Expert perspectives on achieving global sustainability with targeted transformational change

by

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June 2022

A thesis submitted for the degree of Doctor of Philosophy of The Australian National University

Statement of originality

This is to certify that the content of this thesis is my own work. This thesis has not been submitted for any other academic degree. I certify that the intellectual content of this thesis is the product of my own work and that all the assistance received in preparing this thesis and sources have been acknowledged.

Teemu Petteri Koskimäki

“Economists have preached for too long that we should maximize our present gains. It is high time that people realized that the most rational conduct is to minimize regrets.”

~

Nicholas Georgescu-Roegen

1977

Acknowledgments

I want to respectfully acknowledge that my work took place on the ancient Aboriginal Country of the Ngunnawal people. I pay my respects to their Elders past, present and emerging.

I am thankful for my supervisors Ida Kubiszewski, Robert Costanza, and Arto O. Salonen for their guidance, support, encouragement, and insights, which contributed to the success of this research. I am also very grateful for the guidance and support I received from Peter Victor and Alexey A. Voinov in the early stages of my research, and I wish to thank Alice Richardson from the ANU Statistical Support Network for her patient council.

My research would not have been possible without the willingness of scholars to partake in the survey and workshop I organized, so I wish to convey my appreciation of each and every participant for taking the time and sharing their thoughts. I am also thankful of all the positive messages the participants shared with me, which helped me feel connected while otherwise isolated from the scientific community during the pandemic.

I am grateful for my mum and dad for always telling me to use my own brain and to think for myself. Along with my friends and other family members, they provided me with wonderful support and encouragement, from the other side of the planet. My deepest expression of gratitude belongs to my love, Henna Virtanen, who moved with me to Australia from Finland in support of my odyssey to find solutions to global problems through my PhD. Her patient support and love helped me push through the most difficult times, and her feedback also helped improve my work in many respects.

I wish to dedicate this thesis to scholars and activists around the world, young and old, who do not unquestionably accept the status quo but instead seek to change it when it is wrong, who do not give up despite all the incentives and pressures for doing so, and who dare to envision and talk about a better future for all. It is through such activism that my own journey begun 13 years ago, inspiring me to keep asking “why”, but also “why not”. Two people had a particularly decisive role in inspiring me to pursue a career in science, without whom this work would not have happened: Thank you, Peter Joseph, for inspiring change through your influential films and countless lectures, and thank you to the late great Jacque Fresco, for providing an example of someone who saw a better future and never gave up his efforts to bring it forth.

Lastly, my PhD research was funded by Kone Foundation, grant numbers 201804577 & 202101749. Without funding from the Kone Foundation, I could not have afforded a PhD in Australia. Foundations like this play a vital role in encouraging risk-takers and problem solvers. Exploring fundamental issues is not easy and the topics can be controversial. However, foundations encourage bold initiatives and support the freedom of speech and science, for which I am grateful.

KONEEN SÄÄTIÖ

Abstract

To address the increasingly acute global environmental and social problems, transformational change is required to the prevailing socioeconomic systems. However, the transformational change concept has various, even conflicting, interpretations. Some experts support "green" or "sustainable" growth, while a growing number argue instead for a "post-growth" paradigm, particularly for high-income countries, where the environmental and social costs of further consumption growth may outweigh its benefits.

In this dissertation, I examine which future pathways sustainability scholars think different country income groups should follow for the global sustainability transformation to be achieved. First, I review the literature on transformational change and leverage points in order to evaluate how scholars understand transformational change at a conceptual level. Inspired by this, I create a new blueprint for transformational change. Then, I present results from a global expert survey (n=461) which I organised to evaluate expert perspectives on transformational change in different spatiotemporal contexts. Following the survey results, I focus on transformational change in the context of a specific high-income country, Finland, where I organised a Delphi workshop with Finnish sustainability and post-growth experts (n=14), applying a backcasting method.

The thesis findings show support for targeted transformational change to achieve global sustainability. Most of the surveyed scholars were in favour of post-growth pathways for high- and upper-middle-income countries, while green growth was favoured for low- and lower-middle-income countries. As support for post-growth increased from the 2020s to 2030s, support for green growth decreased in all contexts. Specifically, the scholars believed that high-income countries should follow an agrowth path in which countries focus on reducing environmental impacts and improving societal wellbeing regardless of what happens to GDP. The scholars' opinions regarding the future of economic growth varied substantially, and approximately 60 % thought economic growth would eventually end in all groups. However, even among those who supported post-growth pathways, most did not expect growth to end before the 2030s and only around half thought that the end of growth in high-income countries would be the desired and controlled result of purposeful policies. Most scholars thought the end of growth would be unintentional.

Reflecting the global survey results, the workshop panellists also thought that Finland should turn from the prevailing green growth agenda towards an agrowth path. This is partly because the panellists considered agrowth to be more politically realistic as a goal than degrowth, and partly due to indifference toward the GDP indicator. During the workshop, a new narrative vision of a desirable post-growth future was created for Finland. The panellists then suggested a number of practical steps for how to transition to that envisioned future, including how Finnish consumption habits could be influenced and what obstacles might need to be overcome. The biggest obstacle identified was Finland's structural dependence on economic growth, which the panel evaluated to be high. This "societal addiction" to economic growth currently obstructs most countries from following the preferred post-growth pathways. Given the uncertainties of future rates of growth and decoupling, I argue that the risks of this growth addiction are substantial.

Based on the expert perspectives, the main focus of high-income countries should now turn towards overcoming societal growth addictions. My results demonstrate that there exists a high demand for

post-growth solutions and scholars should respond to this demand by focusing more on detailing solutions and less on criticizing the status-quo. New post-growth visions tailored to the context of specific countries need to be created. These further studies could use the approach of my workshop. When guiding the transformation of societies away from growth addiction, my proposed blueprint could be used to demonstrate strategic approaches to transformations. I conclude that while the societal dependence on nature cannot be overcome, our dependence on growth can be. This could help societies achieve important environmental goals and sustainable wellbeing, in time.

Tiivistelmä suomeksi (Summary in Finnish)

Akuutteihin maailmanlaajuisiin yhteiskunnallisiin ja ympäristöllisiin ongelmiin puuttuminen edellyttää transformatiivista muutosta vallitseviin sosioekonomisiin järjestelmiin. Transformatiivisen muutoksen käsitteellä on kuitenkin erilaisia, jopa ristiriitaisia tulkintoja. Jotkut asiantuntijat kannattavat ”vihreää” tai ”kestävää” kasvua, kun taas yhä useammat puoltavat sen sijaan ”kasvun jälkeistä” paradigmaa, erityisesti korkean tulotason maissa, joissa kulutuskasvun ympäristölliset ja sosiaaliset kustannukset voivat ylittää sen hyödyt.

Tässä väitöskirjassa tarkastelen, mitä tulevaisuuden polkuja kestävän kehityksen tutkijoiden mielestä eri maiden tuloryhmien tulisi seurata, jotta globaali kestävyysmurros voitaisiin saavuttaa. Aloitan tekemällä katsauksen transformatiivista muutosta ja muutosvipukohtia (leverage point) käsittelevään kirjallisuuteen, arvioidakseni kuinka tutkijat ymmärtävät transformatiivisen muutoksen käsitteellisellä tasolla. Tämän inspiroimana luon uuden kaavion transformatiiviselle muutokselle. Tämän jälkeen esittelen tuloksia maailmanlaajuisesta asiantuntijakyselystä (n=461), jonka järjestin arvioidakseni asiantuntijoiden näkemyksiä transformatiivisesta muutoksesta erilaisissa spatiotemporaalisissa konteksteissa. Kyselytutkimuksen jälkeen keskityn transformatiiviseen muutokseen tietyn korkean tulotason maan kontekstissa, Suomessa, jossa järjestin Delphi-työpajan suomalaisten kestävän kehityksen ja kasvun jälkeisen talouden asiantuntijoiden kanssa (n=14) backcasting-menetelmää soveltaen.

Väitöskirjan tulokset osoittavat tukea kohdistetulle transformatiiviselle muutokselle globaalin kestävyyden saavuttamiseksi. Suurin osa kyselyyn vastanneista kestävän kehityksen tutkijoista kannatti kasvun jälkeisiä polkuja korkean ja ylemmän keskitulotason maille, kun taas vihreää kasvua suosittiin alhaisen ja alemman keskitulotason maille. Samalla kun tuki kasvun jälkeisestä taloutta kohtaan kasvoi 2020-luvulta 2030-luvulle, vihreän kasvun tuki väheni kaikissa konteksteissa. Tutkijoiden mukaan erityisesti korkean tulotason maiden tulisi seurata kasvuagnostista agrowth polkua, jossa maat keskittyvät ympäristövaikutusten vähentämiseen ja yhteiskunnallisen hyvinvoinnin parantamiseen riippumatta siitä, mitä BKT:lle tapahtuu. Tutkijoiden mielipiteissä talouskasvun tulevaisuuteen liittyen oli huomattavaa vaihtelua ja 60 % ajatteli, että talouskasvu loppuu lopulta kaikissa maatuloluokissa. Tästä huolimatta, edes suurin osa kasvun jälkeisten polkujen kannattajista ei kuitenkaan odottanut kasvun päättyvän ennen 2030-lukua ja vain noin puolet uskoi, että kasvun loppuminen korkean tulotason maissa olisi määrätietoisen politiikan haluttu ja hallittu tulos. Useimmat tutkijat ajattelivat, että kasvun loppuminen olisi tahatonta.

Maailmanlaajuisen kyselytutkimuksen tuloksia heijastellen, työpajan panelistit ajattelivat myös, että Suomen tulisi kääntyä vallitsevasta vihreän kasvun agendasta kohti agrowth-polkua. Tämä johtuu osittain siitä, että panelistit pitivät agrowth-polkua poliittisesti realistisempana tavoitteena kuin degrowth-polkua, ja osittain välinpitämättömyydestä BKT-indikaattoria kohtaan. Työpajan aikana Suomelle luotiin uusi narratiivinen visio mielekkäästä kasvun jälkeisestä tulevaisuudesta. Tämän jälkeen panelistit ehdottivat useita käytännön askelia, joiden avulla visioituun tulevaisuuteen voitaisiin siirtyä, miten suomalaisiin kulutustottumuksiin voitaisiin vaikuttaa ja mitä esteitä tulisi voittaa. Suurimmaksi esteeksi tunnistettiin Suomen rakenteellinen riippuvuus talouskasvusta, jonka paneeli arvioi korkeaksi. Tämä ”yhteiskunnallinen kasvuriippuvuus” estää tällä hetkellä useimpia maita

seuraamasta suositeltuja kasvun jälkeisiä polkuja. Kun otetaan huomioon tulevaisuuden kasvun ja irtikytkennän epävarmuus, väitän kasvuriippuvuuden riskien olevan huomattavia.

Asiantuntijanäkemysten perusteella korkean tulotason maiden huomion tulisi nyt pääasiassa kohdistua yhteiskunnallisten kasvuriippuvuuksien voittamiseen. Tulokseni osoittavat, että kasvun jälkeisille ratkaisuille on olemassa suurta kysyntää. Tutkijoiden tulisi vastata tähän kysyntään keskittymällä enemmän näiden ratkaisujen tarkentamiseen ja vähemmän status quon kritisoimiseen. On luotava uusia kasvun jälkeisiä visioita, räätälöiden ne kunkin maan kontekstiin. Nämä jatkotutkimukset voisivat hyödyntää työpajani lähestymistapaa. Kun yhteiskuntien transformaatiota ohjataan eroon kasvuriippuvuudesta, luomaani transformatiivisen muutoksen kaaviota voisi käyttää havainnollistamaan, kuinka muutoksia voitaisiin lähestyä strategisesti. Johtopäätökseni on, että yhteiskunnan riippuvuutta luonnosta ei voida voittaa, mutta riippuvuutemme kasvusta voidaan. Tämä voisi auttaa yhteiskuntia saavuttamaan tärkeät ympäristötavoitteet ja kestävän hyvinvoinnin, ajoissa.

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Abbreviations

HI	High-income (countries)
UMI	Upper-middle-income (countries)
LMI	Lower-middle-income (countries)
LI	Low-income (countries)
GG	Green growth
PG	Post-growth
DG	Degrowth
AG	Agrowth
TC	Transformational change
SDGs	Sustainable Development Goals
GDP	Gross Domestic Product
CSP	Community Scenario Planning
CE	Common Era
BCE	Before Common Era
UN	United Nations
CBD	Convention on Biological Diversity
GSDR	Global Sustainable Development Report
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
IPCC	Intergovernmental Panel on Climate Change

Chapter 1. Introduction

1.1. Societal dependence on nature

As it stands, humanity is inescapably dependent on the Earth, our evolutionary home (NASA, 2022). The socioeconomic systems which our species has created, in all their complexity, are mere sub-systems which dependent on the larger Earth system (Costanza et al., 2014a). Earth and its diversity of life constitute the economy of nature, as Darwin (1859) often called it, which provides us with resources, waste sinks, and ecosystem services, each with limited rates of renewal (Costanza et al., 2014a; Georgescu-Roegen, 1977). Recognising this dependency, I will hereafter often use the term "socio-ecological system" to emphasise how societies and their economies intertwine with their environments.

However, for a long time humans have largely disregarded their dependency on the rest of nature, placing ever growing pressures on the global environment (Steffen et al., 2007). This perceived human independence began at the onset of the Holocene epoch, around 11,000 years ago, as humans began to settle into agricultural communities, and it was further accelerated by the industrial revolution 200 years ago. It has since become clear that due to the mounting anthropogenic influence, the rest of nature is no longer able to maintain the long-term relative stability that was suitable for the development of human cultures during the Holocene. Humanity has already exceeded some planetary boundaries (Rockström et al., 2009; Steffen et al., 2015) and the Earth system is now on the precipice of exceeding several environmental tipping points (Lenton et al., 2019; Steffen et al., 2018). The fact that many of nature's supporting and regulatory functions have been compromised has led to global climate change (IPCC, 2022) and the sixth mass extinction event in Earth's history (Ceballos et al., 2015). Accordingly, some now argue that since 1950 we have been living in a new epoch, the Anthropocene (Steffen et al., 2018, 2007).

Environmental decline now creates rising risks for businesses in numerous sectors (ultimately all sectors), both directly and through supply chains, with half of the global Gross Domestic Product (GDP; $44 trillion) being threatened by nature loss (World Economic Forum, 2020a). At the same time, various social problems remain to be solved (UN, 2020), including poverty and inequality and the subsequent profound issues they create both within countries and between countries (Wilkinson and Pickett, 2009). The social problems also reduce resilience against future climatic and ecological

impacts, further threatening those already vulnerable and suffering (IPBES, 2019a; IPCC, 2018). The global socio-ecological system has drifted away from its habitable zone, the boundaries of which are defined by the system's ability to provide a secure social foundation without exceeding the ecological ceiling (Raworth, 2017; Rockström et al., 2009).

The monumental and systemic impacts of the great Anthropocene acceleration have been broadly recognised by scientists at least since the 1970s. They have anticipated the global environmental problems and given repeated warnings over the years, calling for action (Meadows et al., 1972; Nobel Prize Summit, 2021; Ripple et al., 2019, 2017; Union of Concerned Scientists, 1992). In response, nations have sought to address the environmental concerns concurrently with addressing issues related to human development, such as poverty and inequality, through the 2000–2015 Millennium Development Goals (UN, 2015a) and their successor the 2030 Agenda for Sustainable Development (UN, 2015b). Despite these efforts, the 2019 Global Sustainable Development Report on the progress towards the Sustainable Development Goals (SDGs) concluded that "the world is not on track for achieving most of the 169 targets that comprise the Goals" (GSDR, 2019). Climate change and biodiversity loss, together with rising inequalities and increasing waste outputs, were identified as issues "with cross-cutting impacts across the entire 2030 Agenda" that nonetheless "are not even moving in the right direction" (GSDR, 2019).

Because the rate of progress has not been sufficient to address the increasingly acute global environmental and social problems, despite decades of efforts, the scientific community and many intergovernmental organisations are now calling for "transformational" or "transformative" change (CBD, 2020; GSDR, 2019; IPBES, 2019a; IPCC, 2018; Ripple et al., 2019, 2017; UN, 2020; Wiedmann et al., 2020), declaring the need for "deep societal transformations" (CBD, 2014) and an "urgent and fundamental departure from business as usual" (IPCC, 2014). However, the transformational change concept has various, even conflicting, interpretations, and two distinctively different approaches exist for achieving it, namely "green growth" and "post-growth".

1.2. Green growth

So far, the predominant solution for addressing the global environmental problems has been to promote "green growth" (GG), which is sometimes called "sustainable economic growth" or "green economy". This approach seeks to decouple economic growth from its environmental and social impacts with efficiency increases and adjustments to the patterns of production and consumption

(Belmonte-Ureña et al., 2021; Hickel and Kallis, 2019; Jackson and Victor, 2019a). According to this approach, consumption growth should continue, but shift towards products and services that are of lower impact and higher value. Growth is assumed to add to human wellbeing, reduce poverty, and facilitate further investments towards the development of green technology, while also enabling sufficient revenue for public spending.

An overlapping concept to GG is the so called "Circular Economy", which has become a highly influential concept in countries' efforts to achieve sustainable development (Belmonte-Ureña et al., 2021; Korhonen et al., 2018). While GG is most often focused on increasing efficiency to reduce carbon emissions, circular economy similarly posits that increased efficiency in resource use, through closed loops instead of the prevailing "extract-produce-use-dump" model, could help diminish societies dependence on virgin resources while reducing waste outputs, thereby bypassing several limits to growth (Belmonte-Ureña et al., 2021; European Commission, 2022; Korhonen et al., 2018).

As the European Commission state on their website, "Managing the life cycle of natural resources, from extraction through the design and manufacture of products, to what is considered as waste is essential to GG and part of developing a resource-efficient, circular economy where nothing is wasted" (European Commission, 2022). Box 1 helps to illustrate how the green growth approach has been assumed in the UN Sustainable Development Goals (SDGs) progress reports and the reports of the Intergovernmental Panel on Climate Change (IPCC), based on how transformational change has been framed in them.

Box 1. Quotes from reports that imply support for transformational change and the green growth approach, based on how the change has been framed in them. Emphasis added.

Intergovernmental Panel on Climate Change (IPCC, 2018)**:**

"Embedded in the goal of limiting warming to 1.5°C is the opportunity for intentional societal transformation".

"Fundamental elements of 1.5°C-related transformation include a *decoupling* of economic growth from energy demand and CO2 emissions".

United Nations, Global Sustainable Development Report (GSDR, 2019)**:**

"Advancing the 2030 Agenda must involve an urgent and intentional transformation of socioenvironmental-economic systems".

"Perpetuating *current modes* of production and consumption, and current levels of inequality threaten the achievement of the entire 2030 Agenda. Urgent transitioning away from *patterns* of economic growth, production and consumption that perpetuate deprivations, generate inequalities, deplete the global environmental commons and threaten irreversible damage is needed".

"All stakeholders should work together to achieve a global *decoupling* of GDP growth from the overuse of environmental resources, with different starting points that require different approaches across rich, middle-income and poor countries."

United Nations, The Sustainable Development Goals Report (UN, 2020)**:**

"The 17 Sustainable Development Goals (SDGs) demand nothing short of a transformation of the financial, economic and political systems that govern our societies today to guarantee the human rights of all".

"Countries now need to operationalize the principles of *sustainable economic growth*".

"Urgent action is needed to decrease our reliance on raw materials and increase recycling and *'circular economy'* approaches to reduce environmental pressure and impact".

1.3. Post-growth

These days there are many scholars who disagree with the idea of GG, arguing that a post-growth approach is needed instead. This is so that unsustainable levels of consumption and production can be scaled back to sustainable levels in an intentional and controlled way, particularly in more developed nations where the costs of growth already outweigh its benefits (e.g., Daly, 2010, 1996; Hickel, 2021a; Hickel and Kallis, 2019; Kubiszewski et al., 2013; The Guardian, 2018; Wiedmann et al., 2020). Recognising the diversity of approaches that seek a world beyond growth, I will use the term "post-growth" (PG) throughout this thesis in a general way to refer to a system in which economic

growth is no longer a necessity and is not prioritised. In a PG system, the economy can decline, remain stable or increase, as long as the changes secure the wellbeing of people without harming nature. The PG approach assumes that with specific policy interventions, wellbeing could be maintained even as the economic scale is reduced within Earth's carrying capacity.

Since PG may be less familiar to many readers than GG, which continues to be more in the mainstream, it is pertinent to introduce PG in more detail. The idea of a PG economy has long roots, extending back to the classical economists of the 19th century. Ever since the ecological declines started to be recognised, some scholars have questioned whether an ever-growing economy is possible in the long run, let alone desirable. John Stuart Mill (1806–1873) was one of the first economists to recognise the need to protect biodiversity against the accelerating economic forces which are turning natural capital into built capital (Costanza et al., 2014a; Mill, 1848). He saw continuous material growth to be impossible in the long run and not an end in itself, envisioning how a steady state would be achieved as economies mature, after which material development would be superseded by mental and social progress, improving the art of living instead of the art of getting on (Mill, 1848). Again in the 1960's, Kenneth Boulding recognised the finiteness of our planet and saw that in future economies, unlike in the past, welfare would no longer depend on increasing material consumption (Costanza et al., 2014a).

Nicholas Georgescu-Roegen also critiqued the "growth mania" in the 1970's, arguing there to be fundamental thermodynamic limits to the economic process (Georgescu-Roegen, 1977, 1971). His insights on the limits regarding the recycling of matter continue to be relevant to today's discussions of circular economy (Georgescu-Roegen, 1977; Korhonen et al., 2018). Influenced by the work of Georgescu-Roegen, the theoretical basis for a steady-state economy was further developed by Herman Daly, who recognised that in a full world, a truly efficient economy would seek to minimize the throughput of matter-energy instead of maximizing consumption (Daly and Cobb, 1989; Daly, 2005, 1996). Together with Robert Costanza, Daly was instrumental in bringing to life the field of Ecological Economics, which sought to increase the overlap between economics and ecology, further developing economics that look beyond growth and focus on sustainable ways to ensure the wellbeing of people and nature (Costanza, 1989; Costanza et al., 2014a; Kubiszewski et al., 2013).

In the 1970's, the notion of planetary limits became a popular topic of discussion after the publication of the bestselling "Limits to Growth" book by Meadows et al. (1972). In the book, the authors presented a system dynamics model which showed that the growth-based business-as-usual (BAU) pathway would lead to a systemic collapse within the 21st century (Herrington, 2021; Meadows et al., 1972). The authors also evaluated various alternative pathways, including options which could be

taken to avert such a future and to transition the world system from growth to equilibrium (Meadows et al., 1972).

As Georgescu-Roegen (1977) observed, “Most economists, however, have always looked upon the advent of a stationary economy with immense disfavour.” Therefore, largely due to the same faith in markets, technology, and human potential to innovate which characterise the GG discourse today, the Limits to Growth book was misunderstood and eventually mostly dismissed by many in the economics and policy circles (Costanza, 1989; Herrington, 2021). In the ensuing debates, Daly noted how economists’ arguments against limits to growth assumed virtually infinite substitutability between different factors of production, disregarding the complementarity of capital stocks and resource flows, as well as the laws of thermodynamics, thus leading economists to neglect the fundamental dependence of economies on the environment (Victor, 2022). Subsequent research has recalibrated the Limits to Growth model with decades worth of additional data, finding that the original scenarios are still broadly on track – the world still seems to be following a pathway that will lead to an unintended slowdown and an eventual halt to economic growth in a decade or so, either due to a pollution caused collapse (e.g., climate change) or due to rising costs of technology, generally in line with some of the original scenarios presented 50 years ago (Herrington, 2021).

The debate over PG resurfaced around 2010, and since then calls for PG approaches have increased as alternatives to the status quo of endless growth. One of these approaches is “degrowth” (DG) (Kallis, 2011; Mastini et al., 2021), which seeks a return back to safe levels of throughput and the establishment of a steady-state economy (Daly, 2010, 1996; Weiss and Cattaneo, 2017). A bibliometric study from 2021 showed that more articles are published on GG annually than on DG, but DG research has been growing at a faster rate than GG research in recent years, while both domains have substantially higher growth rates compared to the average growth of the Scopus database (Belmonte-Ureña et al., 2021). Another emerging PG concept is the growth agnostic “agrowth” (AG) wellbeing economy (Coscieme et al., 2019a; Costanza et al., 2018), which has received favour among several countries through the Wellbeing Economy Governments (WEGo) partnership, which includes Scotland, Wales, Iceland, New Zealand, Finland, and most recently Canada, with many other governments following their lead (WEAll, 2021).

Compared to GG, PG is a more comprehensive approach to change which seeks a paradigm shift into a new type of economy, with different social, economic, and financial dynamics. While increases to eco-efficiency and the circularity of resource use are considered necessary, along with changes to the “patterns” of consumption and production, PG proponents argue that these actions are not alone sufficient and must be combined with intentional reductions to the total levels of consumption and

production, particularly in countries where the costs of growth already outweigh its benefits, i.e., where growth has become uneconomical (Daly and Farley, 2010; Hickel, 2021a). The policies proposed in the PG literature seek to create a sustainable economy where throughput is reduced to a level that is ecologically safe and socially just, and where societies focus on maintaining and improving the wellbeing of people and nature directly, instead of indirectly through aggregate consumption-growth (Costanza, 2020a; Costanza et al., 2017; Raworth, 2017). While GG seeks decoupling between growth and its impacts, PG approaches seek to decouple welfare from economic growth with changes to the prevailing socioeconomic structures.

The PG perspective has recently been present in the reports of the Convention on Biological Diversity, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, and it was also nascently discussed in the latest IPCC report on climate change (Box 2).

Box 2. Quotes from reports that imply support for transformational change and the post-growth approach, based on how the change has been framed in them. Emphasis added.

Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES, 2019a, 2019b)

"Transformative change can be defined as a fundamental, system-wide reorganization across technological, economic and social factors, *including paradigms, goals and values*".

"goals for 2030 and beyond may only be achieved through transformative changes across economic, social, political and technological factors."

"decoupling the idea of a good and meaningful life from *ever-increasing material consumption*".

"Transformations towards sustainability are more likely when efforts are directed at the following key leverage points, where efforts yield exceptionally large effects: (1) visions of a good life; (2) *total consumption* and waste; (3) values and action; (4) inequalities; (5) justice and inclusion in conservation; (6) externalities and *telecouplings*; (7) technology, innovation and investment; and (8) education and knowledge generation and sharing."

Convention on Biological Diversity (CBD, 2020)

"key element in the development of pathways for living in harmony with nature will be the evolution of global financial and economic systems towards a globally sustainable economy, steering away from the current *limited paradigm of economic growth*".

"Lowering *total consumption* and waste is essential to the overall approach of 'bending the curve' of biodiversity loss".

Box continues on the next page.

Box 2. *(Cont.)*

"reducing the drivers of biodiversity loss through reduced *total consumption* and more efficient use of resources, thereby helping to create the conditions that allow biodiversity to continue to provide benefits for people and the planet".

"Exposing and internalizing *hidden externalities* and understanding *tele-coupling* between places and actors that are separated in space is necessary to achieve sustainability in all areas of transition".

Intergovernmental Panel on Climate Change (IPCC, 2022)

"emerging area of literature emphasises the possibility of stabilisation (or even decline) of income levels in developed countries, arguing that such a trend would be preferred or even needed for environmental reasons".

"Such [post-growth] scenarios could result in a dramatic reduction of energy and resource consumption".

"Sufficiency policies are a set of measures and daily practices that avoid demand for energy , materials, land and water while delivering human wellbeing for all within planetary boundaries."

Recently, PG scholars have criticised the IPCC for including continuous growth as an a priori assumption to all of its future scenarios (the Representative Concentration Pathways; RCP) which countries use to plan climate action, arguing that embracing a PG path, specifically in high-income countries, could be a safer, less risky, more just, and a more effective way to reduce emissions (and to make it easier to achieve reductions) while maintaining or improving societal wellbeing, compared to the prevailing BAU or GG pathways pursued by most high-income nations today (Hickel et al., 2021; Keyßer and Lenzen, 2021). Several state-of-the-art ecological macroeconomic simulation studies have also modelled the social, environmental and economic outcomes of various PG and GG scenarios, finding that GG pathways consistently result in insufficient environmental impact reductions, reduced societal wellbeing, or even socioeconomic collapse, while the alternative PG scenarios could help avoid such outcomes (Capellán-Pérez et al., 2020; D'Alessandro et al., 2020; Jackson and Victor, 2020; Nieto et al., 2020).

Despite all the calls for transformational change and the increasingly convincing arguments from PG scholars, there appears to be no consensus among scholars on the desirability and feasibility of the GG and PG pathways, with debate ongoing (Hickel and Hallegatte, 2021). In 2015, Drews and van den Bergh (2017) surveyed economists and environmental scientists to determine support for alternative

pathways, and at that time nearly half of the scholars supported GG for rich industrialised countries, while the other half preferred agrowth or degrowth. However, Hickel and Kallis (2019) have argued that based on A) historical trends of decoupling between economic growth, resource use and carbon emissions, and B) model-based projections of the future rates of decoupling, even under optimistic conditions: "Staying within planetary boundaries may require a de-growth of production and consumption in high-consuming nations and a shift away from the narrow growth-focused development agenda in the global South".

1.4. Research objectives

The main question this dissertation seeks to provide answers to is how sustainability scholars currently see the future, specifically in terms of future pathways and the future of economic growth for different country income groups. I also have a special focus on transformational change in high-income countries, due to their disproportionate global impacts. In evaluating expert perspectives for the future, my chapters will address the following research questions:

1. How is transformational change defined and how could it be achieved? (Chapter 2)
2. What future pathways do sustainability scholars support for different spatiotemporal contexts? (Chapter 4)
3. How do sustainability scholars view the future of economic growth in different country income groups? (Chapter 5)
4. What might a PG economy look like for a specific high-income country? (Chapter 6)
5. How could societal addictions to economic growth be overcome? (Chapter 7)

These are the problems and knowledge gaps I seek to address in this thesis. Understanding the preferences of sustainability scholars is important, as decision makers at various scales and sectors are likely to rely on their guidance during the ongoing system transformations which seek to fulfil the Agenda 2030 commitments for achieving sustainable development. Through the collective knowledge harnessed in this work, we can discern what should be done to address global problems and to achieve global sustainability. Evaluating existing areas of consensus and dissensus helps reveal what future research and discussion needs to focus on.

1.5. Thesis structure

In Chapter 2, I review literature on transformational change and leverage points for change in order to evaluate how scholars understand transformational change at a conceptual level. I focused on the sustainability literature, and ecological economics literatures, and on intergovernmental reports that have addressed global environmental problems. What I found was that scholars use many of the key terms, such as "transformational change", "leverage points" and "drivers" in multiple (even contradicting) ways. I also found that while the underlying causes are often discussed in the ecological economics literature, they are not given sufficient consideration in intergovernmental reports, and they have not been explicitly considered in existing leverage point frameworks. To address these issues, I provide clarified definitions for several terms relevant for the transformational change discourse and create a new blueprint for transformational change that directs focus to the underlying structural causes of undesired system outcomes. I published an open access paper on this chapter in the journal Sustainability in 2021 (Koskimäki, 2021).

In Chapter 3, I detail how I used two approaches to evaluate expert perspectives on what kind of transformations would be needed in different spatiotemporal contexts: a global expert survey and a national scale expert workshop. I organized the global expert survey in July 2021 through the Qualtrics online survey platform, sending invites by email to the corresponding authors of publications addressing the sustainable development goals. The response to the survey was global, with a fairly balanced sample of scholars. With 461 complete responses, the survey had an 8 % response rate. Through the survey I sought to find out what future pathways the experts support for different country income groups in the coming decades for global sustainability to be achieved, what the scholars consider to be the future of economic growth in each group, and how familiar sustainability scholars are with post-growth theory. I used multinomial models, linear mixed-effects models, and factor analysis of mixed data with hierarchical clustering to analyse the data and to determine how differences in the views of scholars can be explained. I present findings from the global survey in chapters 4 and 5.

After the survey, I focused on transformational change in the context of a specific high-income country, Finland. I chose Finland, because it is already a wellbeing focused country that has some of the world's most ambitious environmental goals. Even though the country remains entrenched in the idea of GG, it has started to question overconsumption and the link between economic growth and wellbeing, which makes it an interesting case-study for researching post-growth transformations. To assess expert views on the future of Finland, I organised an asynchronous remote workshop with a

panel of 14 Finnish sustainability and post-growth experts, who I identified through a snowball sampling approach. The month-long workshop took place in November–December 2021 through the eDelphi platform and Zoom. The eDelphi platform allowed the experts to seek consensus on specific issues through rounds of surveys, iterative feedback, and discussion through comment sections. The topics covered in the workshop included future pathways for Finland, future of growth in Finland, Finland's societal dependence on growth, narrative scenario building, and intervention assessment. Once a desirable post-growth scenario for Finland was created, the participants applied the backcasting method to study the possible transition phase, evaluating needed actions and potential obstacles. In a backcasting analysis, the criteria for a desirable future are defined first, and the analysis is concerned with how desirable futures could be achieved, not with what futures are likely to happen based on existing forecast trends. This makes the approach particularly useful for considering transformational change. I present the workshop findings through chapters 6 and 7.

The extent to which BAU, GG, AG, and DG are supported among sustainability scholars today is unknown and may be context dependent. In Chapter 4 I focus on the survey questions which evaluated what future pathways sustainability scholars support, for different country income groups and decades, for global sustainability to be achieved. Most of the surveyed sustainability scholars were in favour of PG pathways (AG or DG) for high- and upper-middle-income countries, while GG was favoured for low- and lower-middle-income countries. As support for PG increased from the 2020s to 2030s, support for GG decreased in all contexts. Based on multinomial models, many variables influenced the pathway choice in a context specific way. For example, those who resided in the lower country income groups were more likely to prefer DG rather than AG for high-income countries in 2020s. I find that sustainability scholars are on average more familiar with GG than PG. Based on these results, transformational change is required everywhere but it must be targeted so that high-income countries focus on implementing PG policies, while efforts and research around GG should mainly focus on lower income countries. Therefore, the most important task for achieving sustainability would be to overcome societal growth addictions in rich countries, so that sufficiently quick environmental and social policies could be implemented regardless of their impact on the Gross Domestic Product (GDP).

To get more detail into what the experts think about the futures of different country income groups, in Chapter 5 I focus on what the surveyed sustainability scholars view to be the future of economic growth in each context. I used linear mixed effects regression models to evaluate what factors influence the desired future GDP rates in the different contexts. I also compared when, if ever, the experts think growth will end in each group, and if the end will be intentional or not. I found that the desired GDP rates varied between country income groups and depended on the preferred future

pathway, but the preferred rates were at or above 0 % irrespective of the context or pathway choice. Most notable was the substantial amount of variation across all contexts. 60 % of the participants thought economic growth would eventually end in all groups, and most thought the end would be unintentional. Overall, economic growth was expected to end sooner in higher and later in lower country income groups. Most scholars see an end to growth occurring in high-income countries in around 10-20 years. This does not necessarily imply reductions to quality of life, however, as 60 % of the participants considered GDP to be a bad indicator of societal wellbeing. By performing a factor analysis of mixed data together with hierarchical clustering I found that the scholars from around the world can be divided into 9 different clusters according to their views on GDP.

In Chapter 6, I focus on PG transformation in the context of a specific high-income country, Finland, presenting results from the Delphi workshop. Reflecting the global survey results, the workshop panellists thought that Finland should focus on increasing societal wellbeing directly while also reducing environmental impacts, regardless of what happens to GDP. During the workshop, a new narrative vision was created along these lines, to evaluate what a desirable post-growth future could look like for Finland. Following a backcasting approach, the panellists then suggested a number of practical steps for how to transition to that envisioned future, how Finnish consumption habits could be influenced, and how to increase the acceptability of the new PG vision among different stakeholder groups. The panel largely agreed that it would be particularly important to include externalities in prices and that consumption-based environmental harm should be accounted for. The least consensus was found on the effects of a monetary reform, favouring cooperatives over for-profit companies, and supporting a sharing economy. To increase acceptability for the new vision, the panel emphasized the need for open and participatory dialogue, for structural and cultural changes, for peer pressure and leading by example, and for altering the prevailing financial incentives and safety nets. I observed differences in the ease of finding consensus among the experts between different PG related questions, and this research can therefore help inform how more inclusive societal deliberations should be approached in the future.

In Chapter 7, I address the main obstacle for PG, societal dependence on economic growth. Costanza et al. (2017) have argued that the existing growth dependence can be called a “societal addiction”, because it provides short-term rewards for society while being detrimental and unsustainable in the long run. I further argue that addiction refers to both a structural reliance and to society’s capacity to change its behaviour. Like with addictions at the individual level, there are several risks associated with the societal addiction to growth. I identify the main risks to include the future uncertainties of GDP growth, caused by secular stagnation, the potential for economic shocks and crises, the uncertain costs of future environmental impacts and mitigation efforts, the increasing requirements of

maintaining exponential growth which can weaken regulation, and the lower quality of life the addiction creates. The uncertainty of future growth rates was particularly striking when I asked the workshop participants to estimate desirable future GDP rates for Finland. The panel concluded that what happens to GDP in the future is uncertain because it depends on various assumptions. Overcoming growth addictions and achieving a PG society would therefore be pertinent whether or not slow growth or DG is inevitable or planned. Most workshop panellists evaluated Finland's growth dependence to be high and expressed several causes for it, including the way tax-revenues are linked to production and consumption, the increasing requirements for public spending and the prevailing ideas regarding the sustainability of public finances. I evaluate these and other causes further. I also discuss how Finland's societal addiction to growth can be seen in its response to the COVID-19 pandemic and how the addiction could be overcome.

In Chapter 8, I discuss the contribution my chapters make to academic knowledge. My findings help demonstrate that discussing PG is a legitimate topic for discussion. Moreover, my findings can also help shift or expand the discourse and policies considered politically acceptable in research and decision making, both internationally and in Finland. The new vision of a post-growth eco-welfare economy created in the workshop can also help inspire change and direct attention to the prevailing growth addiction in Finland. I also discuss how the targeted transformational change perspective could also help enhance the global justice perspective of sustainability. To enable fair and sufficient impact reductions, there is a need to recognise that economic systems should be allowed to change and adapt. Likewise, we should recognise that people's behaviour is influenced by their surroundings and can change towards more sustainable patterns if the structural incentives are altered. Addressing the societal addiction to growth could help expand the available solution space. In this chapter I also consider some overall limitations that should be kept in mind when interpreting the findings. I then discuss how my results can help inform next steps for research. I argue that broader and more inclusive future deliberations are now needed to address the societal growth addictions in high-income countries. These deliberations should seek consensus among scholars from different fields and viewpoints, after which they should be extended to include other societal groups and stakeholders. Including stakeholders to the scenario planning process could help increase acceptance for the proposed changes and new future visions. I recognise ecological macroeconomic modelling as a key area for future research, as such models could be used to test various assumptions and the systemic and long-term outcomes of different policy combinations, thus aiding the formation of consensus on the needed changes and future pathways.

In Chapter 9, I conclude that based on the expert perspectives, achieving global sustainability requires targeted transformational change. In other words, policies in high-income countries will need to

address quite different sustainability challenges than policies in lower country income groups. The main focus of high-income countries should now turn towards overcoming societal growth addictions during the current decade. Approaches to achieve further efficiency need to be combined with approaches that seek sufficiency. Societal transformations in high-income countries must now occur in the shadow of pandemic recovery, war, and ongoing global ecological breakdown, but post-growth policies could help societies respond to all of these crises. Scholars should now focus more on detailing the post-growth solutions and less on criticizing the status quo. When giving advice, they should avoid confrontational methods of communication that are not an effective way to motivate change when it comes to addictions. Combining the societal addictions framing with risk management could be an effective way to influence political debate and policy making. Both the global survey and the workshop concluded that it should not matter what the future of GDP will be. However, I conclude that while growth agnosticism has its benefits, we should not become growth negligent – we must recognize the growth addiction and find cures to it. My thesis can help inform this effort.

Chapter 2. Places to intervene in a socio-ecological system

2.1. Abstract

The scientific community and many intergovernmental organizations are now calling for transformational change to the prevailing socioeconomic systems, to solve global environmental problems, and to achieve sustainable development. I reviewed recent literature on transformational change to evaluate how scholars understand the concept and how such change could be planned and implemented. I found that scholars use many key terms, such as “transformational change”, “leverage points”, and “drivers”, in multiple (even contradicting) ways. I also found that while the underlying causes of unsustainability are often discussed in the literature, they have received insufficient consideration when actions for transformational change have been considered. To address these issues, I provide clarified definitions for several terms relevant for the transformational change discourse and create a new blueprint for transformational change that directs focus to the underlying structural causes of undesired system outcomes. The new blueprint consists of Management strategies and Leverage points (priority points for intervention), which are used to guide Interventions (policies and other actions) that address the Underlying causes, Drivers, Pressures, and Threats, which lead to undesired Socio-ecological outcomes, while accounting for the potential Obstacles for transformational change. I then theoretically demonstrate how the nine phases of the blueprint could be applied to both plan and implement transformational change in a socio-ecological system. Although the blueprint is designed to be applied for socio-ecological systems at national and international scales, it could also be applied to plan and implement transformational change in various sub-systems.

2.2. Introduction

Over the years, scientists have recognized and anticipated the ongoing global environmental problems and given repeated warnings calling for environmental action (Meadows et al., 1972; Nobel Prize Summit, 2021; Ripple et al., 2019, 2017; Union of Concerned Scientists, 1992). In response, nations have sought to address the environmental concerns concurrently with addressing issues related to

human development, such as poverty and inequality, through the 2000–2015 Millennium Development Goals (UN, 2015a) and the successive 2030 Agenda for Sustainable Development (UN, 2015b).

Despite these efforts, the 2019 Global Sustainable Development Report (GSDR) on the progress towards the Sustainable Development Goals (SDGs) concluded that "the world is not on track for achieving most of the 169 targets that comprise the Goals" (GSDR, 2019). Climate change and biodiversity loss, together with rising inequalities and increasing waste outputs, were identified as issues "with cross-cutting impacts across the entire 2030 Agenda" that nonetheless "are not even moving in the right direction" (GSDR, 2019). Consequently, the scientific community and many intergovernmental organizations are now calling for "transformative" or "transformational" change (TC) to solve the pressing global environmental problems and to achieve sustainable development (CBD, 2020; GSDR, 2019; IPBES, 2019a; IPCC, 2018; Ripple et al., 2019, 2017; UN, 2020; Wiedmann et al., 2020),

Not only is it important to recognize the need for TC, but it is also necessary to understand what exactly is meant with the term and how TC in socio-ecological systems could be achieved by utilizing specific points of leverage. TC and leverage points (LP) for transformational system change have been the focus of much research as of late (e.g., Birney, 2021; Chan et al., 2020; Fischer and Riechers, 2019; Leventon et al., 2021; Linnér and Wibeck, 2021), and Chan et al. (2020) have incorporated their version of the LPs in a framework for TC that is currently informing the IPBES (IPBES, 2019c; Pörtner et al., 2021) and the Convention on Biological Diversity (CBD) (CBD, 2020). However, several major issues remain to be addressed. Scholars use the LP and other terms related to TC in multiple contradicting ways (Leventon et al., 2021; Linnér and Wibeck, 2021) and the underlying structural causes of unsustainability have received insufficient consideration in existing frameworks for TC.

In this theoretical work I seek to address these issues with literature-based and logical argumentation, defining key TC terminology and demonstrating how the LP approach could be improved. In section 2.3 I address what TC means and provide a new definition for the term. Then, in section 2.4, I critique existing leverage point frameworks for achieving TC, after which I will integrate a modified list of LPs into an improved blueprint for TC in section 2.5. In this section I also consider how drivers have different levels of directness and how the underlying causes may be identified. In section 2.6 I will give a theoretical demonstration of how the nine phases of the TC blueprint could be applied to plan and implement TC in a socio-ecological system. In section 2.7, I then discuss the findings of this chapter, giving particular focus to the role of values and goals in system change and the potential uses of the new blueprint. In the concluding section 2.8, I emphasize the importance of clearly defining terms

used in sustainability research and the importance of identifying and addressing the underlying causes of systemic problems to achieve true TC, and global sustainability.

2.3. What is transformational change?

In 2015, the 193 countries of the UN General Assembly adopted a new development agenda titled "Transforming our world: the 2030 Agenda for Sustainable Development", which stated that “We are determined to take the bold and transformative steps which are urgently needed to shift the world onto a sustainable and resilient path” (UN, 2015b). However, the concept of “transformation” was not explicitly defined in the agenda. Rather, it seems that the term was used in place of “change” to imply a certain kind of change, something that is not only superficial, but holistic, like the SDGs. The dictionary definition of the word “transform” includes three interpretations: 1) “to change in composition or structure”; 2) “to change the outward form or appearance of”, and 3) “to change in character or condition” (Merriam-Webster, 2016).

In everyday terms, the TC term can seem like a rather strange tautology, given the similarity of the words “transformation” and “change”. However, the distinction is useful because non-transformative incremental changes are also possible. Hence the TC concept is in common use in the field of sustainability science, which often discusses systemic change. The TC term first appeared in published literature in the 1970’s and its occurrence started to increase exponentially in the 2000’s, based on a Scopus search conducted 28 April 2022. Before the year 2000, the concept had been mentioned only 78 times mainly in the fields of business (24 %), social sciences (14 %), medicine (10 %), and psychology (10 %). Since the year 2000, there have been 3,094 mentions, particularly in the fields of social sciences (28 %) and environmental science (13 %), but the term has also continued to be prevalent in the fields of business (9 %) and medicine (9 %). The journal with the most publications using the terms “transformative change” or “transformational change” today is Sustainability Switzerland (57 documents), and the use of these terms has also increased in the journal Sustainability Science (24 documents). Although “transformative” is slightly more common than “transformational” in the literature, I use the two words interchangeably.

Early on, Kindler (1979) defined TC as “a variation in kind that involves reconceptualization and discontinuity from the initial system”, contrasting it to incremental change which he described as “a variation in degree”. He described TC as a departure from tradition which requires more time and energy, while also involving more risks, stating that “This higher investment and vulnerability may be

justified when: (1) incremental change fails to yield an acceptable level of improvement; (2) discontinuities appear in the nature of the problem or in available means for dealing with it; or (3) the focal problem is so important that both strategies warrant examination" (Kindler, 1979). All three of these points clearly apply to the ongoing sustainability related challenges.

Another useful definition has been provided more recently by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), who called for TC in the Global Assessment Report on Biodiversity and Ecosystem Services, writing that "Goals for conserving and sustainably using nature and achieving sustainability cannot be met by current trajectories, and goals for 2030 and beyond may only be achieved through transformative changes across economic, social, political and technological factors" (IPBES, 2019a). The report defined TC as "A fundamental, system-wide reorganization across technological, economic and social factors, including paradigms, goals and values" (IPBES, 2019a). The IPBES also argued that "current structures often inhibit sustainable development and actually represent the indirect drivers of biodiversity loss" which is why "fundamental, structural change is called for" (IPBES, 2019a). In this context, "structural" refers to the organisation of system parts, processes, and rules, not to the sectoral composition of economies. This is also what the word "structural" refers to in the work at hand.

Building on these definitions, and following the dictionary definition of the word "transform" (Merriam-Webster, 2016), I offer the following new definition: TC refers to a fundamental and comprehensive structural change that influences the components and functions of a system, thereby changing its emergent outcomes. The components and functions that affect system outcomes include all technological, economic, and social factors (including values and goals). Therefore, TC can be understood as change that influences the system composition or structure, which then changes the character and condition of the system, which in turn changes its outcomes and outward appearance. This helps complement the IPBES definition, which lacked such causality. The new definition is also compatible with the observations of Kindler (1979), with the changing emergent outcomes indicating a discontinuity from the initial system. The definition also remains abstract in the sense that it could be applied to describe TC in any system.

2.4. Leverage points for transformational change

Defining the concept of transformation is only the first step in understanding TC. Next, I will focus on how TC could be facilitated through the use of leverage point (LP) frameworks for system change. An influential (and, to the best of my knowledge, the first) leverage point framework was created in 1999

by Donella Meadows (one of the creators of the World3 system dynamics model which was presented in the famous Limits to Growth book), who defined LPs as "places within a complex system (a corporation, an economy, a living body, a city, an ecosystem) where a small shift in one thing can produce big changes in everything" (Meadows, 1999). With her framework, Meadows focused on all systems at an abstract level, identifying common shared properties that could be used to change the dynamics or outcomes of a system, and ranking these properties based on their potential power over the system.

Another influential development was made by Chan et al. in 2020, who were inspired by the LPs defined by Meadows but considered them to be ill-suited for addressing complex global socio-ecological system change that has multiple contesting purposes (Chan et al., 2020; IPBES, 2019a). Instead, through a process of iterative expert deliberation, the authors identified eight LPs for societal transformation, which they defined as places "where to intervene to change social–ecological systems", and five levers, which they defined as "the means of realizing these changes, such as governance approaches and interventions", for implementing TC (Chan et al., 2020). Table 1 presents a comparison of the items identified by Meadows and Chan et al.

Table 1. A comparison between the leverage points identified by Meadows (1999) and the levers and leverage points identified by Chan et al. (2020). Leverage points: Priority points for intervention. Levers: Management interventions. The leverage points of Meadows are presented here in order of decreasing importance.

Meadows (1999)	**Chan et al. (2020)**
Leverage points	**Leverage points**
1. The power to transcend paradigms 2. The mindset or paradigm out of which the system—its goals, structure, rules, delays, parameters—arises 3. The goals of the system 4. The power to add, change, evolve, or self-organize system structure 5. The rules of the system (such as incentives, punishments, constraints) 6. The structure of information flows (who does and does not have access to what kinds of information)	1. Visions of a good life 2. Total consumption and waste 3. Latent values of responsibility 4. Inequalities 5. Justice and inclusion in conservation 6. Externalities from trade and other telecouplings 7. Responsible technology, innovation and investment 8. Education and knowledge generation and sharing

Table continues on the next page.

Table 1. *(Cont.)*

Meadows (1999)	**Chan et al. (2020)**
7. The gain around driving positive feedback loops 8. The strength of negative feedback loops, relative to the impacts they are trying to correct against 9. The lengths of delays, relative to the rate of system change 10. The structure of material stocks and flows (such as transport networks, population age structures) 11. The sizes of buffers and other stabilizing stocks, relative to their flows. 12. Constants, parameters, numbers (such as subsidies, taxes, standards)	**Levers** A. Incentives and capacity building B. Coordination across sectors and jurisdictions C. Pre-emptive action D. Adaptive decision-making E. Environmental law and implementation

Being a part of the influential IPBES report (IPBES, 2019c), the framework of Chan et al. was also embraced by the CBD, whose Global Biodiversity Outlook 5 report stated that these levers and LPs "may be targeted by leaders in government, business, civil society and academia to spark transformative changes towards a more just and sustainable world" (CBD, 2020). More recently still, the framework of Chan et al. was also used in the IPBES-IPCC co-sponsored workshop report on biodiversity and climate change (Pörtner et al., 2021).

Chan et al. referred to their work as a "framework of interventions" (Chan et al., 2020), and as such it has value. The authors detailed several areas where TC is needed, what actions could be taken to address specific problems, and they gave evidence-based guidance for decision makers on how these practices should be implemented (Chan et al., 2020). My point of contest is with none of the above, but specifically with the way the LP term was used, and how the provided TC framework placed too much emphasis on values and gave too little consideration for other underlying structural causes of unsustainability in the socio-ecological system. The rest of this paper seeks to demonstrate why these issues should be addressed and how, starting with the LPs.

2.4.1. Clarifying the leverage points

Whereas the LPs of Meadows (1999) were intentionally so broad that they could be applied to any social system at any scale, Chan et al. focused their LPs on the socio-ecological system primarily at the global to national scale (Chan et al., 2020). However, unlike with the list of Meadows, most of the LPs listed by Chan et al. are not points of leverage that address the properties (components or processes) of the system, but instead they list some of the important outcomes of the system and areas where TC interventions are needed. For example, "total material consumption and waste" does not directly identify anything about the system itself that would need to change, or any specific actions. Instead, it implies that something needs to happen to reinforce and enable controlled changes to the levels of consumption and waste. Although Chan et al. accurately argue that total volumes of consumption and production must decrease among the wealthier countries and economic classes and increase among the more disadvantaged (Chan et al., 2020; Hickel and Kallis, 2019; Keyßer and Lenzen, 2021), they specified no actions or processes that could allow these changes to take place, beyond changes in values.

I have chosen to focus on the work of Chan et al., but they are by no means alone in misusing the LP term. In a recent special issue on "Leverage Points for Sustainability Transformations", Leventon et al. (2021) confirmed that authors use the term in multiple contradicting ways, writing: "It is evident through this collection that the papers do not always agree with how systems are (or should be) framed, nor use the same terminology to describe the fundamental components of the leverage points framework: the system, the lever, the leverage points, the interventions, etc. What is a leverage point for one author, is a system or an intervention for another". It is my view that this creates unnecessary confusion, which not only reduces the quality of the science, but that can also lead to adverse real-world consequences when the "LPs" are used to guide decision makers.

Meadows defined LPs as places "where a small shift in one thing can produce big changes" in the whole system (Meadows, 1999). Similarly, Chan et al. defined LPs as priority points for intervention, "where to intervene to change social–ecological systems" (Chan et al., 2020), and recently Linnér and Wibeck proposed to define LPs as "The part of the system that can be influenced for a proportionally greater effect on the whole system" (Linnér and Wibeck, 2021). However, these broad definitions may not be clear enough. When taken out of context, they can be interpreted as referring to anything small that can change something big. This is surely not what Meadows meant, which is why she defined the 12 specific LPs (Table 1). Authors should therefore always seek to refer to these 12 points, not just the

overall definition. Furthermore, an intervention is not a LP. An intervention can tap into a LP when that intervention influences one or more of the specific system properties (LPs).

With the goal of clarifying this concept, I have rephrased the broad definition for LPs to the following form: LPs are key system properties where focused interventions can give rise to large changes in the behaviour of a system. Here, the "key system properties" refer to the 12 points of (Meadows, 1999). A LP perspective can help understand how to create fundamental systems change towards sustainability (Leventon et al., 2021), but only when that perspective correctly interprets what LPs are and what they are not, i.e., when the term is clearly defined and used. Defining terms clearly and using them consistently is what allows scientists to communicate effectively, within and outside academia. Using the LP term without defining it, or having multiple conflicting definitions for it, leads to problems. There is even a danger of turning a useful term into a buzzword devoid of any functional meaning.

2.4.2. Applying leverage points for transformational socio-ecological change

Chan et al. (2020) decided to diverge from the LP typology of Meadows (1999), because they deemed her typology to be ill suited to the context of complex global socio-ecological systems. However, in the following paragraphs I show how the earlier typology of Meadows (1999) not only can be used for this purpose, but also that applying it can reveal many valuable points and insights that were missing from the newer framework.

When comparing the framework of Chan et al. (2020) to the LPs of Meadows (1999), it seems that only two or three actual points of leverage are addressed by the newer framework of Chan et al. Firstly, "visions of a good life" can be seen to correspond to the paradigm shift in values that Meadows had high in her list (Table 1). Since societies have emerged from the interactions of minds, with each other and with the external world, and continue to be maintained by these minds, envisioning a new paradigm that facilitates the achievement of a good life in a new way can be a powerful factor in enabling socioeconomic changes that lead to justice and inclusion, changes in the levels of total material consumption and waste, reduced inequalities, and so forth. Secondly, "education and knowledge generation and sharing" is important in changing the minds of people and thus shifting shared societal goals towards achieving the new paradigm. These two LPs of Chan et al. address the first two LPs of Meadows. Third, the call to "unleash latent capabilities and relational values" may be interpreted as an inference to enabling a positive feedback loop that supports TC.

The highest of the unaddressed LPs was the goals of the system (LP 3 of Meadows). System goals are different from the shared societal goals, in that they emerge from the incentive structure of the system, not from the will (or values) of people – the two can conflict. To understand the structural incentives, it is important to identify the underlying structural causes that reinforce harmful or restrict beneficial behaviours within the system. Addressing such structural constraints is crucial for being able to utilize the other points of leverage covered by Meadows, such as applying critical changes to key parameters like taxes, subsidies, other policies, and the rules of the system. Key parameters are those that can influence the underlying structures and mechanisms, and critical means changes that surpass the normal range of variation for the parameter values, going beyond the status quo and leading to large changes in the whole system (Meadows, 1999).

The points of Chan et al. (Table 1) can be seen as identifying some of the important areas such critical changes should seek to address. For example, "Externalities from trade and other telecouplings" can be addressed by implementing new negative feedback loops (LP 8 of Meadows), such as strong enough ("critical") cap-auction-trade systems for environmentally harmful inputs and outputs to help internalize externalities (Costanza et al., 2014a; Daly, 2010), and by adding new rules or changing existing parameters (LPs 5 and 12 of Meadows), such as ecological tariffs that influence trade (Costanza et al., 2014a; Daly, 2010). Adding missing negative feedback loops helps balance the system into a new, more sustainable, state.

Restructuring or improving the information flows can also be relevant for transforming complex global socio-ecological systems (LP 6 of Meadows). Restructuring information flows means increasing information availability where it is relevant for the wellbeing of people and nature, to strengthen feedback, accountability, and public engagement. As Meadows identified, "Missing feedback is one of the most common causes of system malfunction" (Meadows, 1999). Due to it being relatively cheap and easy compared to other LPs, restructuring information flows should be combined with the other interventions early on in the transformation (Meadows, 1999). However, information alone is not enough unless it can affect influential feedback loops. For example, every year societies are reminded earlier and earlier about the Earth Overshoot Day but this has no visible impact on the system functions, because the adaptive and correcting mechanisms of the prevailing system structure are too weak compared to the strong self-reinforcing feedbacks that maintain the prevailing harmful behaviour.

The critical changes to key parameters and rules, implementation of new negative feedback loops, and information sharing can be supported by recognizing and targeting existing positive feedback loops in the system that act to reinforce old unsustainable patterns, which can create obstacles to

change. One example of such is the positive “success to the successful” loop (Meadows, 1999) which can lead to inequality and regulatory capture. With regulatory capture, agencies that should regulate the market become dominated by the industries they are supposed to regulate, with lobbying being one of the most visible manifestations of this process (IPBES, 2019a; Oxfam, 2017; Wiedmann et al., 2020). This creation and empowerment of vested interests (IPBES, 2019b; Oxfam, 2017) is just one way the system reinforces itself and creates resilience against change.

Even more common is the resistance of ordinary people to change, owing to how their livelihoods often are tied to the old unsustainable patterns, which creates a positive feedback loop where outdated structures support the short-term security and gain of individuals, who therefore wish to maintain the old structures. This discrepancy between long-term interests at the societal level and the short-term rewards at the individual level has long been recognized as a “social trap” (Beddoe et al., 2009; Costanza, 1987; Platt, 1973). In addition to material needs, the psychological needs and worldviews of people and businesses are also tied to the status quo, which has created a “social logic of consumerism” and materialism (Jackson, 2009). Such worldviews may be deeply held, as they can help provide meaning to life and protect people from uncertainty, which can make one feel exposed and vulnerable (Kindler, 1979). Not all positive feedback loops are harmful, however. They can also be strategically utilized, as Chan et al. (2020) recognized, by creating new feedback loops that reinforce new sustainable patterns (LP 7 of Meadows).

Addressing stocks and flows, such as infrastructure and networks, is also relevant when seeking changes to the socio-ecological system (LP 10 of Meadows). Likewise, it is important to ensure that the size of stabilizing buffers is sufficient (LP 11 of Meadows), such as the extent and capacity of social security to abate the impacts of TC on employment and livelihoods. Accounting for the length of delays relative to the rate of system change (LP 9 of Meadows) can also help prevent over- and understeering TC (Meadows, 1999).

Changing the underlying structures (LP 4 of Meadows) with the help of higher order LPs is required to implement changes through the other LPs, which relate to system feedbacks, rules, stocks, buffers, and so on, and to align the goals of the system with the new societal goals. Such fundamental TC also provides an opportunity to add self-organizational capacity to the system that allows the system to adapt and evolve, increasing resilience and facilitating sustainable development in the long-term (Meadows, 1999). After a systemic and structural transformation, the policies that influence the levels of stocks, flows, constants, and (other) parameters can be optimized to increase socio-ecological-economic fairness and efficiency.

2.4.3. Summarizing and focusing the leverage points

To provide a clear list of LPs that could be specifically used to guide transformational socio-ecological change in the context of complex international and national socio-ecological systems, I have reorganized and reduced Meadow's list of twelve LPs to the following five, based on the above discussion:

1. Societal goals – To lead and motivate transformation;
2. Structural goals – To address the underlying causes of problems;
3. Key parameters – To redirect the whole system with critical changes;
4. Information flows and feedback loops – To facilitate change and help overcome obstacles;
5. Flows, constants, and other parameters – To optimize a transformed system.

These are the places to intervene in a socio-ecological system to achieve TC. The LPs are presented in order of decreasing importance, but it must be emphasized that this ranking is based on their relative power over the system, not the sequence in which the points must be utilized. In fact, change makers may not have access to the higher LPs like structural goals right away, which is why they might have to start with information sharing and feedback loops first, thereby influencing key parameters and societal goals. After a sufficient demand (critical mass) is created, the structural goals can finally be addressed, which ultimately determine the system outcomes. As Fischer and Riechers (2019) have emphasized, LPs can interact with each other, and sometimes deeper changes are needed for less powerful actions to work, whereas other times shallower changes can be used to pave the way for deeper changes.

2.5. Frameworks for transformational change

As a part of the Global Assessment Report on Biodiversity and Ecosystem Services (IPBES, 2019c), Chan et al. (2020) utilized their list of LPs to create an iterative framework for achieving TC (Figure 1). In it, they classified drivers of environmental problems and recognized various interventions and decision-making approaches that could be utilized to transform the socio-ecological system into one that is sustainable. The way Chan et al. visualized TC as an iterative process of interventions is valuable, as it demonstrates the dynamic and interlinked process of socio-ecological change (Figure 1). Importantly, Chan et al. also correctly identified that to achieve TC, focus should be expanded from direct drivers to indirect drivers (Chan et al., 2020).

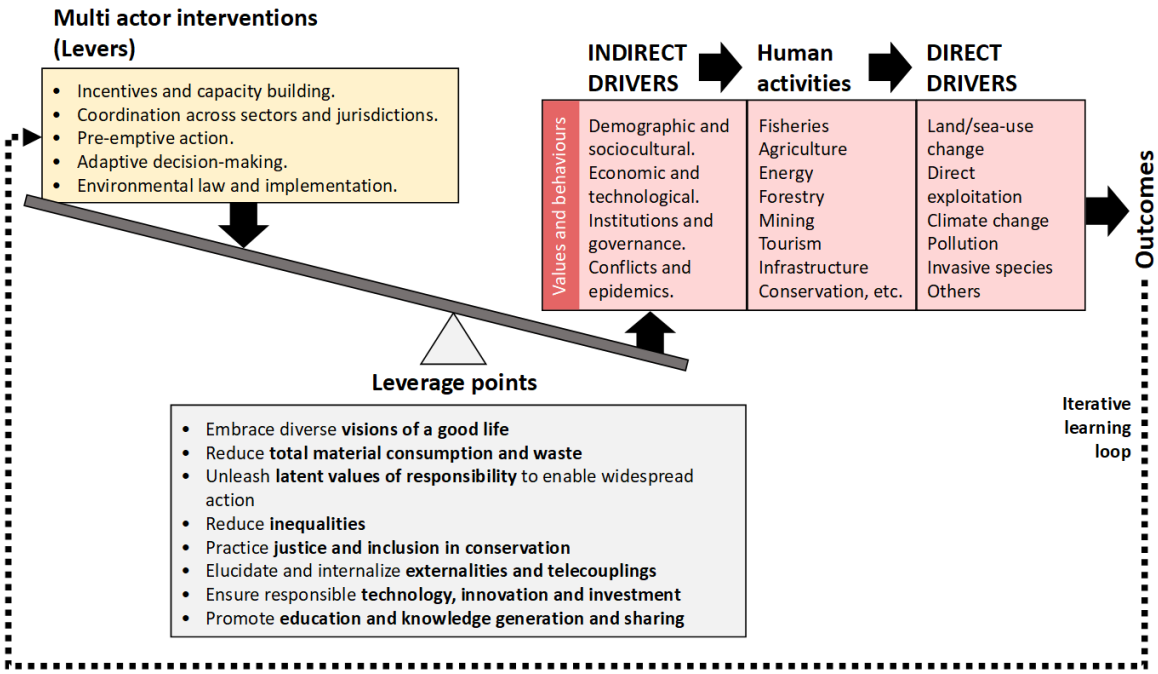

Figure 1. The transformational change framework of Chan et al. (2020) and IPBES (2019). Everything else follows Chan et al. except the box with drivers and human activities, as this part included more details in the earlier version (IPBES, 2019c). Besides adding the word "Outcomes", which was signified with an illustration in the original figures, the text has not been altered in any way and has the original emphasis. Chan et al. explained the emphasis in the leverage point box by writing that "At the leverage points (bolded), we have specified actions consistent with transformative change to sustainability (unbolded)". I have simplified the figure style to facilitate comparisons with Figure 2.

This important and influential framework of Chan et al. (2020) could be improved by adding in the missing LPs of Meadows and by clarifying the terminology in two ways: First, by making a clear separation between outcomes, specific interventions, and LPs, and second, by not calling the interventions "LPs", as argued in the previous section. Other shortcomings can also be identified: The framework lacks sufficient consideration for the underlying causes of global environmental problems, and it does not consider potential obstacles for TC. Lastly, the terms used in each step of the framework have not been clearly defined.

In this section, I address the needed improvements by creating a new version of the earlier framework (Chan et al., 2020; IPBES, 2019c). With this new "TC blueprint" (Figure 2), I add focus on the structural underlying causes of problems and the obstacles to change, beyond simply "values and behaviours". In addition to clarifying the structure and terminology, I also increase the applicability of the framework by dividing it into nine distinct and clearly defined phases, which are generalized enough to be applicable to any socio-ecological system in any context and at different scales.

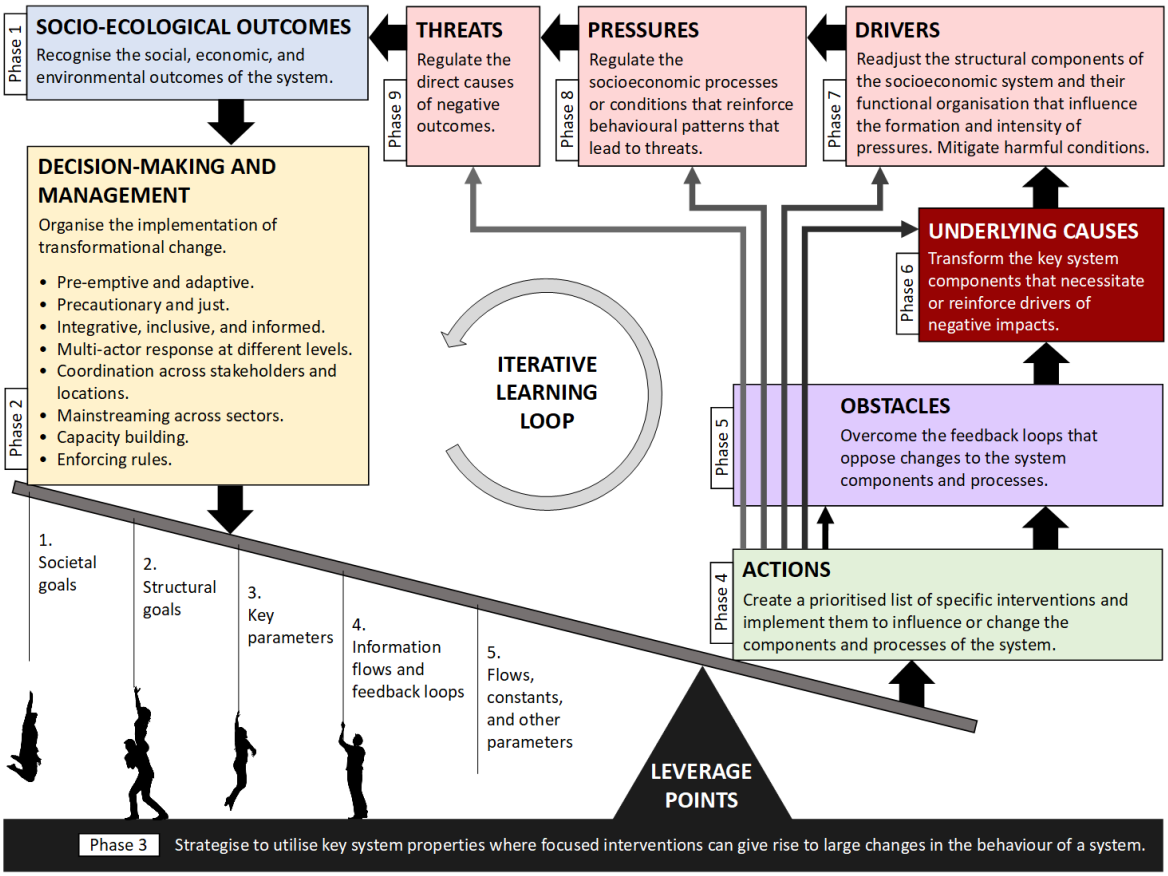

Figure 2. My new blueprint for transformational change. The nine phases guide the implementation (counterclockwise) or planning (clockwise) of directed and effective change to socio-ecological systems, using leverage points and addressing the underlying structural causes that can restrict system outcomes. Table 2 and Table 3 provide definitions for the terms used in this blueprint.

The benefit of this new blueprint is that it clearly separates LPs from decision-making and actions, while also clearly categorizing and defining direct and indirect causes into threats, pressures, drivers, and the key underlying causes of problems. This schematic also helps visualize how "leveraging" change is not just a simple linear process. Instead, the process of this blueprint, with iterative feedback, helps account for irregularities, feedbacks, and other complex interactions of non-linear socio-ecological systems (Linnér and Wibeck, 2021).

Comparing my blueprint (Figure 2) to the framework of Chan et al. (Figure 1), the general order in which stakeholders and decision makers use LPs to implement actions that influence indirect and direct causes of problems remains, as does the feedback between system outcomes and management (the "iterative learning loop"). However, this new blueprint is divided into nine specific phases, and the terminology is clarified in several respects compared to the earlier framework.

Firstly, I have included the list of five LPs summarizing Meadows's LP typology, and these are separated from interventions (phase 4) and outcomes (phase 1). I abstain from using the word "lever" alongside LPs in an effort to avoid unnecessary confusion arising from the similarity of the terms and their overlapping meanings in the English language. Instead, the five levers of Chan et al. are included in phase 2, "decision making and management".

Whereas Chan et al. used "multi actor interventions" as another way to refer to their levers, in this new blueprint the word "intervention" refers only to actions, not decision-making and management (phase 2). Phase 2 is meant to organize the overall implementation of TC, whereas the actions (phase 4) specify the needed interventions that utilize the LPs of phase 3 to target phases 5-9.

When applying my blueprint in practice to a specific socio-ecological system, the needed interventions would be listed in the "Actions" phase, and the "LPs" of (Chan et al., 2020) could be used to identify and categories important areas where actions are needed. Following the system dynamics terminology, in phase 3 I use the term "flows" to refer to the movement of matter, energy, or information through the system. "Constants" refer to variables that are set to some value and remain the same throughout time, whereas "parameters" are variables that can be altered or fine-tuned to guide the system behaviour, such as subsidies, taxes, standards, and rules (Meadows, 1999).

2.5.1. From drivers to underlying causes

Importantly, with this new blueprint I provide separate definitions for threats, pressures, drivers, and underlying causes (Table 2). In several previous studies the word "driver" has been used both in the context of direct and indirect influences (Chan et al., 2020; IPBES, 2019c; WWF, 2020). While not strictly incorrect, it is better to clearly differentiate between the different levels of directness, because that can help reveal causalities and prioritize actions. In my blueprint, underlying causes are the most indirect, followed by drivers and then pressures, whereas threats are the only direct influences. The threats could also be referred to as direct drivers, as the prior studies have done, but this can create unnecessary confusion which should be avoided as the blueprint is meant to guide not only academics, but also decision makers, who in turn may use it when communicating with the general public.

Table 2. Clarified terminology for transformational change. The phases refer to Figure 2.

Phase	Term	Definition
-	Transformational change	A fundamental and comprehensive structural change that influences the components and functions of a system, thereby changing its emergent outcomes.
1	Socio-ecological outcomes	Social, economic, and environmental outcomes of the system.
2	Decision-making and management	Organization of the implementation of transformational change in a way that seeks to ensure sustainable and desirable outcomes for the socio-ecological system.
3	Leverage points	Key system properties where focused interventions can give rise to large changes in the behaviour of a system.
4	Actions	Specific interventions that influence or change the feedbacks, components, or processes of the system.
5	Obstacles	Feedback loops that oppose changes to the system components and processes.
6	Underlying causes	Key functions of specific structural components of the socioeconomic system that either cause drivers to lead to negative outcomes or that impede the operation of balancing feedback loops. I use the word “structural” to refer to the organization of system parts, processes, and rules, not to the sectoral composition of economies.
7	Drivers	The structural components of the socioeconomic system and their functional organization that influence the formation and intensity of pressures. Also, conditions (system dynamics) that restrict capacity for action.
8	Pressures	Socioeconomic processes or conditions that reinforce behavioural patterns that lead to direct threats.
9	Threats	Direct causes of negative outcomes.

Previous research has identified several (indirect) drivers for global environmental problems. For example, the IPBES report listed the following: demographic and sociocultural, economic and technological, institutions and governance, and conflicts and epidemics (IPBES, 2019c). The WWF has similarly identified consumption, economics, institutions, governance, conflicts, technology, demographics, and epidemics as drivers, stating that “In the last 50 years our world has been transformed by an explosion in global trade, consumption and human population growth, as well as an enormous move towards urbanization. These underlying trends are driving the unrelenting

destruction of nature" (WWF, 2020). The formation and intensity of pressures, such as agricultural expansion and the use of non-renewable forms of energy, are influenced by these drivers.

The common characteristic of drivers is that they identify structural and functional properties of the socio-ecological system that can create harmful outcomes to people and nature. Or more specifically, how the structural components of the socioeconomic system (e.g., people, businesses, governments) and their functional organization (interactions through institutions, patterns and levels of consumption, etc.) influence the formation and intensity of pressures. This includes conflicts and epidemics, although they could be seen as exceptional larger order system dynamics that only intermittently constrain the capacity of societies to work towards sustainability, albeit often severely.

So far, there has been little focus on the relative importance of the drivers, and even less on finding what structural components of the socioeconomic system cause drivers to lead to negative outcomes in the first place. For example, what causes consumption levels to exceed the limits of social and ecological sustainability? Why do governments subsidize harmful practices? Why is economic growth needed? Why does the global population keep growing? Why is technology used to exploit instead of regenerate? Instead of seeking structural answers for questions like these, studies tend to attribute some drivers, such as consumption, technology, or population growth, as the underlying causes, while explaining that the ultimate cause for them all is simply "values and behaviours" (Chan et al., 2020; Díaz et al., 2019; IPBES, 2019c, 2019a; WWF, 2020) (Figure 1). The confusing of LPs with system outcomes or specific interventions may have contributed to this insufficient consideration of the structural underlying causes in prior research.

By placing values and behaviours before drivers, the previous studies have inadvertently overlooked the importance of identifying what the key underlying structural causes are. Focusing on values and behaviours as the ultimate drivers of environmental problems can also have the effect of directing blame towards individual choice and away from structural realities (Arponen, 2014), although problems such as overconsumption are driven by both outdated worldviews and structural requirements and reinforcements (Jackson, 2009; Jackson and Victor, 2011). Considering the structural and underlying causes helps direct focus to the context in which behaviours occur.

By iteratively asking "why" the important indirect drivers exist and "what" causes them to lead to harmful outcomes, it is possible to identify and define a set of key underlying causes behind socio-ecological unsustainability. Although such considerations have been insufficiently addressed in intergovernmental reports until very recently (Chapter 1), the ecological economics literature has actively discussed the underlying causes for decades (Costanza, 1989, 1987; Daly, 2005; Victor, 2022). For example, the structural reliance or "societal addiction" (Costanza et al., 2017; Richters and

Siemoneit, 2019) to economic growth has been identified as an underlying cause that not only maintains harmful behavioural reinforcements and restricts the available solution space, but also prevents the application of critical policy changes that would internalize externalities and correct telecouplings (Daly, 2010; Díaz et al., 2019; Dorninger et al., 2021; Jackson, 2009; Richters and Siemoneit, 2019). Similarly, the reliance of countries on international trade has been recognized as an underlying cause that drives down ecological and social standards, creates global inequality, and prevents countries from acting on sustainability (Dorninger et al., 2021; GSDR, 2019). It is due to the amplifying influence of these and other specific underlying causes that drivers like governance failures, overconsumption, and population growth occur and lead to harmful outcomes.

In my blueprint, underlying causes influence drivers, which create pressures, which in turn create direct threats (Figure 2). Furthermore, obstacles can exist that interfere with any action, regardless of what kind of "driver" the actions are directed to address (Figure 2). These are sometimes called "barriers" to change, but I have opted to use "obstacles" instead, which connotates more with something that can be overcome, even if it interferes with or slows down progress.

2.5.2. Decision-making and management terminology

The items of phase 2 (decision-making and management) seek to aid decision makers and managers to organize the implementation of actions in a way that considers LPs and allows iterative TC to take place. All of these items directly correspond to those addressed and detailed in the IPBES report (IPBES, 2019c, 2019a), although not all of them were included into the earlier figures (Figure 1). With my definitions (Table 3), and the new organization in the blueprint, I have merely sought to provide clarity to the points of this phase, to facilitate their implementation as best practice guidelines if the blueprint is used for planning and implementing TC.

Table 3. Decision-making and management (phase 2) terms from the IPBES report (IPBES, 2019c, 2019a), with new clarified definitions and reasoning.

Term	Definition / Reasoning
Pre-emptive and adaptive	The potential outcomes of the planned changes are evaluated in advance and the actual outcomes are used to inform consequent actions.
Precautionary and just	Precautionary means that decisions are reviewed and made with caution, avoiding unnecessary risks, so as not to carelessly apply new innovations that may prove harmful in the long-term. Just means conforming to a standard of morality and correctness as defined by the group applying the blueprint (such as a nation).
Integrative, inclusive, and informed	Decision making that is integrative and inclusive takes into consideration different perspectives and allows everyone to contribute to TC. Informed means decision making considers the latest scientific knowledge of various disciplines and follows the best available multidisciplinary advice.
Multi-actor response at different levels	TC can be planned and applied by individuals, businesses, NGOs, governments, and other groups, each strengthening the overall societal effort to transform.
Coordination across stakeholders and locations	Response can be more effective when people and areas work together under shared overall goals.
Mainstreaming across sectors	Different governmental, societal, and economic subdivisions all integrate the same goals or practices of transformation into their agendas.
Capacity building	Allows more to be done while performing at a greater efficiency. A process that retains or improves the human, social, built, and natural capital that are needed to competently achieve needed changes.
Enforcing rules	The creation, modification, and implementation of laws, policies, and other guidelines, that are needed to change the behaviour of systems and people.

2.6. Applying the new blueprint

In theory, the nine phases of the blueprint could be applied to both plan and implement the transformational change of a socio-ecological system. Going through the nine phases of my blueprint, first the negative outcomes of the system are recognized in phase 1, which leads to a collective envisioning of new desired outcomes and an organization of a response in phase 2. Phase 2 is when the implementation of transformational change is planned and organized.

In this planning phase, the blueprint is applied clockwise to determine what directly threatens (phase 9) the desired outcomes, what pressures (phase 8) lead to the threats, what drivers (phase 7) cause the pressures, what ultimate and specific underlying causes (phase 6) cause the drivers to lead to pressures, and what specific actions (phase 4) would be needed to address the problems at each level, taking advantage of the LPs (phase 3). Then, potential obstacles (phase 5) are identified for each specified intervention, and actions are prioritized to address the obstacles first. When planning TC, my blueprint could also be used as a part of a backcasting scenario building approach. In backcasting, criteria for a desirable future are defined first, after which a feasible and logical path is built from that future state to the present, which can help create alternatives otherwise not available through the forecasting of prevailing trends (Dreborg, 1996; Neuvonen et al., 2014). This makes backcasting particularly useful for considering how TC could be achieved (Dreborg, 1996).

When it comes time to implement the blueprint in practice, it is applied counterclockwise so that the recognised system outcomes (phase 1) are used to justify and motivate the creation of new societal goals (phases 2 and 3), and the implementation of critical transformational actions (phase 4). First, the actions seek to overcome obstacles (phase 5) and fix the underlying root causes of problems (phase 6) that reinforce existing social traps (Costanza, 1987; Costanza et al., 2017) and necessitate behaviours that lead to the negative outcomes. Then, policies that directly address the drivers, pressures, and direct threats (phases 7-9) that impact people or nature in a negative way can be applied effectively and optimized. If the changes applied at each phase end up removing the threats to the desired social, ecological, and economic outcomes (phase 1), decision-making and management in phase 2 continues to enforce the new rules and maintain the new parameter values. If new threats emerge, the loop starts over and keeps going until the outcomes of the system are desirable.

This has to be the general order of action, because addressing the later phases (threats, pressures, and drivers) without first fixing the earlier phases (underlying causes and obstacles) is like swimming against a strong current (Costanza et al., 2017). Adding ad hoc fixes that work against the structural incentives creates inefficiency and wasted resources at best, and an unsustainable fix at worst. So far, socio-ecological change has neither been sustainable nor transformational, because societies have neglected the most influential deep LPs (Birney, 2021; Fischer and Riechers, 2019) (1-4 in my summarized list) and actions have been directed to the threats, pressures, and drivers only, without addressing their underlying causes or properly accounting for the obstacles that create opposition to change.

2.7. Discussion

In this theoretical chapter I provided clarification and improvements to existing LP frameworks that are currently informing international TC discourse and developed a new blueprint for TC. While other sources go into detail about the practical aspects of TC (GSDR, 2019; IPBES, 2019d; IPCC, 2022), that has not been the purpose of this work. My goal has been to illustrate a wider point about TC terminology and theory. These contributions help provide more clarity on TC and LPs, and bring attention to the key underlying causes that cause drivers to lead to negative socio-ecological outcomes. Considering how the key underlying structural mechanisms behind unsustainable behaviours continue to be largely unaddressed in the sustainability discourse, not to mention in practice, it is unsurprising that efforts to achieve sustainability have so far not succeeded. The underlying causes need to be explicitly addressed and researched. Unless the TC discourse addresses this problem, it is unlikely to differ much from the sustainable development discourse in its success.

While the SDGs rely on the premise of green growth, this pathway is being increasingly challenged (Chapter 1). In an article titled "Is green growth possible?", Hickel and Kallis (2019) have argued that green growth cannot reduce environmental impacts sufficiently, which is why high-income countries should seek degrowth and other countries should focus on agrowth, in order for the global economy to stay within planetary boundaries. All of these alternative pathways, green growth, agrowth, and degrowth, imply a discontinuity from business-as-usual and would require structural changes to the components and functions of socioeconomic systems. In other words, they can all be considered as TC approaches, despite their considerable differences. Whatever the future direction will be in different country income groups, my blueprint can be used to plan and guide TC in a strategic way.

To guide TC of socioeconomic systems towards holistic sustainability, many have argued that it is important to identify new measures for monitoring progress (Costanza et al., 2014c; Kubiszewski et al., 2013). This can help societies evaluate if the system outcomes are within the "doughnut", in which social needs are met without exceeding planetary boundaries (Raworth, 2017). However, it must be emphasized that new indicators belong to phase 1 of the transformation and, although necessary, they alone are not sufficient for creating TC.

The key in creating transformational solutions that address the underlying causes is to first recognize, admit, and agree on the underlying causes, points of leverage, and the needed actions, but also to recognise potential obstacles to change. Kindler (1979) argued that "All change involves resistance, which stems from habit, norms, insecurity, dependence, or vested interests", and with regard to TC he singled out two particularly important obstacles, which were both related to uncertainty: "fear of

separation and fear of failure in attempting a creative leap." With separation he referred to the observation that changing worldviews can be painful, while the latter fear referred to the fact that attempting something new and creative introduces uncertainty, since "To view old problems through new paradigms is a substantial challenge" (Kindler, 1979). To reduce the uncertainty related to innovative new solutions to old problems, the TC process could benefit from modelling the likely outcomes of planned interventions. For example, the nascent field of ecological macroeconomics has started to provide examples of relevant modelling work can test the social, ecological and economic outcomes of TC policies (Capellán-Pérez et al., 2020; D'Alessandro et al., 2020; Jackson and Victor, 2020; Nieto et al., 2020). Such modelling can be one way to reduce the fears which can hinder TC.

To overcome obstacles, actions should seek to address the self-reinforcing feedbacks that maintain the prevailing harmful behavior. However, this does not simply mean introducing new values and ways of thinking. A shared characteristic in the frameworks of (Meadows, 1999) and (Chan et al., 2020) was the emphasis on the importance of values. Chan et al. placed "Visions of a good life" and "Latent values of responsibility" high on the list of LPs. Similarly, second highest in Meadows's list was "The mindset or paradigm out of which the system—its goals, structure, rules, delays, parameters—arises". However, for the new values to have positive influence, they must be directed towards solving the underlying structural causes of problems, and actions need to implement new adaptive and correcting mechanisms to the system structures which create the reinforcements and incentives that influence values and guide decisions.

Even if people understood that consumption and growth do not add to wellbeing beyond a certain point (Easterlin et al., 2010; Kubiszewski et al., 2013) and even if they embraced relational values and felt responsibility for taking care of the environment, that still would not be enough to implement TC, unless people feel a need to change the familiar but harmful socioeconomic structures. The new sustainable value systems can be viable in both appearance and practice only when they explicitly consider the underlying structural problems and how they could be solved without risking the security and wellbeing of citizens. Otherwise, people might not embrace the needed value shifts and solutions. Promoting a new ecologically and socially sustainable value system could even lead to an increase in paralyzing forms of eco-anxiety or eco-anger (Pihkala, 2020), if the new value system does not direct people towards recognizing, demanding, and creating structural solutions to the underlying causes.

This important point can be clarified by modifying Meadows's bathtub analogy of a system. Consider the socio-ecological system as a bathtub that has too much hot water. Previously, when the water was considered too tepid, a system developed that effectively incentivized everyone to only run hot water. Consequently, a structural constraint was created to the faucet, which meant that later generations

could not simply adjust the water to colder temperatures when the bath started to be too hot for comfort, even as the values and goals changed. The discord between observed reality and desired system state creates anguish and despair. Only when the structural problems with the faucet are fixed, can the lower temperatures (new goals) be achieved. Until then, attempts to change parameters (policies, taxation) can only determine whether the water is going to keep increasing in temperature rapidly or a bit slower, and new information and changing preferences can only keep increasing anxiety about the worsening situation, unless the emerging values are directed towards solving the structural problem.

Since all systems must adapt to TC, my blueprint has a wide range of potential applications, and the fact that I have separated the LPs from specific outcomes or interventions improves the applicability of this blueprint to different contexts, compared to the earlier framework of (Chan et al., 2020). One particularly important application for the blueprint would be to define what the causal hierarchy of global environmental problems is, focusing on establishing the underlying causes that countries would need to address. The TC blueprint could also be applied to solve problems in the social sphere, considering the specific threats and pressures that are reducing human wellbeing (Raworth, 2017; UN, 2015b), listing the drivers that influence the formation and intensity of those threats and pressures, and identifying the key underlying causes that necessitate or reinforce the drivers, and then forming solutions that address those problems following the phases of the blueprint.

In addition, for socioeconomic systems to stay within environmental carrying capacity, the CBD expects transitions in land-use, forestry, freshwater systems, fisheries and the use of oceans, agriculture and food systems, infrastructure, climate action, and health systems (CBD, 2020). Although my blueprint was created with socio-ecological systems in mind, it could be applied for planning and implementing TC in each of these sub-systems as well. Even though solutions at the level of sub-systems cannot influence the underlying incentive structures of the larger socio-ecological system, the blueprint could be used to plan and implement changes that help improve the sub-systems and conform them to the larger TC occurring at the societal and international scales.

2.8. Conclusions

Since the late 20th century, we have been living in a “full world” where every additional unit of nature appropriated for human use presents trade-offs with dangerous consequences, which imposes new rules on socioeconomic systems (Beddoe et al., 2009; Costanza et al., 2014a; Daly, 2005). To quote

IPBES (IPBES, 2019b), “it is increasingly clear that structural, systemic change is necessary, and continuing along current trajectories increases the likelihood of disruptions, shocks and undesired systemic change.”

In this chapter, I outlined how the LP frameworks for socio-ecological systems could be improved. The LP concept has been identified to be a “boundary object”, meaning a concept which can provide an entry point for transdisciplinary and multi-stakeholder collaboration on complex system change (Fischer and Riechers, 2019). However, to avoid creating further confusion, not only among scholars but also among the decision makers who the sustainability research aims to support, authors should always clearly define the terms they use. Specifically, they should clearly separate interventions and actions from LPs. Furthermore, reviewers of scientific manuscripts should make sure that if authors claim that some intervention addresses a LP, they must also argue how that intervention relates to actual points of leverage, such as those originally recognized by Meadows, i.e., the key system properties where focused interventions can give rise to large changes in the behavior of a system. The LP term has specific meaning and should not be used as a buzzword.

After outlining the needed improvements to LP frameworks, I integrated them into a new blueprint for TC, with clarified terminology and structure. I then used the TC blueprint to theoretically demonstrate how its nine phases could be applied to plan and implement TC in a socio-ecological system. The blueprint is an improvement on previous frameworks due to its clarified structure and terminology, and although it was designed for socio-ecological systems, it could also be applied to plan and implement TC in various sub-systems at different scales. I propose that the terminology I have clarified and defined in Table 2 and Table 3 should become the new standard for TC discourse when addressing socio-ecological systems, which might make TC plans more approachable for a wider range of stakeholders.

Any set of solution proposals that seek to make the socioeconomic system ecologically and socially sustainable, seeking true TC, must systemically and successfully identify and address the underlying causes of the global problems. The blueprint I have developed could help academics and societies achieve this, helping to balance the social, ecological, and economic net-benefits of consumption, production, and trade, thereby bring the scale of economies into balance with Earth’s carrying capacity. When combined with the policies and modelling tools developed in the field of ecological economics, this blueprint could help achieve the targets set for mitigating global environmental problems and for achieving sustainable development.

Chapter 3. Methods and limitations

In this chapter, I detail my two approaches to evaluate expert perspectives on the kind of transformations needed in different spatiotemporal contexts for sustainability to be achieved: a global expert survey and a national scale expert workshop. I provide theoretical background for these methodologies and then describe the approaches used, particularly relating to participant selection, data collection, data quality, participant feedback, and the limitations of my chosen approaches. I also include an overview of the analyses and modelling approaches, while further details of the chapter specific analyses are provided in each respective chapter. I performed all statistical analyses and tests in R (R Studio, v1.4.1717), and the maps used in this study I drew with QGIS (v3.2.3-Bonn).

I organized the global survey using the Qualtrics online survey platform, and I analysed the resulting data using various statistical modelling techniques. The quantitative expert survey sought to answer what future pathways sustainability scholars support for different country income groups in the coming decades, what the scholars consider to be the future of economic growth in each group, and how familiar sustainability scholars are with post-growth theory. Meanwhile, the qualitative expert workshop I organised with 14 Finnish sustainability and post-growth experts using the eDelphi platform and Zoom. The workshop focused on transformational change in the context of Finland, applying a backcasting approach. The workshop panel addressed what a post-growth future might look like in the Finnish context, what actions would be needed to facilitate the transition, and how obstacles to change, such as the societal addiction to growth, could be overcome.

3.1. Global expert survey

The purpose of the global survey was to find out how sustainability scholars around the world see the future, specifically in terms of future pathways and the future of economic growth for different country income groups, and how familiar the scholars are with post-growth. I conducted the anonymous online survey in July 2021 using the Qualtrics online survey platform. Building on the approach of Drews and van den Bergh (2016a), I used the survey to collect data on dependent variables about preferred future pathways and the future of economic growth, as well as on independent control variables relating to participant experience and demography. I also evaluated the scholars' familiarity with green growth and post-growth theory. Full survey available as Appendix D.

3.1.1. Finding participants

My survey approach drew inspiration from various previous global surveys which have targeted scholars, although none had so far focused on sustainability scholars nor facilitated comparisons between different country income groups. Rodina and Chan (2019) did a global survey for water resilience experts by identifying and inviting 6,700 lead authors whose contact information they collected from published literature. Their method reached 5,816 authors and they obtained 536 survey responses, resulting in a response rate of 9.2%. The authors noted that they cast a wide net because their topic was multidisciplinary and wide reaching instead of a specific subdiscipline with an easily identifiable community of experts (Rodina and Chan, 2019). This also applies to my topic. The trade-off is that since people with expertise and interest in the subject are more likely to respond, such a wide net can result in a smaller response rate (Rodina and Chan, 2019).

Utilising the convenient Scopus database, Drews and van den Bergh (2017) surveyed economists and environmental scientists from around the world by sending emails to 7,434 corresponding authors, achieving a response rate of 12 %, after excluding invalid email addresses to which invites could not be delivered. Similarly, a web-based survey study on conservation controversies sent 2,702 invitations to scholars who had published in journals relevant for conservation and sustainability, obtaining email addresses of the corresponding authors by searching the Scopus database (Vucetich et al., 2021). The authors also used a snowball sampling approach by including a link to a separate identical survey that the invitees were asked to share with their professional colleagues (Vucetich et al., 2021). Of the 2,702 invited scholars, 610 (22.6%) opened the survey, 548 (20.3%) provided at least some responses, while 389 (14.4%) responded fully. An additional 70 full responses were obtained using the snowball approach (Vucetich et al., 2021), which inspired me to also take advantage of the snowballing approach.

Another global survey study in the earth and space sciences, looking at gender inequality, gained 1,415 participants through a mixed approach, by sharing an online survey link via email to specific organisations, institutional and departmental mailing lists, social media, and to individual scientists (Popp et al., 2019). The same general approach has also been used by more specialised global survey studies. For example, one study on tiger reintroduction surveyed conservation professionals by sending invitations via email to members of specialist groups and to the corresponding authors of top-cited publications from the Web of Knowledge database (Qin and Nyhus, 2018). Another one, on the illegal trade of wild birds, used three approaches: they identified experts by querying Web of

Knowledge, Google Scholar, and Scopus, they shared the survey to the representatives of relevant NGOs, and they used snowball sampling by asking those directly contacted to recommend additional participants who may have relevant knowledge and experience (Ribeiro et al., 2019).

Drawing from and build on the methods of these earlier studies, I also applied a mixed approach for my survey, combining direct invites, invites through institutions, and snowballing. Like Rodina and Chan (2019), I decided to cast a wide net because the topic of evaluating future sustainability pathways for societies is inherently multidisciplinary and there is no easily identifiable group of experts on this topic. Sustainability scholars can inform decision makers at different scales, from businesses and NGOs to governments and intergovernmental organisations, on various topics that correspond to the 17 broad goals and the 169 targets that comprise the SDG framework (UN, 2015b). The needed transformational changes will affect all sub-systems of the socio-ecological system (CBD, 2020), which must all align to work towards the shared societal goals, whether that be with or without economic growth.

In addition to not limiting the reach of the survey too much, it was important not limit it too little, which would have led to unnecessary emails to scholars likely not interested in or knowledgeable of the topics addressed in the survey. I tried to find a balance between the two. I obtained the email addresses of scholars by searching for relevant publications from the public Scopus database (www.scopus.com) with search terms: "sustainable development goals" OR "SDG*", using three filters. Firstly, I limited the search to years 2015–2021 (the searches were done in June 2021). This is because my search terms specifically addressed the SDGs and the Agenda 2030 Resolution was adopted by the UN General Assembly on 25 September 2015 (UN, 2015b). Secondly, I included the fields: social sciences, environmental science, economics, econometrics and finance, earth and planetary sciences, arts and humanities, multidisciplinary, and decision sciences, omitting fields such as medicine, engineering, physics, etc. This does not mean other fields were completely excluded, since, for example, there can be studies published in the area of medicine that also address the environmental dimension of sustainable development. However, this filtering helped direct the emails to those most likely interested in the survey, which had a societal, economic, and environmental focus. Thirdly, I limited the search to only include scientific articles and review papers. These filters helped limit the number of document results from 13,980 down to 8,748 unique documents. To my final list of contacts, I only included the most recent publication from each unique first author, ensuring that the collected contact information was the most recent available. This resulted in 6,261 emails of corresponding authors, to whom I shared the invitation. Only 294 emails bounced, meaning this method was over 95 % successful at excluding outdated emails.

I chose not to select papers based on specific academic fields, topics, or journals, because the SDGs cover a wide range of topics and disciplines and therefore the selection would have been subjective and arbitrary. I chose not to exclude other languages from the search, because English skills is something that cannot be determined based on the language of the publication alone. However, the survey was in English, I only included English search terms, and I wrote the invitation in English, and therefore the participants were in practice limited to English speaking scholars from around the world. I decided not to subset or rank the publications by the number of citations, because more recent publications may not have had enough time to collect citations. I confirmed this by looking at the percent of papers cited by year (Table A1).

To sum up, the directly contacted sample population included scholars in sustainability fields who had been the corresponding author in at least one article during 2015-2021, whose contact information was provided in published articles or reviews, and who were able to participate in the survey, which was in English. The total number of unique sustainability scholars I identified after applying my filters was 30,377, so the number of scholars contacted directly was equal to 20.6% of those in the field, accepting that I purposefully cast a wide (but a specific kind of) net.

In addition to asking participants directly, I asked participants to share the survey link with their colleagues at the end of the survey to help improve the reach of the survey (snowball sampling). In addition, I also identified contact persons from academic institutions around the world and asked them to share the survey via relevant email lists (Appendix A). However, neither the snowballing nor the institutional invites worked, resulting in only 15 complete responses, which I ended up removing from the data before the analyses. For additional details, see Appendix A.

3.1.2. Invite and response

The invitation had a short description of the survey purpose and relevant key information about the survey, including its duration, language, anonymity and confidentiality, and a link to the participant information sheet with more details. The invitation also mentioned that I had optimised the survey to be as quick and smooth as possible and that only close-ended questions were included. The survey participants were self-selected, meaning that any interested individual who received the invite could volunteer to respond, and the stated purpose of the survey was “to find out what future pathways scholars think different country income groups should follow for local and global sustainability to be achieved, and what scholars view to be the future of Gross Domestic Product (GDP) in each group”.

To maximise the response rate, I optimised the survey to be both desktop and mobile friendly and only included close-ended questions to make responding easier and to potentially improve the response rate. The survey took around 15 minutes to fill. Participants were provided with a participant information sheet before taking part, the survey was anonymous, and individuals are not identifiable within any published outputs. To withdraw from the survey, participants could simply exit the survey without submitting the answers. Incomplete responses were deleted. The ethical aspects of this research were approved by the ANU Human Research Ethics Committee (Protocol 2021/134).

870 scholars opened the survey, 828 started it, and 461 responded fully, giving a 55.7 % completion rate (Figure 3) and a 7.8 % response rate, excluding invalid email addresses to which the invite could not be delivered. An additional 15 complete responses were obtained through the snowball sampling approach and only 7 through the indirect invites via institutional contacts. Due to the low number of responses received through the indirect approaches, in the end only responses from the direct invites were used. Two responses were recognised to be speeders or not engaged with the survey and were thus removed from the data. The responses of those who did not complete the survey, and therefore withdrew from the study, were deleted. In the end, 461 responses could be used for the analyses. Figure 3 shows how most participants who decided to withdraw did so during the first few pages.

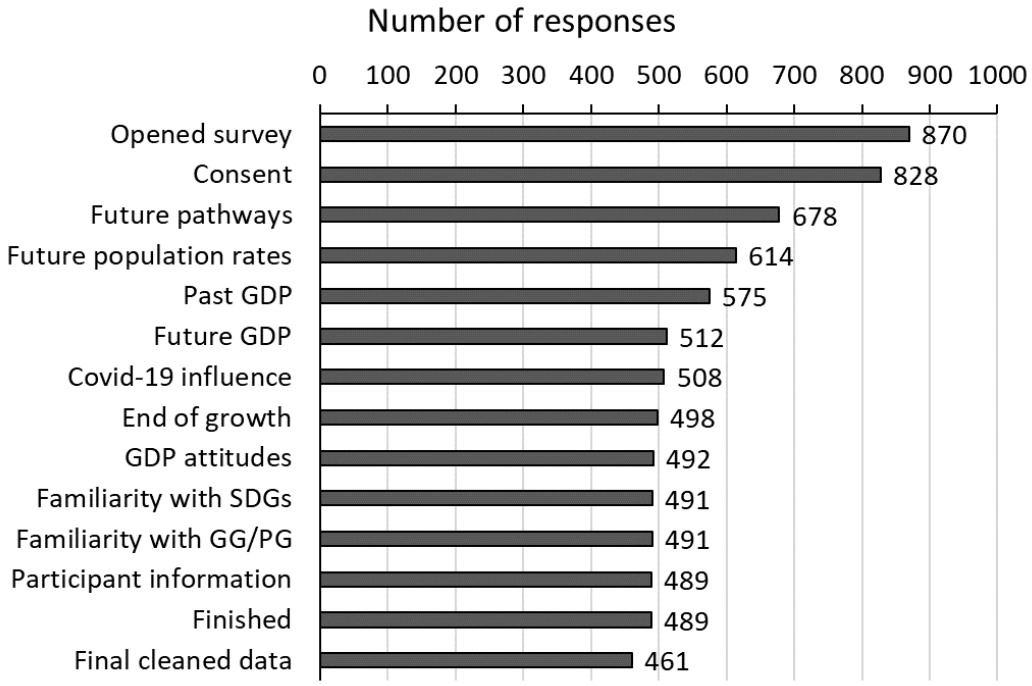

Figure 3. Number of participants who completed each section of the global expert survey. Also shown are the number of scholars who opened the survey and the final sample size after cleaning the data.

3.1.3. Survey structure

My survey had six sections. In section 1, the participants were asked to evaluate what future pathways different groups should follow for local and global sustainability to be achieved. In section 2, the participants were asked to estimate desirable future GDP rates for four country income groups, and in section 3 they were asked to consider whether growth will ever end in each group. After this, sections 4–6 evaluated participant familiarity and experience with key topics (SDGs, GG, PG) and collected relevant academic and personal information to be used as control variables. Details of the global expert survey structure and questions are available in Appendix D.

The structure of my survey built on the approach of Drews and van den Bergh (2016a, 2017), who surveyed Spanish citizens in 2014, and economists and environmental scientists in 2015. In the survey which was targeted at scholars, Drews and van den Bergh (2017) evaluated five main things: 1) Scholars' agreement with 16 statements about economic growth. 2) In the context of "rich industrialised countries", scholars' favoured GDP growth rates ("in the next decade"). 3) When and why economic growth may end or not. 4) Compatibility of growth with 2°C climate policy target. 5) Scholars' favoured growth-environment strategy (i.e., future pathways).

However, my survey also differed from the earlier surveys in several ways. Firstly, I focused on different country income groups, while the earlier research focused only on HI countries. I also focused on sustainability scholars more broadly, while the earlier research focused on economists and environmental scientists only. My methods of analysis also differed from the previous research. Lastly, the previous survey targeted at scholars was conducted 6 years prior to mine, during which time opinions of scholars can change. Nonetheless, the results of Drews and van den Bergh (2017) help provide a useful point of comparison for my results.

In building on the previous survey framework, I excluded some questions, added others, and sought to make improvements on the rest. For example, I reworded the four pathway choices – business-as-usual (BAU), green growth (GG), agrowth (AG), and degrowth (DG) – in an effort to reduce their ambiguity (Table 4) and I purposefully avoided using the term "growth" in the pathway options (and in other questions throughout the survey) because the connotations people may have with this word could bias the responses (Drews and van den Bergh, 2016). In their survey targeted at scholars, Drews and van den Bergh (2017) also included a fifth option "Other", allowing participants to specify their preference. After analysing those 9 % who responded "Other", Drews and van den Bergh (2017) concluded that most of these responses were slightly modified versions of GG, AG, or DG, while some stated that the government should have no welfare goals or market interference. Based on their

experience, I chose not to include this fifth option in my survey. Rewording the options may also have helped by avoiding a need for the extra category.

Table 4. Comparison of pathway wording between my survey and that of Drews and van den Bergh (2016, 2017).

Pathway	**Koskimäki wordings**	**Drews and van den Bergh wordings**
A	...focus on increasing GDP to increase societal wellbeing even while environmental impacts increase.	…further pursue economic growth in spite of its environmental impacts.
B	...focus on increasing GDP to increase societal wellbeing while also reducing environmental impacts.	…further pursue economic growth. There are many ways to make economic growth compatible with environmental sustainability.
C	...focus on increasing societal wellbeing directly while also reducing environmental impacts, regardless of what happens to GDP.	…ignore economic growth as a policy aim, that is, be completely neutral about growth. This will amplify the policy spectrum to combine wellbeing and environmental sustainability goals.
D	...focus on decreasing GDP to reduce environmental impacts, while also directly increasing societal wellbeing.	…stop pursuing economic growth. Production and consumption need to be downscaled in an equitable way to achieve environmental sustainability.

I grouped countries by Gross National Income following the World Bank categories (The World Bank, 2020), as defined in Figure 4, and the pathway and future GDP questions were evaluated separately for the four country income groups.

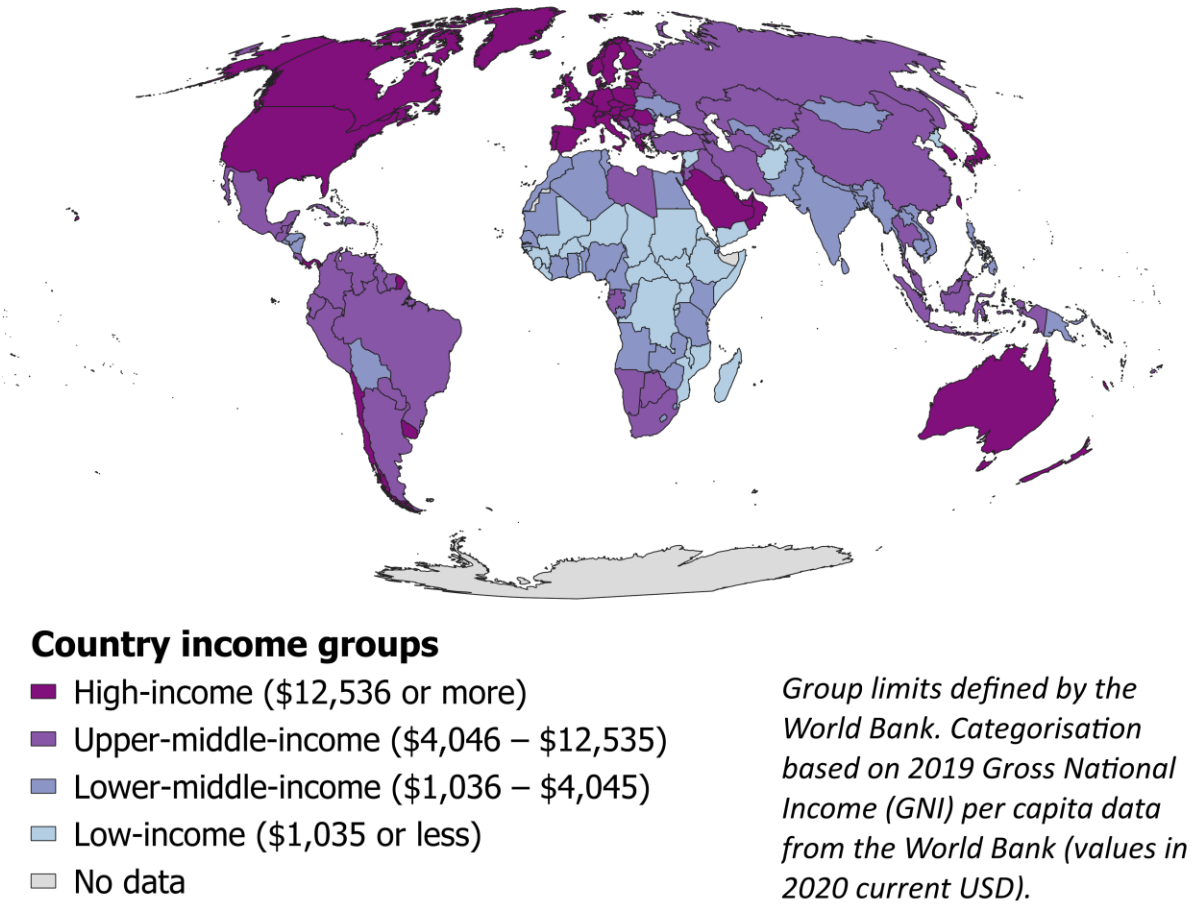

Figure 4. A map of country income groups as used in this work, and as presented to the participants in the survey. Map created using QGIS (v3.2.3) and the World Mollweide projection (EPSG:54009).

The first section of the survey asked participants to choose a preferred pathway for each country income group, for the current and the next decade. All participants evaluated their preferred pathways for all country income groups. Using HI countries as an example, the four pathway options were presented in the following way:

> In general, what future pathway should each group follow in this decade (2021–2029)?
>
> High-income countries should…
>
> (A) ...focus on increasing GDP to increase societal wellbeing even while environmental impacts increase.
>
> (B) ...focus on increasing GDP to increase societal wellbeing while also reducing environmental impacts.
>
> (C) ...focus on increasing societal wellbeing directly while also reducing environmental impacts, regardless of what happens to GDP.
>
> (D) ...focus on decreasing GDP to reduce environmental impacts, while also directly increasing societal wellbeing.

Note that the pathway choices were presented without reference to the pathway name. In interpreting the findings, I consider option A to represent the BAU pathway, while B = GG, C = AG, and D = DG, following the example of earlier studies (Drews and van den Bergh, 2017, 2016; Lehmann et al., 2022). BAU was a position for growth regardless of increasing environmental impacts. GG was a no trade-offs pathway, with increasing GDP and decreasing environmental impacts. Both post-growth (PG) pathways called for decreasing environmental impacts, but while AG called for growth agnosticism, DG explicitly called for decreasing GDP.

Before participants were asked to evaluate these pathways for the country income groups, they were provided with the following definitions for the key terms used in the pathways:

> Gross Domestic Product (GDP): GDP measures the monetary value of all finished goods and services produced within a country during one year. It indicates changes in the total amount of production and consumption.
>
> Societal wellbeing: Wellbeing is the state of being happy, healthy, and prosperous. This includes the availability of nutrition, employment, and essential man-made and ecological resources and services. We use "societal" to refer to the overall wellbeing of a group of people.
>
> Environmental impacts: The sum of all harmful effects on the environment, whether local or global, that result from human activities in a given country income group. This includes all direct and indirect impacts to ecosystems, biodiversity, and climate.

The pathway section was followed by a section on future GDP rates. To ensure that all participants were aware of the same basic information before estimating what the desirable GDP rates would be for each country income group, the participants were provided with background information on future population and past GDP rates (year-on-year percent change) in an interactive way. First, participants were asked to give rough estimates of what they thought future population rates would be and what they thought historical GDP rates had been. Then, tables were revealed that showed the relevant data (Table 5, Table 6) and participants were asked to compare their answers to those tables before continuing forward to estimate what desirable future GDP rates should be, at the end of the section. The tables were also available for reference when participants were estimating the desirable future GDP rates.

Table 5. Average annual rate of population change for each country income group in the future based on UN medium fertility variant (UN, 2019). The table formatting is the same as was used in the survey.

Population change % (annual average)

Group	*2020-2025*	2025-2030	*2030-2035*
High	*0.3%*	0.2%	*0.2%*
Upper-mid.	*0.5%*	0.3%	*0.2%*
Lower-mid.	*1.2%*	1.1%	*1.0%*
Low	*2.6%*	2.4%	*2.2%*

Table 6. Past average GDP percent change for each country income group from 2011 to 2019. Estimates of 2020 averages and projections for 2021 were also provided. Calculated with GDP data from the International Monetary Fund's (IMF) World Economic Outlook (IMF, 2021). The table formatting is the same as was used in the survey.

GDP change % (annual average)

Group	2011-2019	2020	2021
High	2.4%	*-7.3%*	*4.4%*
Upper-mid.	2.7%	*-7.2%*	*5.8%*
Lower-mid.	4.3%	*-3.5%*	*3.4%*
Low	3.6%	*-1.0%*	*3.5%*

Future GDP rates were estimated using a slider ranging from -10.0 to +10.0. The participants were asked to "Please estimate, what average GDP rate each country income group should have in the specified years?". The years were specified as "In the year 2025" and "In the year 2030". I chose the year 2025 because it represents a short-term target after the COVID-19 pandemic, whereas the year 2030 represents a longer-term target that coincides with the end of the 2030 Agenda on sustainable development. Together, these years help provide more detail on what the pathways would look like during the current decade, as scholars view them.

After choosing GDP rates, participants were asked "Would your responses have been different if the COVID-19 pandemic had NOT happened? And if yes, how?", with the answer options being: "No difference, I would have supported the same GDP rates overall", "I would have supported higher GDP rates overall", and "I would have supported lower GDP rates overall". The purpose of this counterfactual question was to assess whether or not participants think the pandemic should impact future GDP rates overall.

In the next section the participants were asked to evaluate if or when economic growth will end in each group. The participants could choose from the following six options: 2020s, 2030s, 2040s, 2050s, sometime beyond 2060, or never. The purpose of this question was to find out three things: 1) When should PG be achieved, if ever? 2) How long might growth continue? 3) What fraction of scholars think growth will never end? Participants who answered other than "never" were also asked whether the end of economic growth will be intentional or unintentional, to verify if they think the end will be the desired and controlled result of purposeful policies, as would be the case if PG pathways were followed. I also evaluated attitudes towards GDP by asking: "GDP measures the monetary value of production, but how good or bad is it as an indicator of societal wellbeing?"

Near the end of the survey, I asked the participants to self-evaluate their familiarity and experience with the SDGs, GG, and PG, after which the participants were asked to provide academic and personal information. Participants were asked to select their main academic field and had the option to indicate three additional fields from a list of 51 options. Participants were also asked to indicate the main geographical focus of their scholarly work by selecting one or more from a list that included six options: the four country income groups, plus options "Global", and "Prefer not to say". The last question was an optional open field for providing feedback on the survey.

3.1.4. Data quality and representativeness

The response to the survey was global (Figure 5). While the global map of the participants' countries of residence (Figure 5) and the research output of the participants (Table 7) showed skewness towards HI countries in my sample, similar skewness can be observed in the global distribution of research output among sustainability scholars, based on documents in the Scopus database (Figure A1). Comparing the research output per country income group in the Scopus database to that based on the survey, the differences were (Survey - Scopus): HI -2.5 % (63.6 - 66.1), UMI -1.5 % (18.5 - 20.0), LMI 4.6 % (16.9 - 12.3), and LI -0.7 % (1.0 - 1.7). To calculate the research output based on the Scopus database, I downloaded a list with the number of documents per country from the Scopus database and then counted the research output of each country income group as a fraction of all published documents. I then estimated the average research output of the participants from each group by using the averages of the categorised number of publications addressing the SDGs (self-reported through the survey). Based on the comparisons, there may have been a slight underrepresentation of research output from HI, UMI, and LI countries and an over representation from LMI countries in my sample. However, since the percentual differences are not big, this indicates that the participant sample

represented the global distribution of sustainability scholars fairly well. It should also be noted that 52 survey participants did not wish to disclose their country of residence and their research output was therefore not included in the estimations. Furthermore, the main geographic focus of the scholarly work of participants was much more evenly distributed between the country income groups (Table 7). The data was also fairly well balanced in terms of gender, age, and academic distribution (Table 7), and the skewness in academic fields toward social and applied sciences seemed to reflect similar patterns as can be observed in the Scopus database.

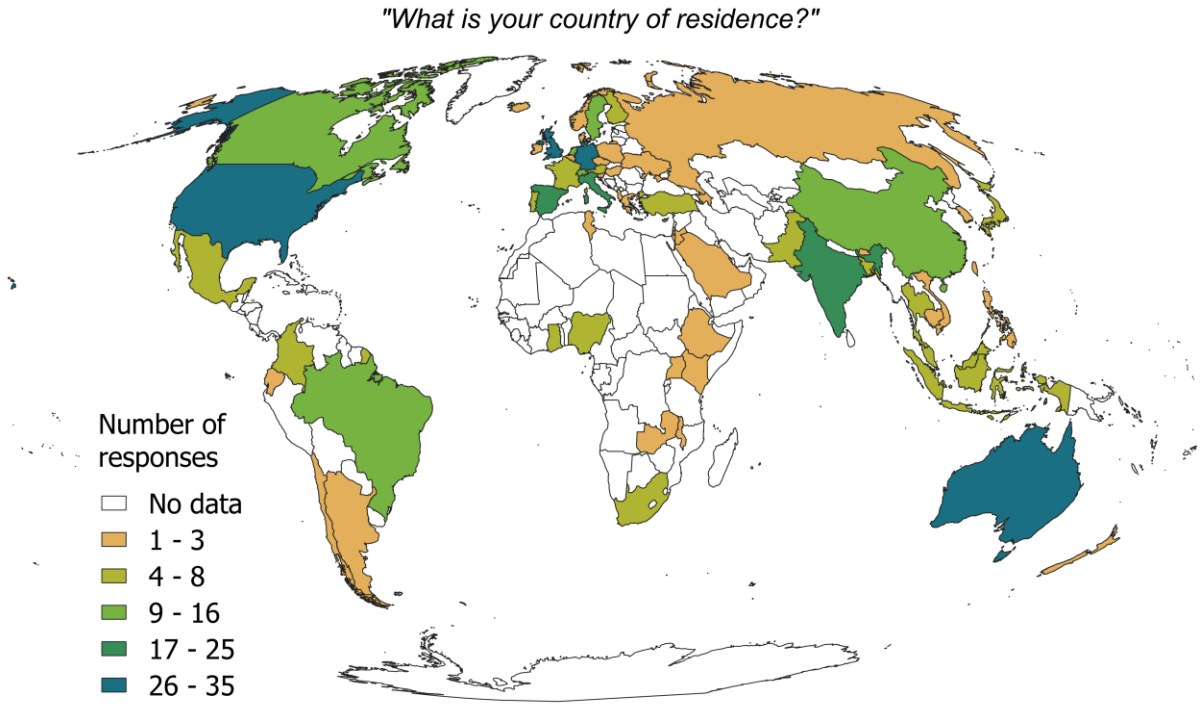

Figure 5. Global distribution of the survey participants. Representing those 409 survey participants who provided their country of residence. The participants represented 66 countries (HI 34, UMI 15, LMI 13, LI 3).

Table 7. Number of responses in each category of key control variables. Country group indicates the country of residence, grouped to country income groups. Publications refers to the average research output of the participants from each group (estimated using averages of the categorised number of publications addressing the SDGs). Geographic focus refers to the main geographic focus of the scholarly work of participants, who could select one or more of the tabled options.

Count	Gender	Count	Age	Count	Academic level
162	Female	22	18-29	3	Prefer not to say
293	Male	162	30-39	1	No degree
1	Other	135	40-49	2	BSc
5	Prefer not to say	80	50-59	68	MSc
		62	60+	205	Dr
				83	As.Prof/Docent
				99	Professor
Count	**Country group**	**Group**	**Publications**	**Count**	**Geographic focus**
7	Low-income	LI	21	7	Prefer not to say
53	Lower-middle-income	LMI	351	177	Global
70	Upper-middle-income	UMI	385	118	LI
279	High-income	HI	1324	164	LMI
				139	UMI
				170	HI
Count	**Field: Main**	**Count**	**Field: Main or additional**		
137	Applied Sciences	345	AS		
60	Conventional Economics	148	CE		
9	Ecological Economics	36	EE		
5	Formal Sciences	15	FS		
27	Humanities	62	HU		
76	Natural Sciences	218	NS		
134	Social Sciences	322	SO		
13	Systems science	23	SS		

All in all, the survey collected information directly for 24 dependent and 16 independent variables, which I used to recategorized and calculated several additional variables (Table D1). Starting with the duration of responses, I used a boxplot as a rough guide to define 6 groups which could be compared to each other in the analyses (those who spent <6, 6-10, 10-20, 20-30, 30-60, or >60 minutes on the survey). Based on the participant responses, I also grouped them to four groups based on the topics they had addressed in their publications: only green growth, only post-growth, both, or neither. The country of residence of the participants was also recategorized into country income groups.

The participants were also asked to indicate the main geographic focus of their academic work using a multiple-choice question with options HI, UMI, LMI, LI, and Global. Although 82 % of the participants chose only one option (Figure A3), the result was 28 unique combinations. For the analyses I regrouped these into five categories: 1) main focus on the higher country income groups (HI or UMI);

2) main focus on the lower country income groups (LMI or LI); 3) main focus on both the higher and the lower country income groups (any combination except all, which was considered to be a global focus); 4) main focus only global (excluding those who chose 1-3 specific groups along with global, in which case the grouping was based on the selected country income groups); and 5) those who preferred not to disclose their focus.

I also calculated a familiarity index that helped roughly describe how familiar the participants were with each of three topics (SDGs, GG, and PG). The index helped aggregate four measured variables: self-assessed familiarity with the topic in question (categorical: 0-4), number of publications addressing the topic (categorical: 0-4), whether the participant had taught a course addressing the topic (binary: 0-1), and whether the participant had attended a course addressing the topic (binary: 0-1). This was necessary to reduce the number of variables in the statistical models. As per weighing the variables, I applied no weight for the self-assessed familiarity (x1), I considered publications to be more important than the self-assessment (x2), course teaching I considered to be more important than self-assessment but less important than publications (x1.5), and course attending I considered to be less important than either teaching or publications (x0.5). Because attending does not guarantee learning, I also considered it to be less important than the self-assessment. The indexes for each topic were compiled by multiplying each variable score with their respective weight, taking the sum of all, then dividing the sum with the maximum weighed score and multiplying the result by 100 to get percentages. Since the weights are not based on any previous studies (I found none that were relevant specifically for this purpose), the accuracy of the index depends on the accuracy of the logic above, and the index should be considered rough and interpreted with care.

3.1.5. Analyses

In this section I provide an overview of the approaches I used to analyse the survey results. I provide further details of the chapter specific analyses in the methods sections of chapters 4 and 5. I performed all statistical analyses and tests in R (R Studio, v1.4.1717). The maps used in this study I drew using QGIS (v3.2.3-Bonn). The selection of analyses was guided by the data type and dimensionality. Specifically, the data was largely nominal or ordinal, and the four country income groups and two decades made it multidimensional.

For Chapter 4 I used multinomial regression models to analyse what factors may influence pathway choice, as these can be applied to non-continuous and non-normally distributed data. The multinomial

model is the ordinal regression equivalent for a nominal variable (that has no natural order), such as the pathways. The multinomial model considers how the pathway is chosen from four options, accounting for the fact that the other options are available. The multinomial regression model allowed me to check the influence of each independent variable for explaining variation in the dependent variable, while taking into consideration the influence of all the other explanatory variables. I began with multinomial models that included all explanatory variables and a few potentially interesting interactions. Based on the results, I listed which variables were significant in at least one of the contexts to determine which variables to include to the final models. I used the Akaike Information Criterion (AIC) to guide model selection. Since lower AIC values are an indicator of better model fit, removing those variables that were not significant in any context improved the quality of the models. I used the multinom function from the nnet package version 7.3-17 (Venables and Ripley, 2002) to fit the multinomial log-linear models via neural networks.

For Chapter 5 I chose linear mixed-effects regression models (LMER) to evaluate what could explain the desired future GDP rates, using the anonymous participant ID number as the random effect. I applied an iterative approach, starting with a full model that included all individual variables and any potential interactions which covered all effects I considered to be plausible and theoretically sound. Based on this first omnibus run, I selected all variables and interactions that were significant to then run customised LMER models for each group. I used post-hoc tests to determine which pair(s) of slopes differed significantly and to calculate the estimated marginal means (means adjusted for the other model variables). I used graphical residual analysis to validate my linear mixed effects models for GDP rates, using residuals vs fitted graphs and Q-Q plots. I used the lmer function from the lme4 package version 1.1-28 (Bates et al., 2015) to fit the linear mixed-effects models to data. I also used factor analysis of mixed data (FAMD) together with hierarchical cluster analysis to find out whether the scholars can be grouped in a meaningful way based on their positions regarding GDP. For this, I used the FAMD function from the FactoMineR package version 2.4 (Lê et al., 2008), the hclust function from the stats package which is a part of R, and the Mclust function from the mclust package version 5.4.9 (Scrucca et al., 2016).

3.1.6. Methodological notes and caveats

Next, it is worth considering some of the general and theoretical limits of inference regarding my survey. Additional chapter specific caveats are included in the discussions of each chapter, and some final considerations can be found in the discussion chapter (Chapter 8).

First of all, the results of the survey only reflect the opinions of those scholars who decided to respond and complete the survey. A self-selection bias may thus exist, as is common in survey studies of this kind (Drews and van den Bergh, 2017). Overall, the sample size and response rate of my survey reflects previous surveys (section 3.1.1.). Comparing the sample size and response rate of my survey to that of Drews and van den Bergh (2017), who received 814 responses with a 12 % response rate, it appears that the response to my survey could have been increased by extending the response time from 1 to 2 months and by sending two reminders instead of one, as Drews and van den Bergh (2017) did. The survey of Drews and van den Bergh (2017) also took place from March to May, while mine was in July, which may have coincided with holidays. However, the higher response rate of Drews and van den Bergh (2017) may also be due to the fact that their survey was targeted to economists and environmental scientists, who may be more interested in the growth-environment discourse than sustainability scholars in general.

A larger sample size would have better represented sustainability scholars from different countries, disciplines, genders, and age groups, potentially improving the performance of the complex multinomial models. However, my sample of 461 complete responses may be considered sufficiently large to demonstrate the existence of some patterns among sustainability scholars globally. The survey was also targeted for English speaking scholars and therefore the results might not represent adequately the opinions of those sustainability scholars who do not speak English, if their opinions happen to differ from the opinions of those who do speak English. However, even a smaller and potentially non-representative sample size can indicate the lack of consensus or reveal the existence of divisions among scholars.

For evaluating the pathway choice, a multilevel multinomial model would have been optimal, but I could not do such a model because including random effects for multinomial models is very challenging and there is no direct way to do that using R. Another approach would have been to use four binary GLM models (one per pathway), which I tried, but this did not work with my dataset because for some groups the pathway A had no observations. Thus, the limiting assumption of the way I used the multinomial model is that the choice of pathway is done out of four options and is not influenced by the choices for other groups or decades. I had to do this because I was not able to use random effects with the nominal data and the sample size was not sufficient to use each possible combination as the response variable. However, this does not mean that the significant results I get for the independent variables are not valid, just that there may be other things that are also influential, but which cannot be accounted for given the limitations of this study.

I paid special attention to the order of questions to make the survey logical and smooth for responders, while minimising question order effects. I considered this as a better approach than question order randomisation, because that would have made the survey harder and more time consuming to respond to, increasing the potential for fatigue. Lastly, note that I have chosen to report the p-values as they are throughout this thesis, uncorrected, so readers can interpret them based on their personal viewpoint on the multiple comparisons problem.

3.2. National scale expert workshop

In November–December 2021, I organised a 5-week long asynchronous remote expert workshop using the eDelphi platform and Zoom, together with 14 Finnish sustainability and post-growth experts. The purpose was to research transformational change into a post-growth future in the context of a specific high-income country. The topics covered in the workshop included future pathways for Finland, future of growth in Finland, Finland's societal dependence on growth, and narrative scenario building with backcasting. During the workshop the panellists responded to three successive questionnaires, in which they could anonymously comment and discuss each individual question, providing explanations and arguments for their own positions and reacting and replying to the answers and comments of other panellists.

3.2.1. Study area

I chose Finland as my area of research for the workshop, because it is a particularly interesting case study for the question of what a PG economy might look like in the context of a specific high-income country. This is because Finland is already wellbeing focused and has been ranked as the happiest country in the world for the past five years in a row (Helliwell et al., 2022). Finland is also a member of the Wellbeing economy Governments Alliance (Finnish Government, 2020; WEAll, 2021). Country comparisons of progress towards the SDGs have ranked Finland first both among European countries and worldwide in 2021 (Lafortune et al., 2021; Sachs et al., 2021). Finland also has some of the world's most ambitious environmental goals, aiming to achieve carbon neutrality by 2035 while safeguarding biodiversity and reducing inequality (Finnish Government, 2019). And with over 80 % index score across all 17 SDGs and their sub-targets, Finland already represents an example for other countries, who have committed to achieving the same sustainability goals (Lafortune et al., 2021; Sachs et al.,

2021). This means that transformational change in Finland could have global reverberations. However, Finland has a large ecological footprint (Happy Planet Index, 2021) and the country remains entrenched in the idea of GG (Finnish Government, 2019). Finland could therefore benefit from alternative post-growth visions, and it may be more receptive to them compared to many other high-income countries.

To better understand the context in which the workshop took place, it is worth to consider some facts relating to the chosen study area. Overall, the Republic of Finland ranked 33rd worldwide on the Happy Planet Index in 2021 (Happy Planet Index, 2021). This index is calculated by multiplying life expectancy (in which Finland was ranked 22nd out of 152 countries), by experienced wellbeing (in which Finland was ranked 1st) and dividing this by ecological footprint (in which Finland was ranked 130th) (Happy Planet Index, 2021). Through surveyed self-evaluations, Finland's experienced wellbeing score was estimated to be 7.78/10, with 10 representing the best possible life for each participant (Happy Planet Index, 2021). Another index related to wellbeing is the Gini index of inequality. A Gini index of 0 would mean all incomes are completely equal, whereas an index of 100 would mean one person has all the income. Finland's Gini index is around 28. For comparison, Slovenia has the lowest score in the world with 24.6, and South Africa has the highest with 63. Germany's and Japan's scores are around 32, while United States' is 41 (World Bank, 2021a).

Politically, Finland has a multi-party system, which normally forms majority coalition governments with two major parties and some smaller parties. The incumbent Marin Cabinet is a centre–left coalition between the Social Democratic Party, the Centre Party, the Green League, the Left Alliance, and the Swedish People's Party. Slight political polarization has been occurring in Finland in recent years (Eduskuntavaalitutkimus, 2019). Geopolitically, Finland is situated between Sweden and Russia (Figure 6) and has historically been governed by both, before gaining independence in 1917. Finland's transition towards what is today widely called a "wellbeing society" started in the 1960s, with increasing standards of living, urbanisation, and consumerism (Soinne, 2018). Today, it is a rich industrialised nation with a high GDP per capita and a low annual rate of GDP growth (Statistics Finland, 2021). The country is very dependent on foreign trade, with exports (37.3 %) and imports (37.8 %) accounting for 75 % of GDP during 2015-2019 (Statistics Finland, 2020). Consequently, a large portion of Finland's ecological footprint is due to burden shifting, with imports accounting for 53 % of life-cycle greenhouse gas emissions and 62 % of the total consumption of natural resources (Finnish Environment Institute, 2019). The Finnish population is relatively small, around 5.5 million people, and it is aging. The population is expected to start decreasing in 2031, as the birth rate in Finland is around 1.33 children per woman (Statistics Finland, 2019).

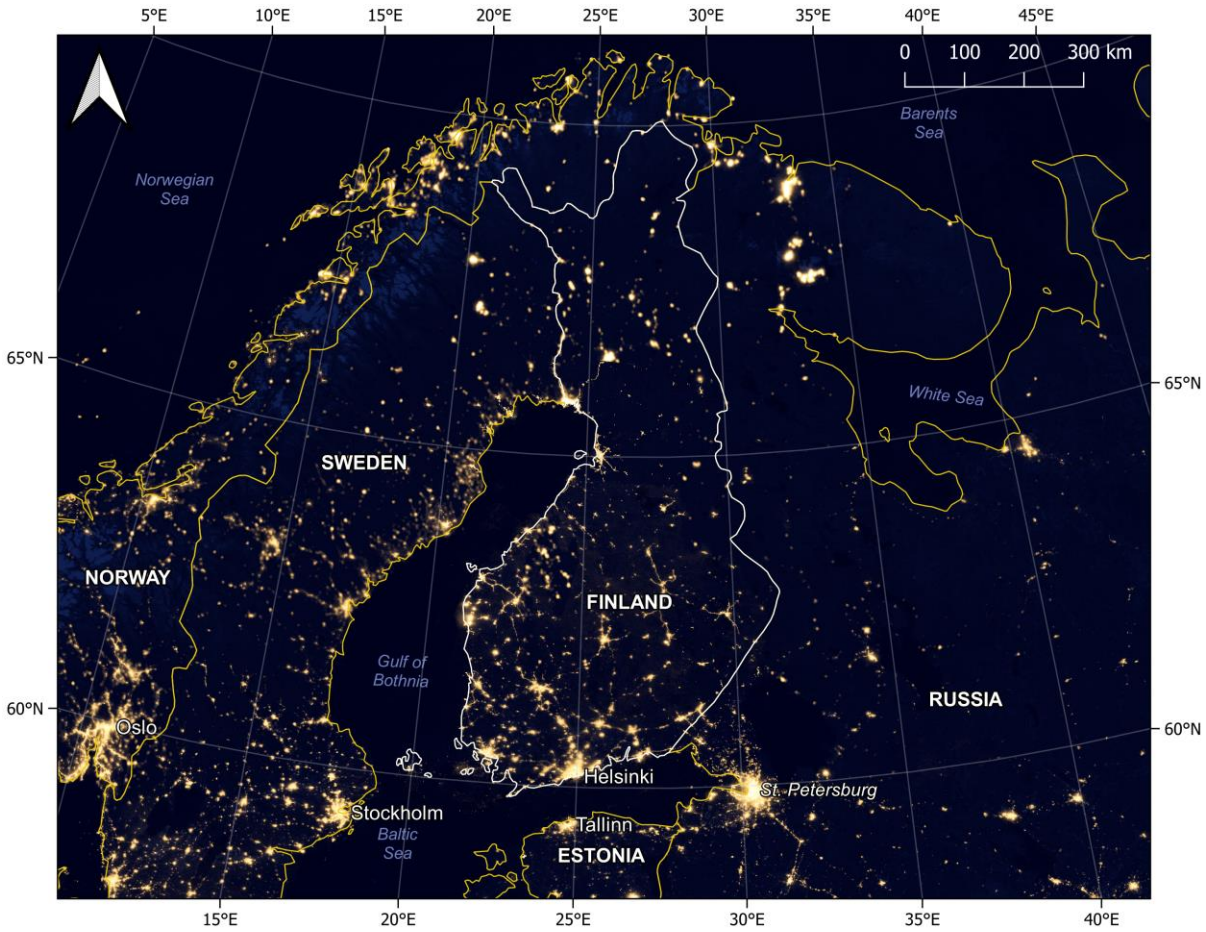

Figure 6. Map of Finland and its geopolitical context, using night lights satellite data from NASA's Earth Observatory (data from 2012). The lights help demonstrate the geographic distribution of Finns within the country, mostly living in southern and coastal urban cities. Map created with QGIS (v3.2.3) using the ETRS-TM35FIN projection (EPSG:3067).

3.2.2. Workshop panellists and engagement

I scouted for Finnish sustainability and post-growth experts from various expert bodies, research groups and think tanks in Finland, which had shown expertise in and an interest towards sustainability and post-growth topics. The participants were limited to scholars who were already interested in post-growth, because not all scholars necessarily understand what post-growth is (and is not) or agree that the desirability of further economic growth should be questioned (Hickel, 2021b; Hickel and Hallegatte, 2021). For example, economists who evaluated options for economic recovery plans for the Finnish government during the COVID-19 pandemic (Vihriälä et al., 2020) falsely confused "degrowth" with economic contraction, equating it to previous economic depressions. Limiting the participants reduced the risk that the workshop would be derailed by the need to resolve basic

differences relating to what post-growth is and whether it is desirable, instead of focusing on envisioning what a post-growth future could look like and how it could be achieved in Finland, which was the main purpose of this research.

To identify participants, I used a snowball sampling approach where I first identified 10 potentially interested participants by going through the websites of several Finnish expert bodies, research groups, and think tanks, who had published research addressing sustainable development and/or post-growth (18 groups in total, final participants belonged to 11 of the 18 groups). I then asked the 10 contacts to suggest other experts who might be interested in taking part in the workshop. I sent direct invites to all identified scholars and experts. I repeated the same process of sending invites and asking for recommendations, until the recommendations started to include experts who had already been invited. A total of 27 Finnish experts were identified and invited, and 14 could attend the workshop.

The anonymous panel was comprised of around 1/3 women and 2/3 men. Half of the panellists were aged between 40–49, while the age categories 30–39 and 50–59 both had 3 panellists, and one panellist was in the 18–29 category. The panel had 1 professor, 4 assistant professors or docents, 5 doctors, 3 master's, and 1 with a bachelor 's degree. Academic experience ranged from a professorship to a bachelor's degree. The panellists represented a wide range of academic fields: social science (13 panellists), conventional economics (7), ecological economics (6), applied science (4), natural science (3), system science (3), and humanities (3). The panellists were also asked to choose which of the following areas they had expertise in: Environment, Society, Law, Economy, Money, Technology, Domestic policy, and Foreign policy. The panel had expertise in all areas except law. All experts belonged to the stakeholder group of scholars or experts, although the following stakeholder groups also each had at least one panellist: decision maker, the media or journalist, investor or financer, and entrepreneur.

All panellists remained engaged from start to finish, except for two who had to drop out due to personal reasons. The final panel had 14 experts and 9 participants were able to attend the end seminar via Zoom. At the end of the Delphi process, the first section had produced 121 comments (totalling 6,840 words) to the 8 main questions (94 of these comments were given during the first week). The second section had 6 questions with 63 comments (5,370 words) and the third and last section received 76 comments (5,815 words) to the 7 main questions. In total, all comments amounted to 18,025 words across all sections. The number of replies (responses to the comments of others) were 27 in section 1, 10 in section 2, and 17 in section 3.

3.2.3. Workshop platforms and the Delphi method

The workshop included four rounds of questionnaires and discussions, organised through the Finnish eDelphi platform (https://www.edelphi.org/#). eDelphi is an online Delphi method software for organising and managing the Delphi process. After the Delphi process had concluded, I organised an end plenary via Zoom to facilitate further dialogue. In the eDelphi platform, a panel of experts seeks consensus on specific research questions through a round of surveys which include comment sections. The "surveys" of each round are concise and build on the results of the previous round, as the main focus of the Delphi-method is to seek consensus through discussion and iterative feedback.

During the workshop, the experts responded to questions and were able to comment their thoughts during each one. Both the responses and the comments were fully anonymous. The participants were not provided with any background materials. The experts could respond to the survey based on their existing knowledge and leave comments, but they could not see the responses or comments of the other panellists. None of the experts in the panel had taken part in the global survey.

As described by Dalkey (1969), "The Delphi technique is a method of eliciting and refining group judgements" and the features of this method are "designed to minimize the biasing effects of dominant individuals, of irrelevant communications, and of group pressure toward conformity." This is achieved with three defining features: 1) anonymity to reduce the impact of dominant individuals; 2) controlled feedback, meaning result summaries between rounds, to reduce noise; and 3) statistical group response to reduce group pressure for conformity, allowing the spread of individual opinions to be represented and visible in the final results (Dalkey, 1969). The Delphi method was originally developed in the 1950–1960s for achieving reliable consensus among experts on broad or long-term strategic planning, policy formulation, and forecasting (Dalkey, 1969; Jiang et al., 2017). This makes the method ideal for answering the research questions of the present study. I used the Delphi method to allow the panel of experts to find consensus through an anonymous and iterative process of surveys and commenting, with controlled feedback between rounds. Figure 7 shows a chart of the Delphi process, as used in this study.

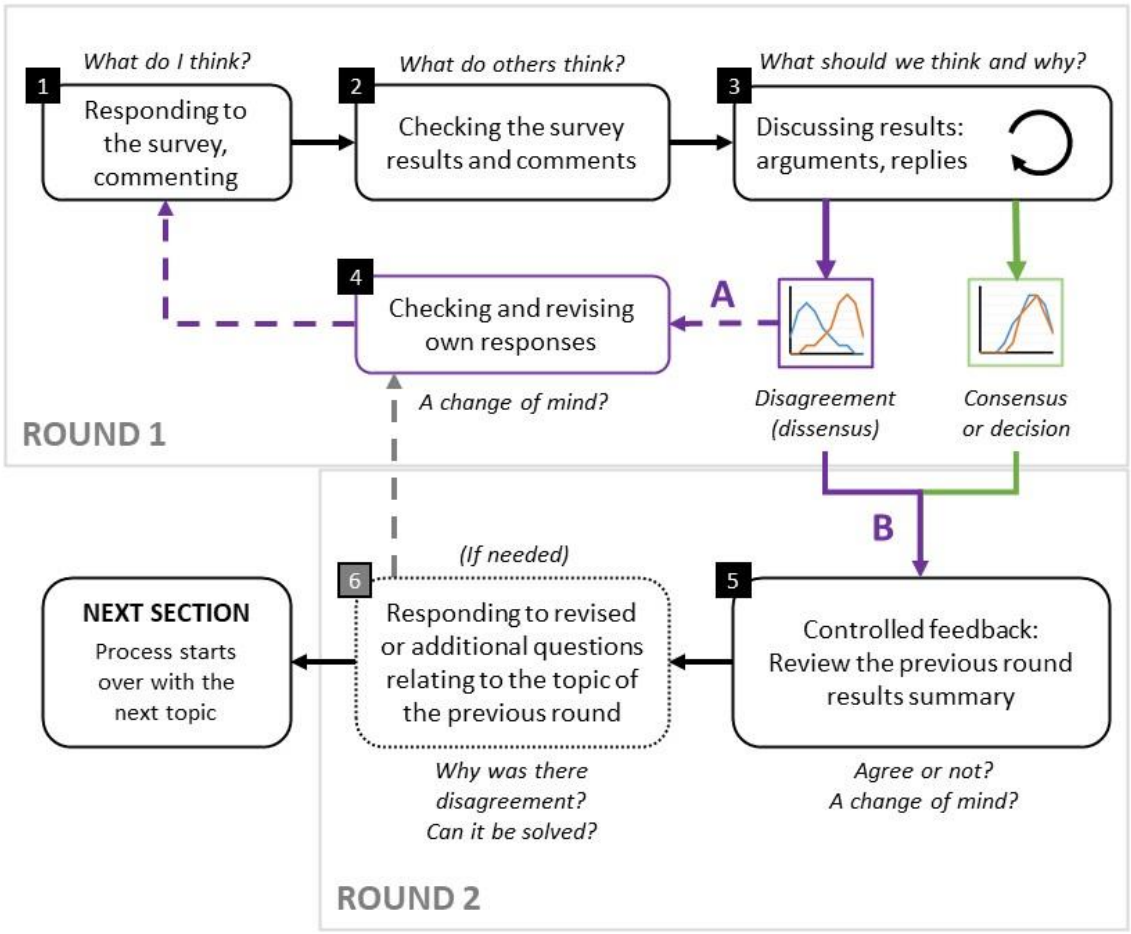

Figure 7. Chart of the 6-step delphi process, as used in this research. Path A refers to the possibility for consensus forming through discussions and refined answers during one round. Path B refers to the path mostly taken by participants in the present study, where step 4 is mostly skipped and disagreements are addressed through summaries and subsequent questions in the following round, created based on the responses and comments of the previous round.

The Delphi process is guided by a manager who facilitates the discussions. In my workshop, I played the role of the manager. The manager can be thought of as a conductor and the panel as the orchestra, with different kinds of instruments representing participants with different and complementary expertise. The manager has several tasks. After selecting the initial research question(s), the manager must identify and invite experts to participate and prepare the first round of questions to begin the discussions. Once the process has begun, the manager must actively communicate with the panellists and keep them engaged and on the same page throughout the research. The manager must also react to the needs of the panel by basing each subsequent round of the Delphi process on the results of the previous round, which can mean modifying, adding, removing, or reorganising the questions, particularly to bring focus on potential areas of disagreement. The manager's task is also to provide balanced interim summaries of the results and comments of the previous round to enable for

controlled feedback, allowing participants to react to the emerging consensus. The moderator remains impartial and does not participate in the discussions, except if clarification or guidance are required.

The benefit of this approach, compared to face-to-face discussions, is that it can efficiently facilitate the convergence of opinions based on arguments, without the impact of in-group power relations, and the anonymity can help encourage the expression of divergent views (Dalkey, 1969; Rivière, 2018). This is critical if the research topic is sensitive in nature, as questioning the hegemony of the economic growth paradigm can be. The delphi method has also been experimentally shown to lead to more accurate results than face-to-face discussion, and the results obtained through this method are generally better accepted by the group (Dalkey, 1969). The Delphi method makes it easy to observe where points of dissension arise, which legitimizes the method and often helps redefine the initial problem (Rivière, 2018). The possibility of asynchronous participation also allows all participants to contribute to the discussions to the extent they want to, without time restrictions, which can help when the problems addressed relate to complex systems and the participants have differing levels of expertise. The fact that participants are free to choose when and where they participate, between the start and end date of each round, can also allow a larger number of experts to take part.

I decided to combine the Delphi method with a face-to-face end plenary via Zoom to facilitate further dialogue about the results after preliminary analysis, to discuss how the results should be disseminated in Finland, and to allow participants to meet other panellists and network, potentially facilitating further collaborations. I considered these benefits to be a good way to complement the asynchronous and anonymous Delphi process, and to motivate participation since experts might be interested in seeing who else had participated. Each participant had the option to choose to stay anonymous, but all decided to have their names published in the final workshop report (Koskimäki, 2022). In this thesis use the term “Delphi workshop” to refer to this combination of an anonymous Delphi process followed by additional face-to-face dialogue (whether online or in-person).

3.2.4. Data collection

I divided the Delphi process into three sections. The total planned duration of each section for each participant was around 1 hour, but there were no set time limits for responding or commenting, within the time each section was considered active. The workshop had four rounds, with section one taking place through two rounds and the remaining sections each taking one round. In each round, the experts responded to questions and had the opportunity to comment under each question to explain

or clarify their answers, or to add notes. Both the responses and the comments were fully anonymous. What follows is an overview of the ways data was collected during the workshop. Further details of the Delphi process are provided in the results section, to the extent relevant, and in Appendix E.

During the first week, only the first section was accessible to the participants. The participants were not provided with any background materials. The experts could respond to the survey based on their existing knowledge and leave comments, but they could not see the responses or comments of the other panellists. This was done to capture individual opinions before they were exposed to ideas from others, therefore ensuring the maximum variability of ideas which could then be selected and drawn from in the second week and during the subsequent rounds. The possibility of seeing what others had responded also acted as a way to incentivise participants to continue the study during the second week, when the first section was opened up for discussion.

In the rest of the sections the answers and comments were immediately visible to the participants to facilitate discussion. Once a section was opened, it remained open until the panel was closed at the end of the study. Participants could reply to comments and change their responses at any time, and the response data of each section (including comments) were exported from the platform at the end of each week. The Delphi-process was open for participation for 5 weeks. Each week focused on a specific section, except for the last week which was an extension to allow participants more time to complete and check the last section. What follows is an overview of each section, further details of the workshop structure and survey questions are provided in Appendix E.

The first section was titled “The role of growth in the future of Finland” and it was partly identical with the global survey I had performed earlier (see section 3.1), to allow for comparisons. The survey of the first section included questions on the following topics, directed at the Finnish context: 1) definitions for key terms; 2) future pathways options; 3) projection of future GDP rates; 4) end of growth; 5) the desirability and likelihood growth would be brought to an end intentionally; 6) Finland’s level of dependence on economic growth; 7) support for post-growth among scholars, citizens, and decision makers; and 8) the difficulty of changing the system, to overcome Finland’s growth dependence. These questions were followed by a form for collecting participant background information which asked for the participant gender, age, educational attainment level, participation in a list of Finnish research groups and organisations, field(s) of expertise, and stakeholder groups. For the second week, I made the responses and comments visible for all participants so that the panellists could check the results and reply to the comments. Based on the comments and responses during the first week, I also rearranged the questions in descending order of relevance and added a new question addressing how the panel interprets the term “post-growth”.

The second section, which opened in the third week, was titled “Envisioning the future of Finland”. This section begun with a summary of the first section results, which the panel was asked to comment on (controlled feedback). After this the panellists were asked what term should be used to describe the kind of socioeconomic system Finland should aim to create, as the term “post-growth” was questioned by some panellists during the first round. Then the panel was presented with three tasks to help envision what a desirable post-growth future could look like in Finland. First, the panellists were asked to comment how a transition to a post-growth Finland would show on 6 specific areas of change, which have been detailed in Finland’s Agenda2030 roadmap (Finnish National Commission on Sustainable Development, 2021). Then the panellists were presented with a vision of a degrowth moderation economy and asked to evaluate their agreement with it. Lastly, the panellists were also asked to evaluate their agreement with another, more detailed vision of a future Finland, which was based on a detailed plan of ecological reconstruction created by the Finnish research group BIOS (BIOS, 2019a, 2019b). I created this vision by summarising the plans of the BIOS group and turning them into narrative form.

The third section, in the last week of the Delphi process, was titled “Mapping the path”. This section also begun with a controlled feedback summary of the previous section results, in which panellists had envisioned what a sustainable Finland would look like in the future. Following a backcasting approach, the panellists were then asked questions to determine how the desired future could be reached. A backcasting analysis is concerned with how desirable futures could be achieved, not with what futures are likely to happen (Dreborg, 1996). It is a process in which criteria for a desirable future are defined first, which the panel did in the second section, after which a feasible and logical path is built from that future state to the present (Dreborg, 1996; Neuvonen et al., 2014). In other words, backcasting seeks to answer how one or more targets could be reached.

Although backcasting has roots in the 1970’s, the method was first applied in participatory settings in the early 2000s (Neuvonen et al., 2014). Backcasting helps evaluate alternative future pathways when conventional forecasting based on historical trends leads to undesirable long-term outcomes (Neuvonen et al., 2014), or when forecasting the long-term future is too uncertain due to difficulties in predicting external variables and the potential for change in the functional relationships of the system (Dreborg, 1996). The output of a backcasting study is an alternative vision of the future (or several alternative visions), accompanied by a pathway for reaching the envisioned future, the feasibility and consequences of which are thoroughly analysed (Dreborg, 1996). A backcasting method is particularly useful for considering how transformational change could be achieved (Dreborg, 1996). Backcasting not only asks “what can change”, but also “how can change take place” and “who could make the change happen”, which requires the identification of policies, planning processes, and

behavioural change, and the identification of relevant actors and stakeholders (Neuvonen et al., 2014).

Accordingly, in the third section I asked the experts to evaluate the impactfulness of 19 specific actions for achieving the envisioned future. I selected these specific actions by first listing all actions which had been proposed in the comments of the earlier sections, and then, being conscious not to exhaust participants with too many options, excluded actions that were less relevant for the question of creating broad system change. The choice was guided by the arguments associated with the proposed actions, as well as by my knowledge of the post-growth literature, where many of the same actions had been proposed. After evaluating the 19 specific actions, the experts were asked to consider Finnish consumption habits and comment concrete actions that could be taken to influence both the amount and the type of consumption. The participants were also asked to evaluate how support for the envisioned post-growth vision could be increased among A) citizens; B) members of parliament / decision makers; C) scholars / experts; D) entrepreneurs / investors; and E) the elites (the rich and privileged). The participants were also asked to re-evaluate two questions for which consensus had not yet been achieved. First of these was Finland's level of growth dependence, which the experts re-evaluated after being presented with a summary of the arguments given in the first section discussion. Second, the experts were asked to evaluate what would be more difficult in Finland, achieving majority support for the envisioned post-growth future, or implementing the change in practice if majority support had already been achieved. The last section ended with feedback questions about the Delphi process and experience.

Two weeks after the last section ended, I hosted an end plenary via Zoom, which 9 participants were able to attend. I started the plenary by welcoming all participants and giving an overview of the end plenary agenda, which was followed by short introductions by each participant. After this the main results from the Delphi process were shown to the group one by one and openly discussed. After participants had given their comments, I commented my interpretation of them, allowing the participants to react to not only the results but also to the interpretation. The meeting was recorded, and the discussions were used as additional data when interpreting the results. The workshop outcome was a final report titled "Finland after growth addiction", which presented the panel's vision of a post-growth Finland and presented proposals by which the growth addiction could be overcome, and balance achieved with the environment (Koskimäki, 2022).

3.2.5. Participant feedback

At the end of the final section, I asked the participants to provide feedback on the Delphi process through 10 specific questions. I created the questions to evaluate how well the workshop was organised and managed, and to better understand the patterns I observed in the participant behaviour (Figure 8). Participants could also give feedback through comments, or verbally in the end plenary. The feedback was overwhelmingly positive. Confirming this, all panellists agreed for their names and profile pictures to be included in the final workshop report (Koskimäki, 2022). Based on the feedback, most panellists read most of the comments from other panellists and the low numbers of replies to the comments of others were, in part, due to the panellist being busy. Most panellists agreed that their understanding of the views of other experts grew during the Delphi process, and most somewhat agreed that the responses and comments of other panellists helped them question their own views. Most panellists considered that the workshop workload was well balanced, that the questions were interesting, and that the consensus summaries of each section (controlled feedback) were in line with their own views (Figure 8).

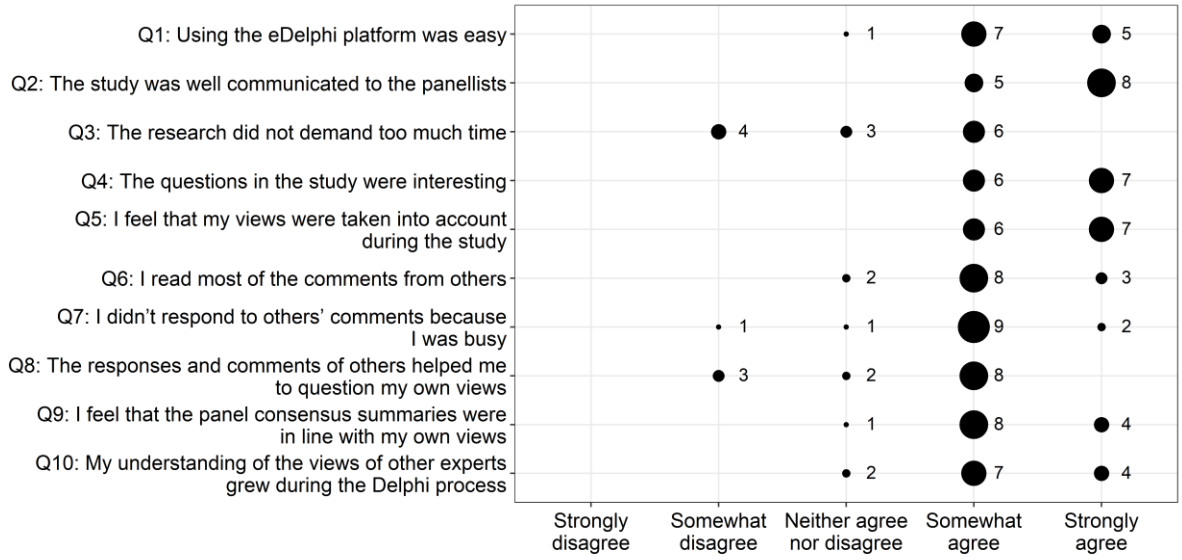

Figure 8. Feedback from the workshop panellists.

3.2.6. Methodological notes and caveats

The Delphi method allows for mixed-method research that is both qualitative and quantitative. The present research was primarily qualitative in nature, as the sample of 14 scholars was not meant to

be representative of all scholars. Instead, the purpose was to draw on their collective expertise and experience through the Delphi rounds in order to find and refine answers to the specific research questions. That said, the panel was comprised of many distinguished scholars from a variety of backgrounds and organisations.

The Delphi method of subsequent questionnaire rounds with controlled feedback worked really well for the purposes of this expert workshop and would probably work well in wider and more inclusive deliberations as well, with some key alterations to the used approach. With 14 participants, the first round resulted in a large number of comments, which hindered discussion during the second week. Therefore, a better approach could have been to apply the live-delphi method where results and discussions are immediately visible, as I did in sections 2 and 3, and it could also have helped to have fewer questions in the first round. That said, the Delphi process is all about adaptation and the first round is rarely going to be without its issues.

The summary of the results and arguments of the previous round (controlled feedback) was considered relevant and useful by the panellists, and future research might find it useful to complement these summaries with a few additional questions. The feedback questions about the Delphi process itself were helpful for checking whether or not the panellists felt that information was provided in a balanced and impartial way during the workshop. With just one manager, the one round per week schedule was quite demanding, so either additional time or more moderators would be useful in future implementations of this method. I found the eDelphi platform to be very useful for facilitating the asynchronous discussions and combining it with an end plenary via Zoom proved beneficial for the interpretation of the results and comments. In fact, future research might find it useful to have such discussions weekly, if they can be arranged.

During the last round, participants were asked to evaluate the impact of specific actions for reaching the envisioned post-growth future. In hindsight, it would have been better if more time was allocated for this task, so that each proposal could have been carefully defined and discussed, detailing factors relevant for their implementation. I suggest future research to allocate time for an additional round which focuses specifically on this. As it stands, the variation in the responses evaluating the impact of the 19 selected actions may therefore partly reflect different assumptions or interpretations, not the proposed actions themselves.

Based on the panellists' feedback, the fact that I provided clear definitions for key terms in the other questions was helpful and important. For the future pathways question, three definitions were used, for GDP, societal wellbeing, and environmental impacts, which were the same ones used in the global

survey (Chapter 4). These definitions were further updated based on panel feedback. Below are the updated definitions, which might prove useful for future research:

> Gross Domestic Product (GDP): Measures the monetary value of all finished goods and services produced within a country during one year. Through value, GDP can also indicate changes in the total amount of production and consumption.
>
> Societal wellbeing: Refers to the total wellbeing of all individual citizens of a nation. The wellbeing of individuals is affected by social relationships, the feeling of security of both the present and the future, non-material rights and opportunities, and the resources, products, and services that benefit humans. The products and services include the availability of nutrition, education, health services, and other essential man-made and ecological resources and services.
>
> Environmental impacts: The sum of all harmful effects on the environment, whether local or global. This includes all direct and indirect impacts to ecosystems, biodiversity, and climate. Environmental impacts also include the depletion and deterioration of renewable and non-renewable resources.

The definition of societal growth dependence is also important to consider, keeping in mind future deliberations. Particularly whether to use the term “dependence” or “addiction”, when addressing the problem. During the workshop the term “societal growth dependence” (“kasvuriippuvuus” in Finnish) was used instead of societal growth addiction, and it was defined as follows: “Societal growth dependence measures how difficult it would be for society to meet the needs of citizens and maintain societal wellbeing without economic growth”. The trade-off is that compared to the societal growth addiction term, dependence refers more to the structural causes, instead of defining the issue as the emergent outcome of a highly complex system. I discuss this term further in Chapter 7.

Chapter 4. Achieving global sustainability with targeted transformational change

4.1. Abstract

Business as usual, green growth, agrowth, and degrowth are alternative future pathways much discussed and debated in society and in the scientific literature. However, the amount of support each approach enjoys among sustainability scholars, on whom decision makers may depend on for guidance during the ongoing ecological and social crises, is unknown and may be context dependent. In a global expert survey, I asked 461 sustainability scholars to choose which of corresponding four pathways they think different country income groups should follow during the 2020s and the 2030s. The relative support for different future pathways differed between country income groups, with agrowth and degrowth pathway receiving the most support for the high-income and upper-middle-income groups during both decades, while green growth and business-as-usual received the most support for lower-middle-income, and low-income countries. Support for green growth decreased between the decades, while the support for post-growth pathways increased in all groups. Based on multinomial models, many variables influenced the pathway choice in a context specific way. For example, those who resided in the lower country income groups were more likely to prefer DG rather than AG for high-income countries in 2020s. I find that sustainability scholars are on average more familiar with GG than PG. Based on these results, transformational change is required everywhere but it must be targeted so that high-income countries focus on implementing post-growth policies, while green growth efforts and research should mainly focus on lower income countries. Therefore, the most important task for achieving sustainability would be to overcome societal growth addictions in rich countries, so that sufficiently quick environmental and social policies could be implemented regardless of their impact on the gross domestic product.

4.2. Introduction

The environmental and social outcomes of conventional business-as-usual (BAU) economic growth have made governments and many scientists look for ways to make economic growth “green” and

"sustainable" (European Commission, 2019; GSDR, 2019). Despite the prevailing growth focused approach, the possibility of "green growth" (GG) has long been contested (Daly, 1996; Jackson and Victor, 2019a) and many scholars are now calling for "post-growth" (PG) approaches instead, such as "degrowth" (DG) (Kallis, 2011; Mastini et al., 2021), "agrowth" (AG) (van den Bergh, 2011), a steady-state economy (Daly, 2010, 1996), or a wellbeing economy (Coscieme et al., 2019a; Costanza et al., 2018). GG refers to the hypothesis that economic growth can be made environmentally and socially sustainable. In contrast, AG is the hypothesis that the focus on economic growth needs to end in order for societies to achieve environmental and social sustainability, whereas DG more directly argues for active reductions to the economic scale, in order to reduce consumption and production to sustainable levels. I use PG as an umbrella term which refers to both DG and AG approaches.

Considering these different pathway options, Hickel and Kallis (2019) have argued that based on A) historical trends of decoupling between economic growth, resource use and carbon emissions, and B) model-based projections of the future rates of decoupling, even under optimistic conditions, DG of production and consumption may be required in rich nations, while the global South may need to adopt an AG approach, getting away from "the narrow growth-focused development agenda". Such a targeted approach for getting back to within planetary boundaries (Rockström et al., 2009) would also be fair, given how HI countries contribute disproportionally to global environmental problems (Dorninger et al., 2021; Oxfam and SEI, 2020; Teixidó-Figueras et al., 2016; Wiedmann et al., 2020). In addition to accounting for most of the global environmental burdens historically, HI countries currently shift many environmental burdens to lower income countries through resource and pollution intensive industry, while simultaneously appropriating their resources through ecologically unequal exchange (Dorninger et al., 2021; IPBES, 2019a; IPCC, 2022). Embracing PG may therefore be necessary for global sustainability to be achieved in time.

Many intergovernmental reports have recently recognised this, stating that countries should be "steering away from the current limited paradigm of economic growth" (CBD, 2020), and that they should be "decoupling the idea of a good and meaningful life from ever-increasing material consumption" (IPBES, 2019a). The potential of post-growth scenarios was also nascently recognised in the 2022 IPCC AR6 WGIII report on climate change, which stated that although most climate models (and therefore their own Shared Socioeconomic Pathways) still assume continued growth, "[post-growth] scenarios could result in a dramatic reduction of energy and resource consumption" (IPCC, 2022). However, the Sustainable Development Goals (SDGs) framework of the United Nations (UN, 2015b) crucially does not even discuss PG, despite meaning to guide nations towards achieving environmental, social, and economic sustainability through its 2030 Agenda. Belmonte-Ureña et al. (2021) have noted that DG is not mentioned at all in the UN SDGs website, neither as related topic nor

as a knowledge resource. These considerations raise the question, to what extent do sustainability scholars support PG pathways?

To answer this question, I organised a global expert survey targeted at sustainability scholars. My main goal was to find out what alternative future pathways (BAU, GG, AG, or DG) sustainability scholars currently support, and if the support is dependent on the spatiotemporal context (country income group and decade). Specifically, I seek to find out if the views of sustainability scholars reflect the conclusions of Hickel and Kallis (2019) that DG would be needed in rich nations and AG in the global South. I also evaluate how familiar the scholars are with the concepts of GG and PG to begin with.

While previous surveys have focused mostly on the views of economists and environmental scientists or the general public (Chambers et al., 2019; Drews and van den Bergh, 2017, 2016; Lehmann et al., 2022; Tomaselli et al., 2019), my focus is on sustainability scholars. This is because they are the experts on whom decision makers are likely to rely on for guidance, as countries seek to achieve the commitments which they have made through the SDGs framework. Furthermore, since the sustainability transformation will have effects at all scales and sectors, directly or indirectly, the multidisciplinary sustainability scholars can help inform change at different levels – from individuals to businesses to governments to intergovernmental organisations, informing them on the various changes which are needed within this decade to reach environmental and broader sustainability goals.

Despite recent literature indicating that DG would be required in HI countries, I do not expect there to be a majority consensus among the sustainability scholars for such a pattern, given how GG focused the SDGs are. I also hypothesise that the scholars are more familiar and experienced with GG than PG. My null hypothesis is that I will not find significant differences between scholars from different fields, or between the responses of those with the most scientific experience compared to those with less experience. Likewise, my null hypothesis will be that there are no gender or age differences in the responses for any of the questions. Similarly, I hypothesise that the responses by scholars who reside in or whose work focuses on LI, LMI, UMI, and HI countries do not differ from each other significantly for any of the questions.

4.3. Methods

I sent invites to the global survey by email to the corresponding authors of publications addressing the sustainable development goals (see Chapter 3 for details). The response to the survey was global, with a fairly balanced sample of scholars from 66 countries (Figure 5, Table 7). With 461 complete

responses, the survey had an 7.4 % response rate. Building on the approach of Drews and van den Bergh (2016a), I used my survey to evaluate the scholars' preferences regarding four future pathways and the future of growth (Full survey available in Appendix D). In this chapter I focus on the pathway preferences, while Chapter 5 will address the expert opinions regarding the future of growth. In contrast to earlier studies, I directed my focus on sustainability scholars and expanded the context to include different country income groups and time periods. Countries were grouped by Gross National Income following the World Bank categories, as defined in Figure 4.

After defining the key terms "Gross Domestic Product", "Societal wellbeing", and "Environmental impacts" (see Chapter 3), I asked the participants to choose their preferred future pathway for each country income group, for the current and the next decade (the 2020s and the 2030s). All participants evaluated their preferred pathways for all four country income groups: high-income (HI), upper-middle-income (UMI), lower-middle-income (LMI), and low-income (LI) countries. The pathway question was presented in the following way: "In general, what future pathway should each group follow in this decade (2021–2029)?", and the question was also repeated for the next decade (2030-2039). The participants could then indicate what they thought each of the four country income groups should do, by choosing one of the following: (A) ...focus on increasing GDP to increase societal wellbeing even while environmental impacts increase. (B) ...focus on increasing GDP to increase societal wellbeing while also reducing environmental impacts. (C) ...focus on increasing societal wellbeing directly while also reducing environmental impacts, regardless of what happens to GDP. (D) ...focus on decreasing GDP to reduce environmental impacts, while also directly increasing societal wellbeing.

Note that the pathway choices were presented without reference to the pathway name. In interpreting the findings, I consider option A to represent the BAU pathway, while B = GG, C = AG, and D = DG, following the example of earlier studies (Drews and van den Bergh, 2017, 2016; Lehmann et al., 2022). BAU was a position for growth regardless of increasing environmental impacts. GG was a no trade-offs pathway, with increasing GDP and decreasing environmental impacts. Both PG pathways called for decreasing environmental impacts, but while AG called for growth agnosticism, DG explicitly called for decreasing GDP. Note also that I purposefully avoided using the term "economic growth" throughout the survey, because people may have connotations to that concept that might bias the responses (Chapter 3). Using the term "growth" would also have made it difficult to represent the AG and DG pathways without using these terms explicitly.

In addition to determining pathway preferences, I evaluated the participants' familiarity with the SDGs and with PG and GG theory and collected data about various independent control variables relating

to participant experience and demography (see Chapter 3 for details). By asking questions about the scholars' familiarity with the three topics (SDGs, GG, and PG), I was able to create a familiarity index that helped roughly describe how familiar the participants were with each topic. The index helped aggregate four measured variables: self-assessed familiarity with the topic in question, number of publications addressing the topic, whether the participant had taught a course addressing the topic, and whether the participant had attended a course addressing the topic (see Chapter 3 for details).

To analyse the data, I used Chi-Square tests of independence to test if differences in the support for different pathways were significant, and to test if differences existed in the scholar's familiarity with each topic. I then sought to understand what factors might explain the pathway choices by running multinomial regression models, one for each group-decade context (8 contexts), once using GG and a second time using AG as the reference, thereby capturing the most important and interesting pathway comparisons. I began with multinomial models that included all explanatory variables and a few potentially interesting interactions. Based on the results, I listed which variables were significant in at least one of the contexts to determine which variables to include to the final models. On average, the Akaike Information Criterion (AIC) of the 16 original models was 879.7, while the average AIC of the 16 customised models was 857.3 (See Table B1 in Appendix B for details). Since lower AIC values are an indicator of better model fit, removing those variables that were not significant in any context improved the quality of the models.

I chose the Chi-square tests and the multinomial regression models, as these approaches can be applied to non-continuous and non-normally distributed data. The multinomial model is the ordinal regression equivalent for a nominal variable (that has no natural order), such as the pathways. The multinomial model considers how the pathway is chosen from four options, accounting for the fact that the other options are available. The multinomial regression model allowed me to check the influence of each independent variable for explaining variation in the dependent variable, while taking into consideration the influence of all the other explanatory variables.

4.4. Results

4.4.1. Future pathways to sustainability

The global survey revealed that support for different future pathways differs between country income groups, with around 80 % of sustainability scholars supporting pathways that can be categorised as

PG (AG and DG) for high-income countries, during both the current and the next decade (Figure 9, A). Around one quarter of the surveyed scholars chose DG for HI countries, meaning they thought these countries should focus on decreasing GDP. The AG pathway, in which nations focus on reducing environmental impacts and improving societal wellbeing regardless of what happens to GDP, had the largest amount of support for both HI and UMI countries, while the GG pathway, in which countries focus on increasing GDP to increase societal wellbeing while also reducing environmental impacts, received most support for LMI and LI countries (Figure 9, A). Support for the post-growth pathways increased between this decade and the next, while the support for both BAU and GG decreased overall (Figure 9, B).

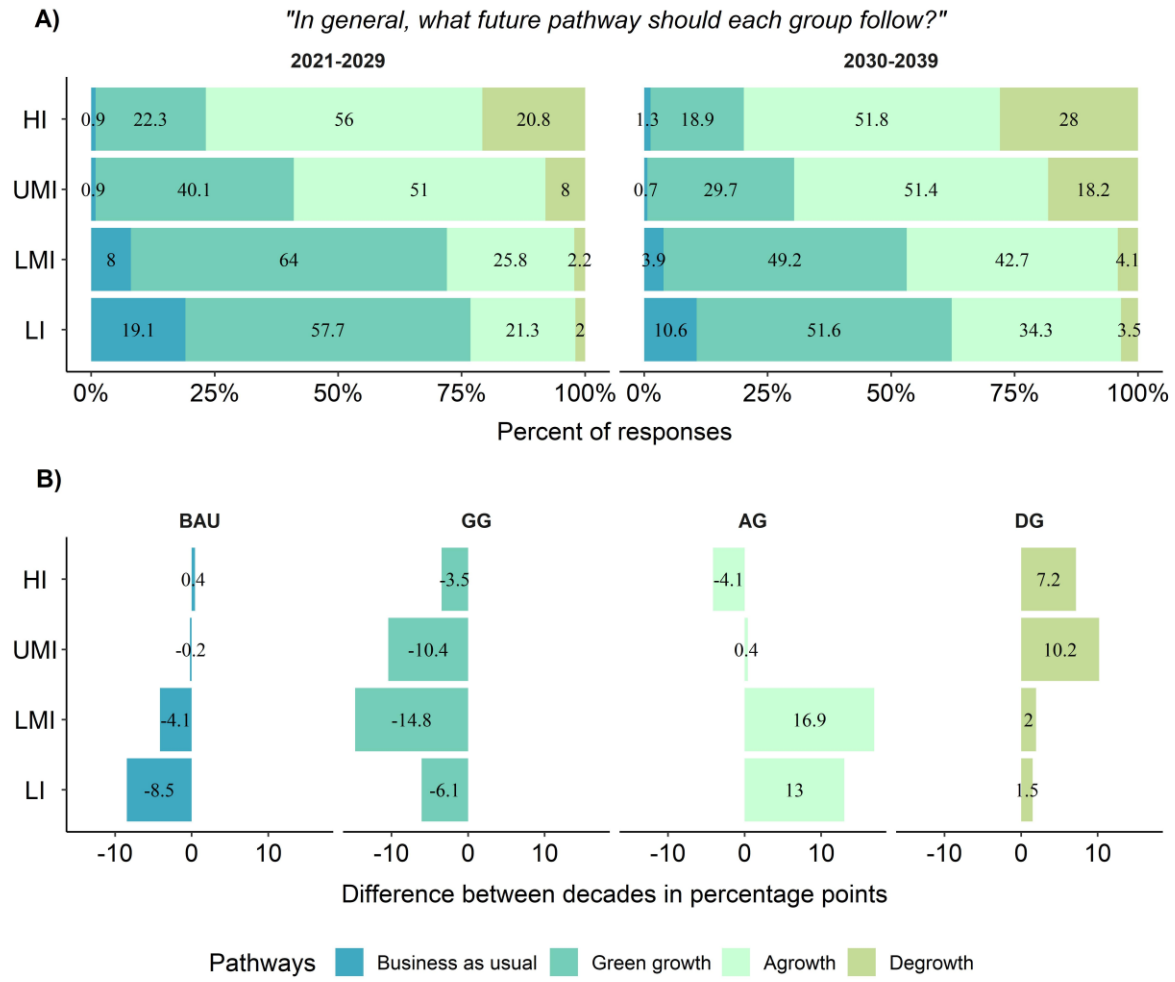

Figure 9. Support for different future pathways. Overall support for pathways during the current (2021-2029) and the next decade (2030-2039) differed for different country income groups and between decades. A) Stacked bar graphs of pathway choices during the two decades, with percentages labelled. B) Difference between percentages between 2030s and 2020s for each pathway. Note that in the survey, concise descriptions of each pathway were used instead of the labels (see methods).

Support for GG was dominant for LI countries for both decades (58 % for 2020s, 52 % for 2030s), and support for BAU was also substantially higher for LI countries than for the other country income groups (Figure 9, A). GG also received the most support for LMI countries, but its support decreased from 63 % to 49 % between the two decades, whereas support for the PG approaches increased greatly from 28.6 to 47.1 %, primarily driven by the increasing support for the AG approach. While AG gained support for the LMI and LI countries between decades, it was primarily the DG pathway which gained support for the UMI (+10 %) and HI (+7 %) countries, according to which countries should focus on decreasing GDP to reduce environmental impacts, while also directly increasing societal wellbeing. Furthermore, support for DG was significantly higher for HI compared to UMI, and for UMI compared to LMI countries, during both decades (Table 8). The amount of support for the AG pathway did not differ statistically between HI and UMI countries during either decade (Table 8). In contrast, while the amount of support for AG was not statistically different between LI and LMI countries during the 2020s, the difference was significant for the 2030s (z=2.64, Table 8), with support increasing in both contexts but more for LMI (+17 %) than for LI countries (+13 %). As for GG, while a statistically significant difference in the support was observed between LMI and LI countries for the 2020s (z=1.96, Table 8), support for GG decreased more for LMI (-15 %) than for LI countries (-6 %) between decades, resulting in no difference being observed any longer for the 2030s between these groups. Due to low amounts of support, no statistically significant differences were observed for the BAU pathway between HI and UMI countries, nor for the DG pathway between LI and LMI countries, during either decade (Table 8).

Table 8. Chi-Square tests of independence for differences in pathway choice. Comparisons between groups, and between decades. P-values are reported for the overall comparison. Z refers to standardized residuals of each specific comparisons, grouped by the levels of each variable, with bolded values exceeding the critical z value of 1.96 (-1.96) at significance level 0.05.

Comparison	Decade	χ^2	Df	p	z (BAU)	z (GG)	z (AG)	z (DG)
HI-UMI	2020	50.593	3	<0.001	0.00	**-5.83**	1.52	**5.53**
HI-LMI	2020	240.207	3	<0.001	**-5.27**	**-12.77**	**9.31**	**8.88**
HI-LI	2020	292.694	3	<0.001	**-9.23**	**-10.96**	**10.82**	**9.02**
UMI-LMI	2020	105.291	3	<0.001	**-5.27**	**-7.25**	**7.86**	**4.04**
UMI-LI	2020	164.650	3	<0.001	**-9.23**	**-5.34**	**9.39**	**4.24**
LMI-LI	2020	24.392	3	<0.001	**-4.91**	**1.96**	1.63	0.23
HI-UMI	2030	21.676	3	<0.001	1.00	**-3.84**	0.13	**3.52**
HI-LMI	2030	154.223	3	<0.001	**-2.48**	**-9.73**	**2.77**	**9.87**
HI-LI	2030	208.364	3	<0.001	**-5.98**	**-10.41**	**5.39**	**10.22**
UMI-LMI	2030	77.673	3	<0.001	**-3.31**	**-6.06**	**2.64**	**6.80**
UMI-LI	2030	129.935	3	<0.001	**-6.57**	**-6.77**	**5.26**	**7.20**
LMI-LI	2030	19.145	3	<0.001	**-3.93**	-0.72	**2.64**	0.52

4.4.1.1. Multinomial modelling results

I used 16 multinomial regression models to see which independent variables could explain the pathway choice in each of the four contexts during both decades, first using GG and then AG as the reference pathway to which the other pathways were compared. Based on the model results, many variables were only significant for specific groups or decades (Table 9). This was partly due to the fact that certain pathways were not chosen by a sufficient number of participants in some contexts to result in statistically meaningful comparisons. In particular, the DG pathway was rarely selected for the lower country income groups while the BAU was rarely selected for the higher (Figure 9). Table 9 provides an overview of the significance of each explanatory variable for each unique comparison, in each context. The statistical details from the models are included in Table 10, Table 11. Further results tables and R code are available online (see Appendices section for details).

Table 9. Explanatory variable odds ratios (OR) by context and comparison. OR specified only for significant comparisons (p<0.05), empty cells indicate comparisons that were not significant. OR < 1 indicates decreased odds while OR > 1 means that a variable increased the odds of preferring pathway "x to y" in the specified context, compared to its reference category, which is given after the variable name in brackets "(/reference)". Letter "s" indicates those specific comparisons where the sample size was too small (< 10) to be statistically meaningful. The statistical details from the models are provided in Table 10, Table 11, and in online appendices.

Context	Comparison	Age (linear)	Age (quadratic)	MSc (/Dr)	As. Prof. (/Dr)	Prof. (/Dr)	Male (/Female)	From UMI (/HI)	From LMI or LI (/HI)	Higher GDP C-19 (/Same)	Lower GDP C-19 (/Same)	Applied Sci. (/Econ.)	Natural Sci. (/Econ.)	Social Sci. (/Econ.)	Other fields (/Econ.)	Focus LI (/HI)	Focus HI & LI (/HI)	Focus global (/HI)	GDP very bad (/good)	GDP bad (/good)	GDP very good (/good)	GG familiarity index	PG familiarity index	SDG familiarity index	End in none (/All)	End in some (/All)
HI in 2020s	AG to GG				0.42	2.65				0.48	0.42				s						0.41				0.28	
HI in 2020s	DG to GG		3.56	s		3.55				0.21	0.3				s				3.33		s		1.04		s	
HI in 2020s	DG to AG	0.34		s	2.35				3.22	0.43									2.15		s		1.02		s	
HI in 2030s	AG to GG				0.32						s				s						0.39				0.35	s
HI in 2030s	DG to GG									0.43	s				s				2.66						0.14	s
HI in 2030s	DG to AG				2.37																				0.4	
UMI in 2020s	AG to GG		3.33		0.41					0.51									4.41	4.72			1.03		0.24	
UMI in 2020s	DG to GG	0.13	6.27	s		s	0.3	s	s	s	s	s	s	s	s		s	s	s	s	s				s	s
UMI in 2020s	DG to AG	0.2		s		s		s	s	s	s	s	s	s	s		s	s	s	s	s				s	s
UMI in 2030s	AG to GG				0.34										s				3.96	2.91					0.34	
UMI in 2030s	DG to GG									0.34		s	s	s	s				6.39		s				s	
UMI in 2030s	DG to AG				2.6							s	s	s	s						s				s	
LMI in 2020s	AG to GG						0.49	s											5.63	5.04	s		1.02			s
LMI in 2020s	DG to GG			s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s				s	s
LMI in 2020s	BAU to GG			s	s	s		s	s		s	s	s	s	s		s	s	s	s					2.82	3.41
LMI in 2020s	DG to AG			s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s				s	s
LMI in 2020s	BAU to AG			s	s	s		s	s		s	s	s	s	s		s	s	s	s	s				4.38	s
LMI in 2030s	AG to GG														2.83				3.12	2.29	s				0.47	
LMI in 2030s	DG to GG			s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s		1.07		s	s
LMI in 2030s	BAU to GG		0.16	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s				s	s
LMI in 2030s	DG to AG			s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s				s	s
LMI in 2030s	BAU to AG		0.14	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s				s	s
LI in 2020s	AG to GG							s			s	s	s	s	s		2.91	2.41	s	s	s					s
LI in 2020s	BAU to GG				s								s		s											3.39
LI in 2020s	BAU to AG				s	3.64	2.97	s			s	s	s	s	s			0.25	s	s	s					s
LI in 2030s	AG to GG				0.49										3.04		2.17		2.8		s		1.02			
LI in 2030s	DG to GG			s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s				s	s
LI in 2030s	BAU to GG			s	s	2.87			s		s	s	s	s	s		s	s		s						
LI in 2030s	DG to AG			s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s				s	s
LI in 2030s	BAU to AG			s	s	3.13	2.52		s		s	s	s	s	s		s	s	0.16	s	s					3.11

The age of the scholars was not meaningful for any pathway comparison in the context of LI countries, but it was significant in other contexts – though its effect was not always linear. For example, older age had a quadratic concave effect on the preferred pathway by decreasing the odds of preferring BAU over GG by a factor of 0.16 (CI 0.05, 0.53; p = 0.003 for quadratic; OR 24.93, p < 0.0001 for the linear function), and likewise decreasing the odds of preferring BAU over AG by a factor of 0.14 (CI 0.04, 0.5; p = 0.002 for quadratic; OR 32.62, p < 0.0001 for the linear function) (Figure 10, A). This means that older participants were less likely to support BAU in these contexts, but this effect decreased with age. These effects were not evident for the 2020s. In comparison, age had a quadratic convex effect on the preferred pathways for UMI countries by increasing the odds of preferring AG over GG in 2020s by a factor of 3.33 (CI 1.43, 7.75, p = 0.005 for quadratic; OR 0.63, p = 0.367 for the linear function) (Figure 10, B) and by increasing the odds of preferring DG over GG in 2020s by a factor of 6.27 (CI 1.52, 25.9, p = 0.011 for the quadratic function, OR 0.12, p = 0.016 for the linear function). In other words, older participants were increasingly more likely to support AG and DG over GG for UMI in the 2020s. This effect was also not evident for the 2030s. Comparing DG to AG, older age linearly decreased the odds of preferring DG in 2020s by a factor of 0.2 (CI 0.04, 0.9; p = 0.036). For HI countries, similar to UMI countries, a one-unit increase in the ordinal variable age had a quadratic convex effect on the preferred pathway by increasing the odds of preferring DG over GG for the 2020s by a factor of 3.56 (CI 1.08, 11.75, p = 0.037 for the quadratic function; OR 0.32, p = 0.112 for the linear function). This means that older participants were increasingly more likely to support DG over GG in this context. Again, this effect was not evident for the 2030s. At the same time, older age linearly decreased the odds of preferring DG over AG for HI countries in 2020s by a factor of 0.34 (CI 0.12, 0.96; p = 0.041).

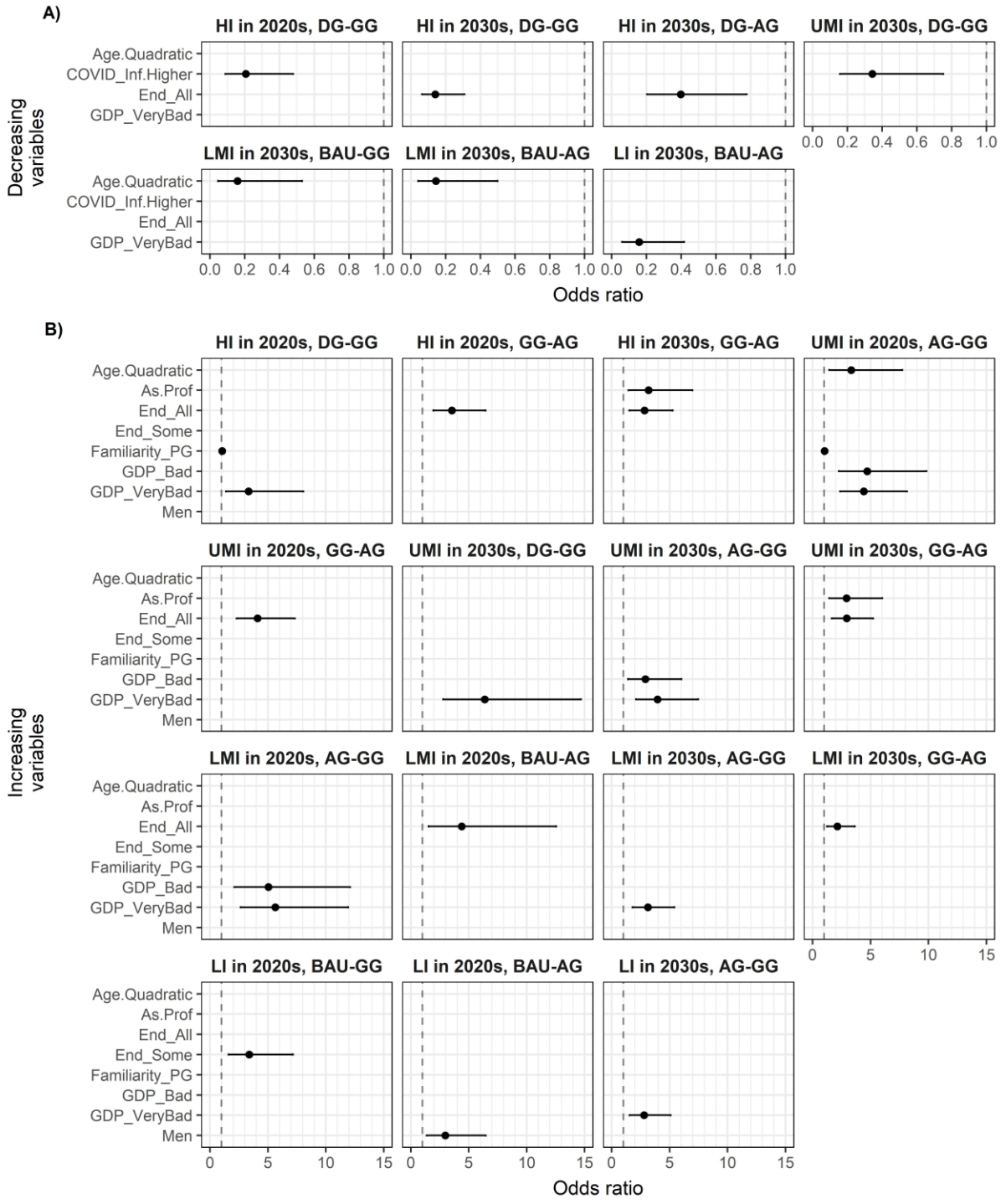

Figure 10. Forest plots of the most significant variables ($p<0.01$) for explaining pathway choice in different contexts. Lines indicate the 95 % confidence interval for the odds ratio, which is marked with a dot. Plot titles indicate the context and the comparison between pathway choice and the reference pathway. Variables that had a decreasing effect (A) and those that had an increasing effect (B) on the odds of choosing a pathway over its reference are presented separately. The vertical dashed line shows odds ratio of 1. Variable codes are explained in Table B3.

Level of educational attainment was also a significant explanatory variable for pathway choice in several contexts. Compared to those scholars whose highest achievement was a doctorate, being an associate professor increased the odds of preferring GG over AG for HI countries in 2020s by a factor of 2.37 (CI 1.14, 4.91; p = 0.02) and in 2030s by a factor of 3.17 (CI 1.44, 6.97; p = 0.004). At the same time, being an associate professor increased the odds of preferring DG over AG for HI countries in 2020s by a factor of 2.35 (CI 1.1, 5.02; p = 0.027) and in 2030s by a factor of 2.37 (CI 1.18, 4.77; p = 0.015). In comparison, having a full professorship (compared to a doctorate) increased the odds of preferring AG over GG for HI countries in 2020s by a factor of 2.65 (CI 1.11, 6.32; p = 0.028), while also increasing the odds of preferring DG over GG for HI countries in 2020s by a factor of 3.55 (CI 1.22, 10.4; p = 0.021). For UMI countries, being an associate professor increased the odds of preferring GG over AG in 2020s by a factor of 2.43 (CI 1.2, 4.89; p = 0.013) and in 2030s by a factor of 2.94 (CI 1.43, 6.03; p = 0.003), while also increasing the odds of preferring DG over AG for UMI countries in 2030s by a factor of 2.6 (CI 1.2, 5.61; p = 0.015). The comparison between As. Prof. and Dr for the choice between AG and GG was not significant for LMI countries, but in the context of LI countries, being an As. Prof. increased the odds of preferring GG over AG in 2030s by a factor of 2.05 (CI 1.01, 4.16; p = 0.045). Full professors were more likely than doctors to prefer BAU for LI countries over GG or AG during both decades.

Compared to women, men had increased odds of preferring BAU over AG for LI countries in 2020s by a factor of 2.97 (CI 1.36, 6.46; p = 0.006) (Figure 10, B) and in 2030s by a factor of 2.52 (CI 1.04, 6.13; p = 0.042). Men also had increased odds of preferring GG over AG for LMI countries in 2020s by a factor of 2.06 (CI 1.19, 3.57; p = 0.01). And while gender was not significant in the context of HI countries, men had decreased odds of preferring DG over GG for UMI countries in 2020s by a factor of 0.3 (CI 0.12, 0.75; p = 0.01).

An interesting finding worth highlighting was that the country income group of residence impacted the pathway preference in a very specific way (Table 9). Compared to those who resided in HI countries, those who resided in the lower country income groups (LMI or LI) had increased odds of preferring DG over AG for HI countries in 2020s by a factor of 3.22 (CI 1.28, 8.11; p = 0.013). The two lower country income groups were combined in the analyses to ensure sufficient sample size. This was the only significant influence for the country of residence based on my models.

Other variables were even more significant for explaining pathway choice, as I will detail next. After asking the participants to evaluate desirable future GDP rates for each group in the future (a question I will focus on in Chapter 5), the scholars were asked if/how their responses would have been different if the COVID-19 pandemic had not happened. Around half of the participants, 51.4 %, thought that

the COVID-19 pandemic should have no overall effect on future GDP rates. Meanwhile, 34.5 % said they would have supported higher future GDP rates overall if the pandemic had not happened, and 14.1 % would have supported lower rates overall. Compared to those participants who would have supported the same GDP rates overall regardless of the pandemic, those who would have supported higher GDP rates had decreased odds of preferring DG over GG for HI countries in 2020s by a factor of 0.21 (CI 0.09, 0.48; $p < 0.0001$) and in 2030s by a factor of 0.43 (CI 0.2, 0.92; $p = 0.029$). Those with this position also had increased odds of preferring GG over AG for HI countries in 2020s by a factor of 2.09 (CI 1.1, 3.96; $p = 0.025$) and decreased odds of preferring DG over AG for HI countries in 2020s by a factor of 0.43 (CI 0.22, 0.85; $p = 0.015$). For UMI countries, those who would have supported higher rates if the pandemic had not happened had increased odds of preferring GG over AG in 2020s by a factor of 1.95 (CI 1.11, 3.43; $p = 0.02$) and decreased odds of preferring DG over GG in 2030s by a factor of 0.34 (CI 0.16, 0.75; $p = 0.007$). Those who would have supported lower GDP rates overall also had increased odds of preferring GG over AG for HI countries in 2020s by a factor of 2.4 (CI 1.04, 5.55; $p = 0.041$) and decreased odds of preferring DG over GG for HI countries in 2020s by a factor of 0.3 (CI 0.11, 0.83; $p = 0.02$). The influence of the pandemic was not statistically significant for pathway choice in the context of LMI or LI countries.

In the survey, the participants were also asked to evaluate if or when economic growth might end in each group. Compared to those who chose that growth would sooner or later end in all groups, those who thought that growth would never end in any group had increased odds of preferring GG over AG for HI countries in 2020s by a factor of 3.53 (CI 1.93, 6.45; $p = 0$) and in 2030s by a factor of 2.83 (CI 1.52, 5.26; $p = 0.001$). This position also decreased the odds of preferring DG over AG for HI countries in 2030s by a factor of 0.4 (CI 0.2, 0.78; $p = 0.007$) and decreased the odds of preferring DG over GG for HI countries in 2030s by a factor of 0.14 (CI 0.06, 0.31; $p = 0$). For UMI countries, the position also increased the odds of preferring GG over AG for UMI countries in 2020s by a factor of 4.1 (CI 2.29, 7.32; $p = 0$) and in 2030s by a factor of 2.95 (CI 1.66, 5.24; $p = 0$).

In the context of LMI countries, those who thought that growth would never end in any group had increased odds of preferring BAU over GG in 2020s by a factor of 2.82 (CI 1.12, 7.1; $p = 0.028$), BAU over AG by a factor of 4.38 (CI 1.53, 12.54; $p = 0.006$), and they also had increased odds of preferring GG over AG in 2030s by a factor of 2.13 (CI 1.24, 3.65; $p = 0.006$). This variable was not significant in the context of LI countries. In comparison, those who chose that growth would end sooner or later in some but not all groups also had increased odds for preferring BAU over GG for LMI countries in 2020s by a factor of 3.41 (CI 1.23, 9.49; $p = 0.019$), but also for preferring BAU over GG for LI countries in 2020s by a factor of 3.39 (CI 1.61, 7.16; $p = 0.001$), and for preferring BAU over AG for LI countries in 2030s by a factor of 3.11 (CI 1.05, 9.22; $p = 0.04$).

Attitudes towards GDP also influenced pathway choice depending on the context (Figure 11), based on evaluations of how good or bad GDP is as an indicator of societal wellbeing. Compared to those who considered GDP to be slightly good as an indicator of societal wellbeing (in general), those who considered it to be extremely or very bad had increased odds of preferring DG over GG for HI countries in 2020s by a factor of 3.33 (CI 1.38, 8.07; p = 0.008) and in 2030s by a factor of 2.66 (CI 1.17, 6.06; p = 0.02). The odds of preferring DG over AG for HI countries in 2020s were also increased by a factor of 2.15 (CI 1.08, 4.29; p = 0.03).

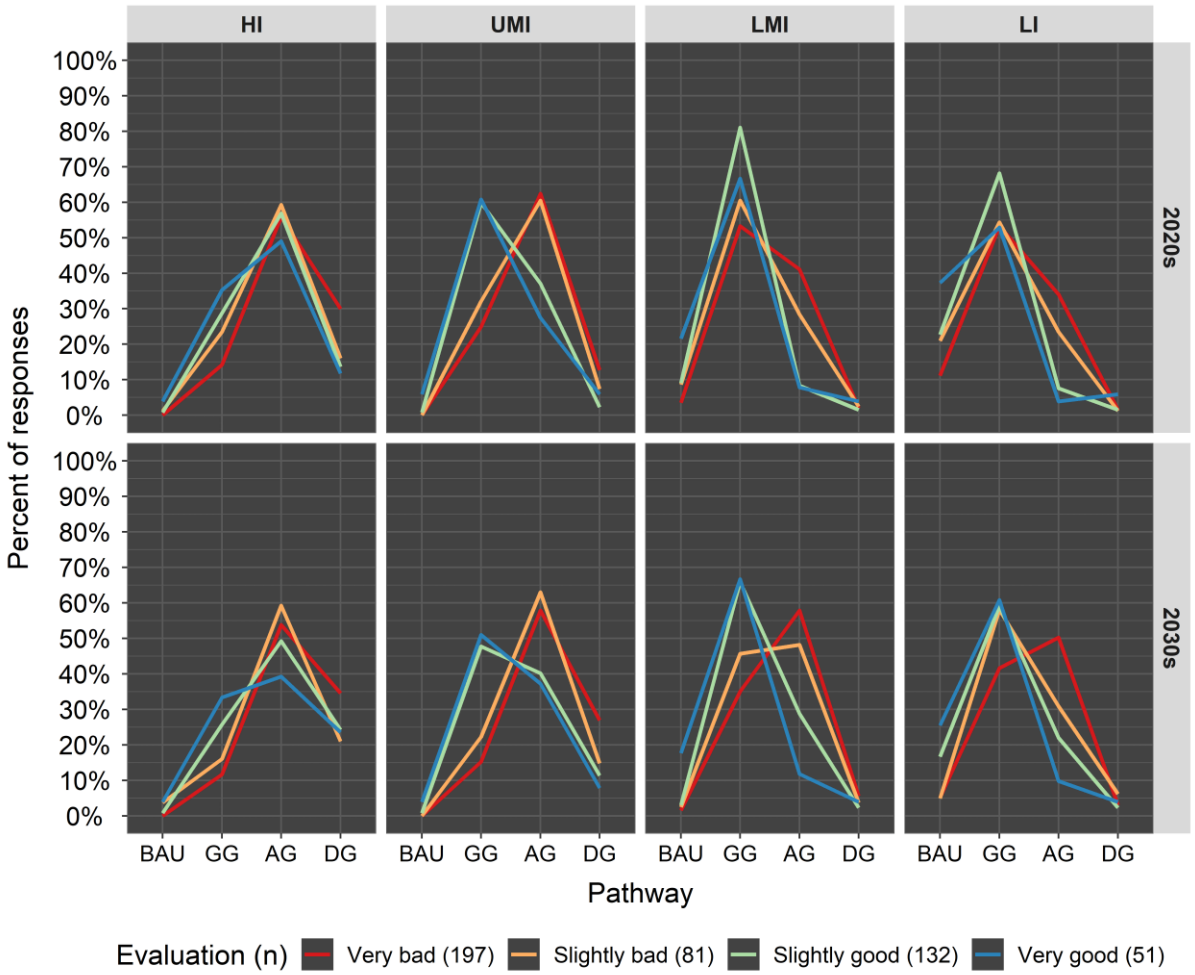

Figure 11. Attitudes towards GDP. Based on evaluations of how good or bad GDP is as an indicator of societal wellbeing, influenced the pathway choice depending on the context. Those more critical of GDP tended to show more support for the agrowth and degrowth pathways (AG and DG), while green growth (GG) was more popular among those less critical of GDP. For this figure the categories "extremely" and "very" have both been combined under "very". Original question wording: "GDP measures the monetary value of production, but how good or bad is it as an indicator of societal wellbeing?"

For UMI countries, this increased the odds of preferring AG over GG for UMI countries in 2020s by a factor of 4.41 (CI 2.38, 8.16; p = 0) and in 2030s by a factor of 3.96 (CI 2.09, 7.47; p = 0). Likewise, the odds of preferring DG over GG for UMI countries in 2030s was increased by a factor of 6.39 (CI 2.78, 14.68; p = 0). For LMI countries, those who considered GDP to be extremely or very bad as an indicator of societal wellbeing had increased odds of preferring AG over GG in 2020s by a factor of 5.63 (CI 2.65, 11.93; p = 0) and in 2030s by a factor of 3.12 (CI 1.8, 5.41; p = 0). Lastly, for LI countries this perspective increased the odds of preferring AG over GG in 2030s by a factor of 2.8 (CI 1.54, 5.1; p = 0.001) and decreased the odds of preferring BAU over AG for LI countries in 2030s by a factor of 0.16 (CI 0.06, 0.42; p = 0). In the contexts of HI and LI countries the pathway choices of those who considered GDP to be only slightly bad as an indicator of societal wellbeing did not differ statistically from those who considered GDP to be slightly good. However, for UMI countries the odds of preferring AG over GG in 2020s were increased by a factor of 4.72 (CI 2.27, 9.84; p = 0) by this comparison, and in 2030s by a factor of 2.91 (CI 1.41, 6.02; p = 0.004). For LMI countries those who considered GDP to be slightly bad had increased odds of preferring AG over GG in 2020s by a factor of 5.04 (CI 2.1, 12.09; p = 0) and in 2030s by a factor of 2.29 (CI 1.18, 4.43; p = 0.014). Lastly, those who considered GDP to be extremely or very good as an indicator of societal wellbeing had increased odds of preferring GG over AG for HI countries in 2020s by a factor of 2.43 (CI 1.01, 5.83; p = 0.047) and in 2030s by a factor of 2.56 (CI 1.02, 6.4; p = 0.045).

Pathway choice could also be explained by the participants' familiarity with PG theory, as measured by an index which was comprised of self-assessed familiarity, number of publications, teaching experience, and course attending (see Chapter 3 for more details). The higher the continuous index, the greater the familiarity. For HI countries, the higher the PG familiarity index, the higher were the odds of preferring DG over GG in 2020s by a factor of 1.04 (CI 1.01, 1.07; p = 0.003), and the higher the odds of preferring DG over AG in 2020s by a factor of 1.02 (CI 1, 1.04; p = 0.039). For UMI countries, an increase in the PG familiarity index increased the odds of preferring AG over GG for UMI countries in 2020s by a factor of 1.03 (CI 1.01, 1.05; p = 0.002). For LMI countries, an increase in the PG familiarity index increased the odds of preferring AG over GG in 2020s by a factor of 1.02 (CI 1, 1.05; p = 0.019) and the odds of preferring DG over GG in 2030s by a factor of 1.07 (CI 1.01, 1.13; p = 0.026). An increase in the PG familiarity index also increased the odds of preferring AG over GG for LI countries in 2030s by a factor of 1.02 (CI 1, 1.04; p = 0.028). The same index was calculated for familiarity with the SDGs and GG theory, but these were not statistically significant in any context.

Table 10. Significant explanatory variables for each context when pathways were compared to GG (reference). Variables sorted from lowest to highest p-value by context. A table with all results, including those not statistically significant, is available online (see Appendices section for details).

Context	Pathway	Variable	Ref. Var.	p	Sig	OR	Lower	Upper
HI in 2020s	DG	COVID_Inf.Higher	No.Inf.	0.000	****	0.206	0.089	0.478
HI in 2020s	DG	Familiarity_PG	-	0.003	**	1.043	1.015	1.072
HI in 2020s	DG	GDP_VeryBad	SlightlyGood	0.008	**	3.333	1.377	8.071
HI in 2020s	DG	C9.inf_Lower	No.Inf.	0.020	*	0.297	0.107	0.826
HI in 2020s	DG	Level_Prof	Dr	0.021	*	3.554	1.215	10.399
HI in 2020s	AG	Level_Prof	Dr	0.028	*	2.646	1.108	6.323
HI in 2020s	DG	Age.Quadratic	-	0.037	*	3.557	1.078	11.747
HI in 2030s	DG	End_None	End_All	0.000	****	0.140	0.064	0.309
HI in 2030s	DG	GDP_VeryBad	SlightlyGood	0.020	*	2.664	1.171	6.060
HI in 2030s	DG	COVID_Inf.Higher	No.Inf.	0.029	*	0.434	0.205	0.918
UMI in 2020s	AG	GDP_Bad	SlightlyGood	0.000	****	4.721	2.266	9.838
UMI in 2020s	AG	GDP_VeryBad	SlightlyGood	0.000	****	4.411	2.384	8.157
UMI in 2020s	AG	Familiarity_PG	-	0.002	**	1.031	1.011	1.053
UMI in 2020s	AG	Age.Quadratic	-	0.005	**	3.330	1.432	7.749
UMI in 2020s	DG	Men	Women	0.010	*	0.303	0.123	0.749
UMI in 2020s	DG	Age.Quadratic	-	0.011	*	6.271	1.517	25.942
UMI in 2020s	DG	Age.Linear	-	0.016	*	0.125	0.023	0.684
UMI in 2030s	DG	GDP_VeryBad	SlightlyGood	0.000	****	6.385	2.779	14.685
UMI in 2030s	AG	GDP_VeryBad	SlightlyGood	0.000	****	3.955	2.091	7.474
UMI in 2030s	AG	GDP_Bad	SlightlyGood	0.004	**	2.910	1.405	6.023
UMI in 2030s	DG	COVID_Inf.Higher	No.Inf.	0.007	**	0.344	0.157	0.752
LMI in 2020s	AG	GDP_Bad	SlightlyGood	0.000	****	5.038	2.100	12.090
LMI in 2020s	AG	GDP_VeryBad	SlightlyGood	0.000	****	5.629	2.654	11.933
LMI in 2020s	AG	Min_>60	10-20 min	0.003	**	3.586	1.528	8.410
LMI in 2020s	AG	Familiarity_PG	-	0.019	*	1.024	1.004	1.046
LMI in 2020s	BAU	End_Some	End_All	0.019	*	3.411	1.226	9.491
LMI in 2020s	BAU	End_None	End_All	0.028	*	2.821	1.121	7.098
LMI in 2030s	AG	GDP_VeryBad	SlightlyGood	0.000	****	3.121	1.801	5.412
LMI in 2030s	BAU	Age.Quadratic	-	0.003	**	0.158	0.047	0.531
LMI in 2030s	AG	GDP_Bad	SlightlyGood	0.014	*	2.291	1.184	4.432
LMI in 2030s	DG	Familiarity_PG	-	0.026	*	1.065	1.007	1.126
LMI in 2030s	AG	Field_Other	Economics	0.040	*	2.832	1.048	7.652
LI in 2020s	BAU	End_Some	End_All	0.001	**	3.391	1.608	7.155
LI in 2020s	AG	Min_>60	10-20 min	0.003	**	3.838	1.589	9.273
LI in 2020s	AG	Focus_Hi&Lo	Focus.HI	0.016	*	2.910	1.220	6.934
LI in 2020s	AG	Focus_Global	Focus.HI	0.026	*	2.411	1.110	5.239
LI in 2030s	AG	GDP_VeryBad	SlightlyGood	0.001	**	2.801	1.539	5.096
LI in 2030s	AG	Min_>60	10-20 min	0.008	**	3.099	1.350	7.113
LI in 2030s	AG	Familiarity_PG	-	0.028	*	1.021	1.002	1.041
LI in 2030s	BAU	Level_Prof	Dr	0.035	*	2.869	1.077	7.634
LI in 2030s	AG	Field_Other	Economics	0.037	*	3.040	1.067	8.660
LI in 2030s	AG	Focus_Hi&Lo	Focus.HI	0.040	*	2.166	1.037	4.525

Table 11. Significant explanatory variables for each context when pathways were compared to AG (reference). Variables sorted from lowest to highest p-value by context. A table with all results, including those not statistically significant, is available online (see Appendices section for details).

Context	Pathway	Variable	Ref. Var.	p	Sig	OR	Lower	Upper
HI in 2020s	GG	End_None	End_All	0.000	****	3.532	1.933	6.454
HI in 2020s	DG	C.grouped_LI/LMI	HI	0.013	*	3.219	1.278	8.108
HI in 2020s	DG	COVID_Inf.Higher	No.Inf.	0.015	*	0.430	0.218	0.847
HI in 2020s	GG	As.Prof	Dr	0.020	*	2.370	1.145	4.911
HI in 2020s	GG	COVID_Inf.Higher	No.Inf.	0.025	*	2.085	1.098	3.959
HI in 2020s	DG	As.Prof	Dr	0.027	*	2.351	1.103	5.016
HI in 2020s	DG	GDP_VeryBad	SlightlyGood	0.030	*	2.149	1.077	4.293
HI in 2020s	DG	Familiarity_PG	-	0.039	*	1.022	1.001	1.043
HI in 2020s	DG	Age.Linear	-	0.041	*	0.337	0.118	0.956
HI in 2020s	GG	C9.inf_Lower	No.Inf.	0.041	*	2.399	1.038	5.547
HI in 2020s	GG	GDP.att_2	SlightlyGood	0.047	*	2.428	1.011	5.830
HI in 2030s	GG	End_None	End_All	0.001	**	2.829	1.521	5.259
HI in 2030s	GG	As.Prof	Dr	0.004	**	3.171	1.443	6.973
HI in 2030s	DG	End_None	End_All	0.007	**	0.397	0.203	0.776
HI in 2030s	DG	As.Prof	Dr	0.015	*	2.373	1.181	4.766
HI in 2030s	GG	GDP.att_2	SlightlyGood	0.045	*	2.557	1.021	6.402
UMI in 2020s	GG	End_None	End_All	0.000	****	4.100	2.295	7.319
UMI in 2020s	GG	As.Prof	Dr	0.013	*	2.425	1.203	4.885
UMI in 2020s	GG	COVID_Inf.Higher	No.Inf.	0.020	*	1.950	1.109	3.430
UMI in 2020s	DG	Age.Linear	-	0.036	*	0.199	0.044	0.903
UMI in 2030s	GG	End_None	End_All	0.000	****	2.948	1.658	5.237
UMI in 2030s	GG	As.Prof	Dr	0.003	**	2.936	1.428	6.029
UMI in 2030s	DG	As.Prof	Dr	0.015	*	2.599	1.203	5.610
LMI in 2020s	BAU	End_None	End_All	0.006	**	4.384	1.533	12.544
LMI in 2020s	GG	Men	Women	0.010	*	2.061	1.188	3.571
LMI in 2020s	GG	Field_Other	Economics	0.049	*	0.334	0.112	0.998
LMI in 2030s	BAU	Age.Quadratic	-	0.002	**	0.144	0.042	0.499
LMI in 2030s	GG	End_None	End_All	0.006	**	2.132	1.244	3.654
LI in 2020s	BAU	Men	Women	0.006	**	2.968	1.363	6.462
LI in 2020s	BAU	Focus_Global	Focus.HI	0.011	*	0.251	0.087	0.724
LI in 2020s	BAU	Level_Prof	Dr	0.012	*	3.640	1.322	10.029
LI in 2030s	BAU	GDP_VeryBad	SlightlyGood	0.000	****	0.159	0.060	0.417
LI in 2030s	GG	C.grouped_Not	HI	0.022	*	2.776	1.161	6.631
LI in 2030s	BAU	Level_Prof	Dr	0.038	*	3.133	1.068	9.194
LI in 2030s	BAU	End_Some	End_All	0.040	*	3.114	1.053	9.217
LI in 2030s	BAU	Men	Women	0.042	*	2.519	1.036	6.129
LI in 2030s	GG	As.Prof	Dr	0.045	*	2.054	1.015	4.155

2.1.1.1. Inconsistencies in the focus of scholars

Based on the global survey results, the majority of those scholars whose main geographical focus is on the higher country income groups (HI or UMI) should mainly focus on PG, while those whose focus is on the lower country income groups (LMI or LI) should focus on GG. However, this is currently not the case (Table 12). Of those participants whose scholarly work focused on the higher country income groups, 35 % had addressed GG but not PG in their publications, 4 % had addressed PG but not GG, while 16 % had addressed both, and 45 % neither. Similarly, of those whose scholarly work focused on the lower country income groups, 25 % had addressed GG but not PG, 3 % had addressed PG but not GG, while 14 % had addressed both, and 57 % neither. The results were similar when comparing those who indicated their main geographic focus to be HI countries to those who indicated it to be LI countries.

Table 12. Comparison of the geographic focus of scholars to the focus of their scholarly work by topic.

Focus	**GG only**	**PG only**	**Both**	**Neither**
HI/UMI	34.8%	4.3%	16.1%	44.7%
LMI/LI	25.2%	3.4%	14.3%	57.1%
All (global)	21.9%	6.3%	19.8%	52.1%
HI	28.7%	5.5%	16.5%	49.4%
Not HI	28.9%	3.6%	16.4%	51.1%
LI	25.0%	5.2%	12.9%	56.9%
Not LI	30.2%	4.0%	17.7%	48.2%

4.4.2. Scholars' familiarity with the SDGs, Green Growth, and Post-Growth

Reflecting the fact that the survey was targeted at sustainability scholars, 82 % of participants reported that they were either extremely or very familiar with the SDGs, and a further 16 % reported they were moderately familiar with them (Figure 12). In contrast, the familiarity of sustainability scholars with GG theory was substantially lower, with 41 % of participants reporting to be either extremely or very familiar, 12 % only slightly familiar and 8 % not familiar at all (Figure 12) and familiarity with PG theory was even lower than that, with only 21 % reporting to be either extremely or very familiar, 24 % slightly familiar and 20 % not familiar at all (Figure 12).

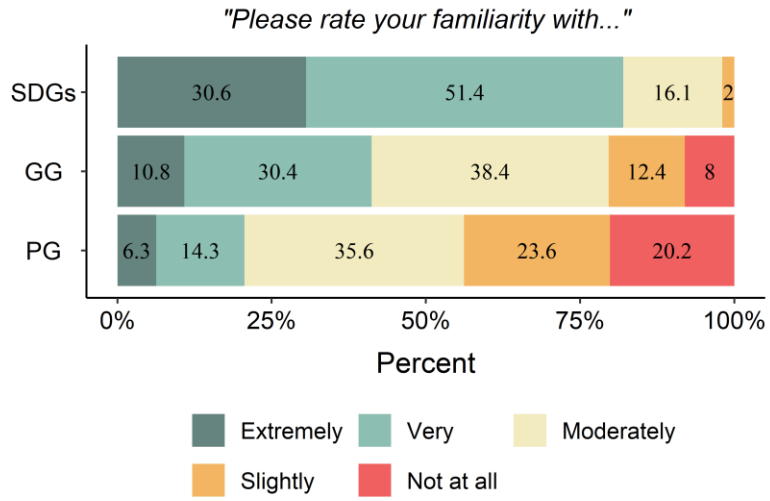

Figure 12. Self-assessed familiarity with key topics: the UN Sustainable Development Goals (SDGs), green growth (GG) theory and post-growth (PG) theory (N = 461 for each topic).

The number of publications addressing each topic reflected these reports of familiarity, as did answers to the two questions of whether the participants had taught or attended a university course that covered each of these topics (Figure B1, Figure B2). 3 % of the participants had not (co)authored publications that addressed the SDGs, 55 % had not addressed GG theory, and 79 % had not addressed PG theory. Over half of the participants, 58 %, had taught a course covering the SDGs, while the corresponding number for GG theory was 29 % and 17 % for PG theory. The level of familiarity differed significantly overall between the three topics based on all measures (Table 13). These results show that although the majority of sustainability scholars support PG pathways, they are mostly unexperienced with PG theory. To see if familiarity differed by pathway choice, I used Chi-square tests to compare both GG and AG supporters against DG supporters (Table 14). While I found no statistically significant differences in familiarity with the SDGs or GG theory, I did observe differences in familiarity with PG theory (Table 14). DG supporters were more familiar with PG theory than GG supporters (χ^2 = 12.37, Df = 4, p = 0.015) or AG supporters (χ^2 = 11.29, Df = 4, p = 0.024), while GG and AG supporters did not differ from each other significantly (χ^2 = 3.90, Df = 4, p = 0.419).

Table 13. Chi-Square tests for four familiarity variables by topic. Comparing if differences between topics exist in self-assessed familiarity (1-3), number publications (4-6), as well as teaching (7-9) and attending (10-12) courses addressing each topic (Sustainable Development Goals, Green Growth, and Post-Growth). P-values are for the overall comparison. Z refers to standardized residuals of each specific comparisons, by the levels of each variable (with bolded values exceeding the critical z value of -1.96 at significance level 0.05). For familiarity, the z levels 0-4 are: not at all, slightly, moderately, very, and extremely familiar, respectively. For the number of publications: 0, 1-5, 6-15, 16-30, 31+. For course teaching and attending: 0 = No, 1 = Yes.

Question	Comparison	χ^2	Df	p	z (0)	z (1)	z (2)	z (3)	z (4)
Familiarity	SDG-GG	182.49	4	<0.001	**-6.21**	**-6.13**	**-7.62**	**6.50**	**7.39**
Familiarity	SDG-PG	382.07	4	<0.001	**-10.17**	**-9.86**	**-6.77**	**11.99**	**9.51**
Familiarity	GG-PG	73.07	4	<0.001	**-5.30**	**-4.46**	0.89	**5.85**	**2.47**
Publications	SDG-GG	299.97	4	<0.001	**-17.12**	**11.04**	**6.45**	1.16	1.14
Publications	SDG-PG	553.51	4	<0.001	**-23.40**	**17.16**	**8.59**	**2.02**	**2.24**
Publications	GG-PG	65.65	4	<0.001	**-7.99**	**6.85**	**2.93**	0.91	1.42
Teaching	SDG-GG	77.08	1	<0.001	**-8.85**	**8.85**			
Teaching	SDG-PG	164.48	1	<0.001	**-12.89**	**12.89**			
Teaching	GG-PG	18.78	1	<0.001	**-4.41**	**4.41**			
Attending	SDG-GG	8.29	1	0.004	**-2.95**	**2.95**			
Attending	SDG-PG	44.10	1	<0.001	**-6.72**	**6.72**			
Attending	GG-PG	14.19	1	<0.001	**-3.85**	**3.85**			

Table 14. Chi-square tests for familiarity by topic and pathway choice. Context: high-income countries for the 2020s. P-values are reported for the overall comparison. Z refers to standardized residuals of each specific comparisons, grouped by the levels of each variable, with bolded values exceeding the critical z value of 1.96 (-1.96) at significance level 0.05. The z levels 0-4 are: not at all, slightly, moderately, very, and extremely familiar, respectively.

Question	Comparison	χ^2	Df	p	z (0)	z (1)	z (2)	z (3)	z (4)
Fam.SDG	DG-GG	3.50	3	0.321	-	-1.68	0.02	0.96	-0.62
Fam.SDG	DG-AG	3.40	3	0.334	-	-1.51	-0.15	1.22	-0.79
Fam.SDG	GG-AG	0.13	3	0.988	-	0.32	-0.17	0.08	-0.06
Fam.GG	DG-GG	6.35	4	0.174	-1.25	-1.82	1.41	0.80	-0.52
Fam.GG	DG-AG	7.61	4	0.107	0.23	**-2.51**	0.43	1.56	-0.50
Fam.GG	GG-AG	4.81	4	0.307	1.87	-0.61	-1.26	0.60	0.11
Fam.PG	DG-GG	12.37	4	0.015	**-2.73**	-1.33	1.55	1.80	0.91
Fam.PG	DG-AG	11.29	4	0.024	-1.66	-1.91	0.86	1.55	**2.00**
Fam.PG	GG-AG	3.90	4	0.419	1.65	-0.41	-1.01	-0.65	0.82

Comparing GG supporters to DG supporters, the two groups of scholars differed most in their familiarity with PG theory (distance: 46.5 percentage points), second most in their familiarity with GG theory (distance: 30 percentage points), and the least with respect to the SDGs (distance: 13.8 percentage points), and those who chose the DG pathway for HI in 2020s instead of GG were overall

more familiar with all three topics (Figure 13). It is also notable that 29.3 % of those who chose DG for HI in 2020s were only slightly or not at all familiar with PG theory.

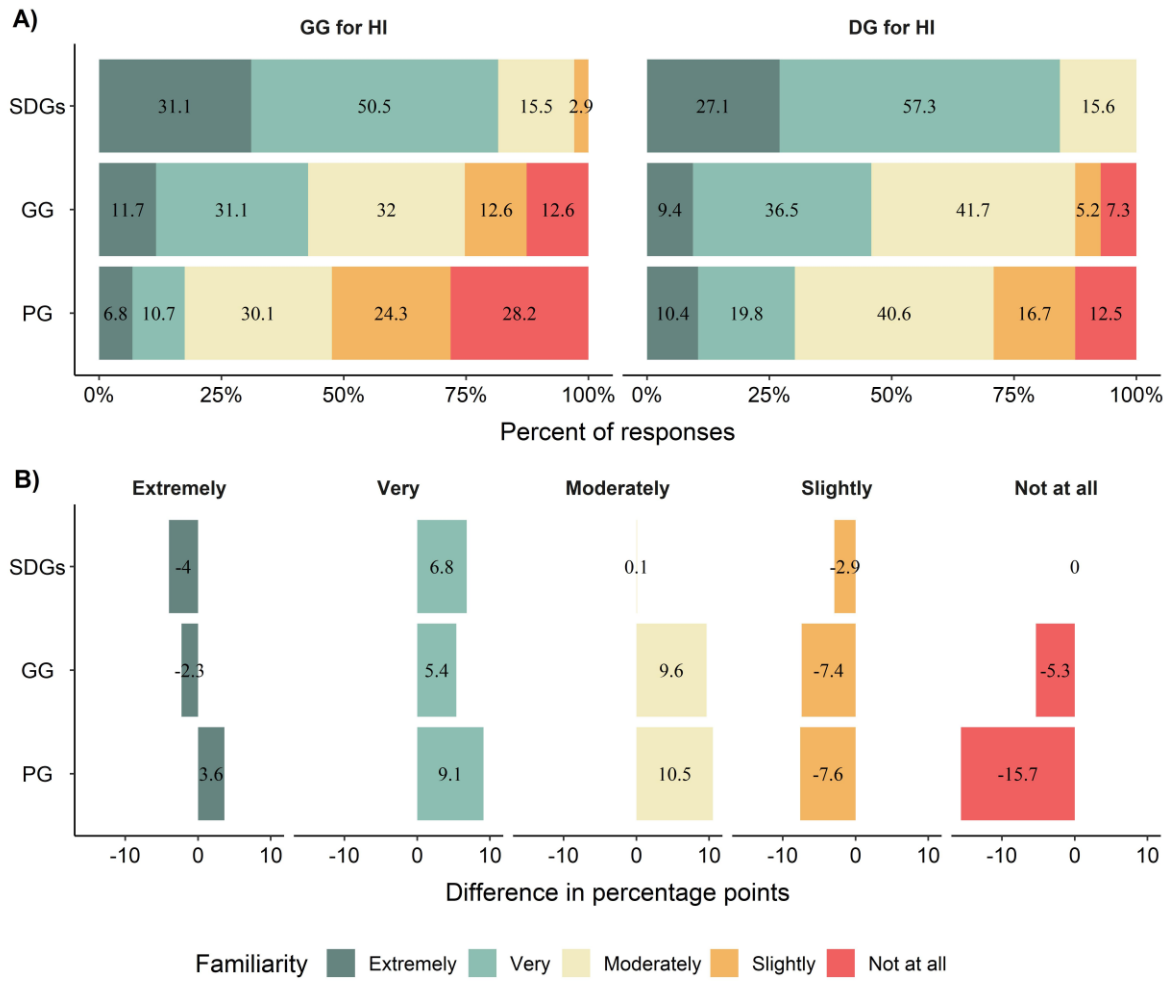

Figure 13. Differences in the self-assessed familiarity by pathway choice for high-income countries (HI) for the 2020s. A) Familiarity per topic among those who supported GG and among those who supported DG. B) Difference per level of familiarity, comparing those who supported DG to those who supported GG.

4.5. Discussion

The main objective of this chapter was to explore sustainability scholars' views on which future pathways countries in different income groups should pursue during the current and the following decade, and how familiar the experts are with PG and GG theory. The findings show that most sustainability scholars think that transformational change away from BAU is required everywhere, but it must be targeted so that HI and UMI countries focus on implementing policies that allow AG or DG

paths to be followed, while efforts to achieve GG should mainly be focused on LI and LMI countries, at least during the 2020s. Only a very small minority (less than 1 %) supported BAU for HI and UMI countries. The finding that around 80 % of scholars supported PG pathways for HI countries is surprising, given how little focus is given to PG in sustainability reports and the UN 2030 Agenda for sustainability (Belmonte-Ureña et al., 2021; GSDR, 2019; Sachs et al., 2021; UN, 2020). Although my findings did not fully align with what Hickel and Kallis have concluded to be necessary, namely that DG should be followed in rich nations while the global South embraces AG (Hickel and Kallis, 2019), I did find that support for PG pathways increased between the current and the next decade for all groups, while support for GG and BAU decreased – particularly for LMI and LI countries. The wide and increasing support for AG clearly suggests that most sustainability scholars think societal wellbeing and the environment should take priority over GDP growth, eventually everywhere.

I found that older age increased the odds of supporting PG pathways in the context of HI and UMI countries in the 2020s while decreasing the odds of preferring BAU for LMI countries in the 2030s. Reflecting this finding, associate professors seemed to prefer either GG or DG instead of AG for HI countries while full professors were more supportive of both AG and DG, compared to doctors. At the same time, full professors were also more likely to support BAU for LI countries. While gender was not significant at explaining pathway choice in the context of HI countries, men were more supportive of GG over PG for UMI and LMI, and BAU over AG for LI countries. I also found that those who thought the COVID-19 pandemic should affect future GDP rates were less supportive of PG for the higher country income groups, but the influence of the pandemic was not statistically significant for pathway choice in the context of LMI or LI countries. Lastly, my findings showed that attitudes towards GDP as an indicator of societal wellbeing was an important factor for explaining pathway choice across different contexts. Specifically, those who thought GDP does a good job in this respect were more supportive of GG than PG, whereas those who thought GDP is a bad indicator of societal wellbeing were more supportive of PG.

4.5.1. Interpretation of pathway choices

BAU was a position for growth regardless of increasing environmental impacts, which assumed that societal wellbeing increases with GDP. This assumption also held true for the GG pathway, which differed from BAU by being a no trade-offs pathway with increasing GDP and decreasing environmental impacts. If the rate of future decoupling turns out to be insufficient to reduce environmental impacts in absolute terms (Haberl et al., 2020; Hickel and Kallis, 2019; Parrique et al.,

2019), while the scale of production and consumption increases in the lower income countries, the GG pathway would essentially seek to minimise the negative environmental and social impacts of growth.

Like GG, both PG pathways also called for decreasing environmental impacts, but unlike GG, these pathways stated that societal wellbeing should be increased directly. The PG pathways differed from each other in that AG called for growth agnosticism, while DG explicitly called for decreasing GDP. This implies that scholars who chose the PG pathways recognised the potential for trade-offs regarding GDP. However, through the pathway choice alone it is not possible to determine the extent of this trade-off, i.e., whether the actual rates of future GDP growth would differ between the supporters of different pathways. This is why later survey questions focused on the future of economic growth in detail, as I will report in Chapter 5.

While AG implied an agnostic position regarding growth, the DG pathway implied support for lower growth rates, or even negative, which is consistent with some definitions of degrowth. For example, according to the definition used by Belmonte-Ureña et al. (2021), "DG assumes resource limitations and advocates smaller growth rates, even negative, to balance the natural and the economic systems". Therefore DG could also have been the pathway of choice for those who support intentionally low growth, as some PG scholars have argued for (Jackson and Victor, 2019b; Victor, 2019). Common for all interpretations of the PG pathways is that the wellbeing of people and nature should take priority over GDP. This was supported by the finding that the supporters of PG pathways were more likely to consider GDP to be a poor indicator of societal wellbeing (Figure 11).

The AG approach implies that if societies take other measures of success into consideration, in addition to or instead of the growth rate of GDP, actions will be incentivised that seek to achieve sustainable levels of consumption and production. This can mean either decreasing or increasing GDP, depending on the extent to which decoupling is achieved between GDP growth and its impacts on the environment and societal wellbeing (Haberl et al., 2020; Hickel and Hallegatte, 2021; Hickel and Kallis, 2019; Parrique et al., 2019). It has been argued that HI countries may only be able to achieve sustainable prosperity via active reductions to the volume of the economy (Hickel, 2019; Hickel and Kallis, 2019; Jackson, 2009; Jackson and Victor, 2020; Parrique et al., 2019), i.e., through intentional DG. Should this be true, the AG and DG pathways would result in the same outcome for HI countries, assuming that AG supporters would actually be accepting of and prepared for the aggregate declines in production and consumption levels.

4.5.2. COVID-19 and pathway choice

Scholars who said they would have preferred the same future GDP rates regardless the COVID-19 pandemic were more likely to support PG pathways for HI countries, whereas scholars who thought the pandemic should affect future rates were more likely to support GG. It is rather straightforward to interpret why those who thought that future GDP rates in the years 2025 and 2030 should be higher overall due to the COVID-19 pandemic had increased odds of supporting GG over AG for HI countries, since GG supporters think future growth can occur sustainably. The same logic explains why GG supporters had increased odds of thinking that growth will never end. However, it was more surprising, and somewhat counterintuitive, to find that those who thought that future GDP rates should be lower overall due to the pandemic also had increased odds of supporting GG over AG or DG for HI countries. Of those GG supporters who thought that future GDP rates should be different in HI countries, 33 % said they chose rates that were overall lower (rather than higher) than what they would have chosen without the pandemic – the respective fractions for AG and DG supporters were 29 % and 43 % (and 0 % BAU supporters).

From the data, it is not possible to determine the reasons why those who supported lower rates for HI also had increased odds of supporting GG. One potential explanation is that those who supported PG pathways already supported low growth rates for the future and didn't think that the pandemic should affect that, while those who supported GG may have considered the pandemic to have long-lasting effects that would slow down economic growth during this decade (Burgess et al., 2021). Or, alternatively, the GG supporters may have noticed the widely reported environmental benefits associated with the economic slowdown (Loh et al., 2021; Rume and Islam, 2020; UN, 2020), which could imply benefits from lower growth rates, as the supporters of PG already recognise. Rather than speculate further, I merely conclude that this somewhat counterintuitive finding might present an intriguing opportunity for future research. I will return to discuss the influence of the pandemic further in Chapter 5, after a detailed analysis of the survey questions relating to the future of economic growth.

4.5.3. Augmenting previous survey studies

Previous survey studies have focused on different groups, areas, or time periods, and applied different methods of analysis. For comparisons with my research, the most relevant of these was research by

Drews and van den Bergh (2017), who used similar pathway choices when evaluating the perspectives of economists and environmental scientists in 2015. A comparison between my findings and theirs reveals striking differences in the support for different pathways, reinforcing the pattern of increasing support for post-growth and decreasing support for green growth through time, which I noticed in my results (Figure 14). This comparison also corroborates the finding that a robust consensus seems to exist among scholars against the BAU pathway for HI countries, with nearly 99 % of scholars preferring other pathways. While my survey was targeted at scholars who had published research on sustainability topics between the years 2015 and 2021, Drews and van den Bergh (2017) surveyed scholars who had published in a number of specific journals from the fields of environmental economics, ecological economics, and environmental science between the years 2009 and 2014. This earlier study surveyed the preferences of scholars from 2015 onwards, in the context of "rich industrialised countries". For this comparison I have limited my sample to include scholars from similar fields and limited the focus to the same context (HI countries) to facilitate comparability. The pathways used by Drews and van den Bergh (2017) were broadly comparable to the ones I used (See Chapter 3, Table 4).

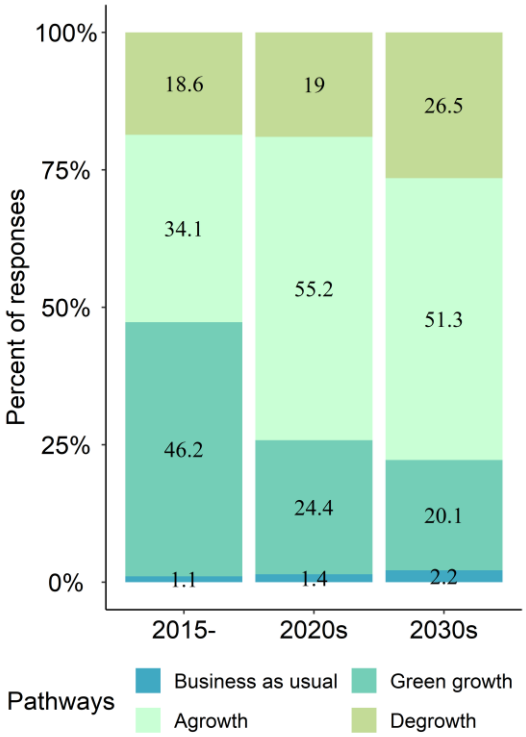

Figure 14. Comparing pathway support to previous research by Drews and van den Bergh (2017), who evaluated support for different pathways for high-income countries among economists and environmental scientists from the year 2015 onwards. My findings applied to the 2020s and the 2030s.

Like me, Drews and van den Bergh (2017) found no significant effect for gender for explaining pathway choice in the context of HI countries. However, I did find gender to be a significant variable in the context of the other country income groups. Similarly, whereas I found significant effects for age and education level, Drews and van den Bergh (2017) did not. I evaluated participant attitudes towards GDP as an indicator of societal wellbeing, which I found to be a significant factor for explaining pathway choice in most contexts. Unlike me, Drews and van den Bergh (2017) also tested government and private affiliation, finding them insignificant (at least in the context of HI countries). They also asked the participants to estimate their political orientation, which they found to be highly significant for explaining pathway choice: Those leaning to the right of the left–right political spectrum had decreased odds of supporting AG or DG over GG. This is one variable I could have also benefitted from evaluating. I did not find academic field to be a significant predictor when using aggregated fields, but differences between specific fields may still exist, as Drews and van den Bergh (2017) found that environmental scientists, social scientists, and ecological economists had increased odds for supporting AG and DG over GG when compared to environmental economists. What I found was simply that economists who have published on sustainability topics did not differ significantly from researchers in other fields who had also published on sustainability topics. This does not mean that the economics field in general does not differ from others in their views regarding future pathways and economic growth.

While Drews and van den Bergh (2017) found that participants from LI or LMI countries had decreased odds of supporting AG over GG for HI countries (OR 0.35, p=0.002), I did not find similarly decreased odds. For the same context and variable, Drews and van den Bergh (2017) found no difference in support for DG when compared to GG (OR 0.87, p=0.7), but in my results the test was not far off from being statistically significant (OR = 2.76, p = 0.079). Furthermore, since I also ran my analyses with AG as the reference, I found that participants from LI or LMI countries had higher odds of preferring DG over AG for HI countries, compared to participants from HI countries. This finding seems to support the arguments of Hickel (2021a, 2021b), who has associated DG with decolonization, writing that through reversing the processes on which growth in the global north is based, DG calls for "disaccumulation, decommodification, and decolonization", but also that "decolonization in the South along these lines would likely cause degrowth in the North". It may therefore be that scholars from less affluent countries may be concerned or even sad to find out that most sustainability scholars think the end of economic growth in high-income countries would not be intentional.

Recently, another paper by Lehmann et al. (2022) used similar pathway options, using the wordings of Drews et al. (Drews et al., 2019; Drews and van den Bergh, 2016) to evaluate the attitudes of environmental protection specialists, by surveying the employees of the German Environment Agency

(of whom only 25 % had a doctorate). Lehmann et al. (2022) also did not explicitly define the time period, so we may assume that their results are roughly comparably to my findings for the 2020s. The authors found that 45 % of the experts they surveyed thought rich industrialised countries should follow an AG pathway, while DG was supported by 30 % and GG by 25 % of the participants. This corroborates my findings of substantial support for PG among experts for HI countries during the current decade. Building on the work of Drews et al. (2019), Lehmann et al. (2022) also evaluated the implicit positions of the survey participants by evaluating their agreement with specific position statements, and through this approach they found even greater support for PG, with 53 % supporting AG positions, 46 % DG, while just 1 % supported GG statements. This further reinforces the conclusion that support for PG is substantial among the experts.

Scholars have debated for some time whether DG is too politically unattractive to be impactful (Drews and Antal, 2016; Hickel, 2021b; Kallis, 2011; Lehmann et al., 2022; van den Bergh, 2011). This consideration may also have influenced the pathway choices of scholars in my research. Specifically, some scholars may have preferred the AG option instead of DG due to considerations of political feasibility when it comes to intentionally focusing on decreasing GDP. The approach of evaluating implicit positions through specific statements could have allowed me to evaluate this possibility. Future research might also benefit from measuring participant opinions on the feasibility of implementing each pathway, and potentially comparing if differences in opinions vary by the spatiotemporal context.

Of particular note is that Lehmann et al. (2022) also evaluated participant agreement with another approach developed in Germany termed “precautionary post-growth”, which emphasises the uncertainty of future growth while noting that societal growth dependencies must be overcome to facilitate societal wellbeing and environmental policies. They found high agreement for this approach among the experts, most of whom were not familiar with it prior to participating. However, the average agreement differed by pathway choice, with AG and DG supporters more likely to agree with the approach than GG supporters. Tellingly, across all participants the average agreement with the sentence “Potentials for a more growth-independent design of societal institutions should be identified and realized” was very high. This reinforces the conclusion that future research should be directed at overcoming societal growth addictions, a theme to which I will return later on in chapters 6 and 7. Future surveys in particular could benefit from detailed analyses of the question of growth dependency, or the “societal addiction” to growth (Costanza et al., 2017).

In comparison to the findings discussed above, which have addressed the perspectives of experts, some previous surveys have also evaluated the acceptability of alternative future pathways among

the public. In 2014, Drews and van den Bergh (2016a) surveyed 1008 Spanish citizens and found GG to have 59 % of the support, while 21 % favoured AG, 15 % DG, and 4 % BAU. In comparison, a survey performed in 2016 in Canada found that most participants supported reducing consumption, while the people were divided whether a good life is possible without, or dependent on, economic growth, and whether economic growth and environmental sustainability are compatible (Tomaselli et al., 2019). Whereas in 2016 in Australia, the majority of people seemed to support pathways that focus on wellbeing and community over individualism and GDP growth (Chambers et al., 2019). These findings show that while the public seems to have had greater support for GG than experts do, some level of agreement with PG ideas exists, which is why discussing these ideas in HI countries could already be considered to be socially acceptable, at least when the approach is wellbeing focused. Support for different pathways may also have changed among the general public in the past 6 years, like they have among scholars.

4.5.4. The need to shift focus

My results emphasise that PG needs more attention in both research and education. The results revealed that although sustainability scholars think HI countries should follow PG pathways, GG is currently receiving the most focus among scholars regardless of the geographical focus of their scholarly work. A quick Scopus search (performed 2022-03-14) provides corroborating evidence, showing that GG has been addressed in 3,256 articles or reviews (search terms: "green growth" OR "green economic growth" OR "sustainable growth"), while PG has been addressed in 791 (search terms: "post-growth" OR "degrowth"), when limiting the search to the four most relevant subject areas (Social Sciences; Environmental Science; Economics, Econometrics and Finance; and Arts and Humanities). Corroborative evidence has been provided by a bibliometric analysis performed by Belmonte-Ureña et al. (2021), who showed that more articles are published on GG annually than on DG. Their research also showed that DG research has been growing at a faster rate than GG research in recent years, and that both domains have had substantially higher growth rates compared to SDG research, research on circular economy, and compared to the average growth of the Scopus database (Belmonte-Ureña et al., 2021).

The fact that GG receives so much focus from scholars is hardly surprising, given how GG is the core theoretical basis of the sustainable development agenda (Belmonte-Ureña et al., 2021) and thus the primary pathway followed by most HI countries. HI countries are also investing substantial amounts of money on research with the hope of making GG a reality (e.g., European Commission, 2019).

However, more research should clearly be focused on PG pathways directly, in order to demonstrate what an AG or DG future might look like in different country income groups, particularly in HI and UMI countries. Research is also needed to evaluate what policies and actions could help achieve such visions in practice, and to find out what obstacles may need to be overcome so that the interventions can be implemented. This conclusion reflects the bibliometric analysis of Belmonte-Ureña et al. (2021), which revealed a striking lack of keywords associated with the practical implementation of degrowth, reflecting the need for more detailed research.

The reviews of DG literature have also observed that DG scholars would benefit from a more diversified research programme utilising modelling, surveys, and other methods of hypothesis testing instead of continuing to focus on the deficiencies of the prevailing GG oriented status-quo, which have long been discussed (Belmonte-Ureña et al., 2021; Weiss and Cattaneo, 2017). GG scholars have been much more active in discussing solutions to practical problems (Belmonte-Ureña et al., 2021), which is understandable, as the burden of proof has been on PG to dethrone the predominant assumptions favouring GG. It could nonetheless be argued now that following the precautionary principle, the burden of proof should be reversed, so that those promoting or assuming a GG pathway should justify doing so, because the GG pathway may be considered risky and potentially dangerous (Hickel et al., 2021; Keyßer and Lenzen, 2021).

My results could also be used to argue this, since they reveal that the majority of sustainability scholars now question GG for HI countries and seem to be open for considering PG solutions. This may also encourage scholars to bring up PG as a valid discussion point whenever decisions on sustainable development are being made, whether that be practical actions, research projects, funding, etc. Furthermore, my results can provide justification for PG scholars to start focusing more on solutions and less on criticizing growth. Scientists have been giving out warnings of the dangers of prevailing pathways since at least the 1970's, but as Costanza et al. (2017) have argued, confrontational warnings and judgements are not an effective way to motivate change when it comes to addictions and may even prolong the destructive behaviour. PG scholars should seek to demonstrate, through their research, how embracing a PG path, especially in HI countries, could be a safer, less risky, more just, and a more effective way to reduce emissions, resource use, and waste outputs (and to make it easier to achieve those reductions) while securing or improving societal wellbeing. This is what should be emphasised.

Such research could also help scholars achieve an even higher consensus on the best pathway choice for each country income group. Additionally, a specific approach that could help consensus creation was that used by Drews et al. (2019), who applied a clustering approach to group economists and

environmental scientists based on their agreement on specific statements about growth and the environment. The authors recognised three clusters which differed in their views. 31 % of the scholars were allocated to a GG cluster, 25 % to DG, and 44 % to an AG cluster. Extending such an approach to cover different spatiotemporal contexts could help inform which topics are particularly contested and in need of further research and discussion. I found that strong consensus is lacking particularly for the LMI and LI countries for the 2030s. To achieve consensus on the future pathways for these country income groups, the focus of sustainability research might need to shift in the developing countries themselves. According to the results of Belmonte-Ureña et al. (2021), developing countries have produced 34 % of GG papers, 20 % of circular economy papers, 18 % of SDG papers, and only 5 % of published research on DG. They argue that this can reinforce GG as the preferred pathway choice in developing countries, as these countries may be more likely to perceive guidance as suitable if the guidance is based on research which has been produced in developing countries.

My findings show that for global sustainability to be achieved, the research focus in developing countries should shift more towards PG topics by the end of this decade, particularly to allow transitions to growth agnosticism. This could help them avoid lock-ins to unsustainable economic patterns, avoiding the societal addictions on growth which currently characterize rich nations and hinder their ability to respond to social and environmental needs. AG could ensure that development in the lower country income groups does not occur at the cost of the environment on which the economy ultimately depends. Just like developing countries may be able to leapfrog to cleaner technologies without going through the same polluting intermediary stages as HI countries did, they may be able to skip the deepest depths of the growth addiction by recognising that GDP was only ever meant to be used as a tool, not as an end in itself (Kuznets, 1934).

4.6. Conclusions

According to sustainability scholars, global sustainability may be achieved through targeted transformational change in which PG pathways, specifically growth agnosticism, take place in higher country income groups while lower country income groups focus on GG or AG. Compared to the lower country income groups, economic and employment policies in high-income countries will therefore need to address very different sustainability challenges, focusing particularly on sustainable levels of economic throughput, a just distribution of income and wealth, and the sharing of work (Costanza et al., 2020; Daly, 2010; Hardt and O'Neill, 2017; Mastini et al., 2021; Otero et al., 2020; Palahí et al., 2020; The Guardian, 2018). Sustainability scholars now seem to be open for considering PG solutions,

especially if the solutions are argued for from the perspective of growth agnosticism, focusing on effective ways to secure the wellbeing of both people and nature. My findings therefore corroborate the conclusion that PG scholars should begin to focus even more on detailing the PG solutions and less on criticizing the status-quo.

Most rich countries seem to be currently seeking GG, but it may be that a truly green economy also means an economy free from the constraints of growth. If the societal growth addictions could be overcome in rich countries, they would be able to implement stronger environmental and social policies quicker, without worrying too much about their impact on future GDP rates. Research has identified that scientist could play an important role in helping societies break their societal growth addictions, for example through community scenario planning (Costanza et al., 2017). To facilitate such scenario building, PG scholars should focus more on creating new PG visions and models to replace the ones that currently sustain and reinforce the growth paradigm.

With pressing global environmental problems and the rate of progress lagging, substantial investments should be made to pursue targeted transformational change. The window for addressing global problems appears to be closing, making the next two decades decisive for actions to achieve global sustainability (Herrington, 2021; Lenton et al., 2019; Pörtner et al., 2021). The relatively low familiarity with PG among the surveyed scholars – estimated in my survey through self-assessment, number of publications, teaching experience, and course attending – may have contributed to the relatively low amount of representation of PG considerations in academic literature, in various intergovernmental reports, and in scientists' warnings regarding sustainable development and global environmental and social problems (IPCC, 2022; Ripple et al., 2019, 2017; UN, 2020; United Nations, 2015; Chapter 1). To facilitate a transition from GG to PG in rich countries, more emphasis needs to be given to PG alternatives in research, education, and decision making. This way it might be possible to find consensus on global transformations that would be both fair and adequate.

Chapter 5. The future desirability of economic growth in different country income groups

5.1. Abstract

To address the ongoing global sustainability challenges, targeted transformational change is needed in which different pathways are followed in different country income groups. In particular, it has been argued that high-income countries should seek post-growth pathways already during the current decade to decrease their environmental impacts to globally safe levels. In this chapter I evaluate how sustainability scholars view the future of economic growth, in different country income groups, based on results from a global expert survey. I analysed the preferences of scholars using linear mixed-effects models and I identified 9 distinct dispositions using a factor analysis of mixed data together with hierarchical clustering. I found a substantial amount of variation across all contexts in the desired future GDP growth rates, which varied between country income groups and depended on the preferred future pathway, among other variables. Most scholars preferred low but positive GDP rates for high-income countries for the years 2025 and 2030. Most scholars also thought economic growth would eventually end in all groups, and growth was expected to end sooner in higher than in lower country income groups. For high-income countries, most participants either thought growth would end in the 2030s, or never. Around 60 % of the sustainability scholars considered GDP to be a bad indicator of societal wellbeing. The results of this chapter help better understand what kind of future sustainability scholars envision for different country income groups. Considering global impact-inequalities and the limits of green growth, the results of this chapter call for further discussion about the feasibility of decoupling and post-growth in the field of sustainability science. This could help societies find the safest, surest, and fastest ways to address global environmental problems and secure sustainable development for all.

5.2. Introduction

Unless the pressing global environmental problems are solved, the ongoing environmental decline will undoubtedly lead to socioeconomic instability during the 21st century. In fact, the effects of increasing

intensities and frequencies of droughts, floods, extreme weather, fires, and disease can already be seen around the world (CBD, 2020; UNEP, 2020a). Solving these global problems is the defining task of our time. Recognizing the depth and systemic nature of the problems humanity now faces, several influential reports have declared the need for "deep societal transformations" (Global Biodiversity Outlook 4; (CBD, 2014) and an "urgent and fundamental departure from business as usual" (BAU) (IPCC, 2014), by creating "transformational change" (TC) (GSDR, 2019).

As alternatives to BAU, various future pathways seek TC that combines social, economic, and environmental goals (Chapter 1; Chapter 4). Some support the idea of green growth (GG), which aims to increase the economic scale while decreasing environmental impacts. Alternately, others support post-growth (PG) approaches such as degrowth (DG) which aims to decrease environmental impacts to a globally safe level by facilitating decreases in the economic scale in a controlled way, that simultaneously secures wellbeing, or agrowth (AG) which is a growth agnostic approach that does not explicitly set economic goals but instead focuses on actions that directly improve societal wellbeing and the environment, regardless of what happens to economic growth.

The GG approach has been the mainstream solution for addressing the global environmental problems so far and the need to simultaneously address social problems has also led to calls for "sustainable economic growth" (European Commission, 2019; UN, 2015b). I will use the two concepts interchangeably since sustainable economic growth is merely an extension of GG. To achieve GG, countries would need to decouple economic growth from environmental and social pressures. Furthermore, the decoupling of environmental impacts would have to be absolute instead of relative (Figure 15). With absolute decoupling, the environmental impacts start to decline (in absolute terms) even though the economy keeps growing, whereas with relative decoupling, the environmental impacts continue to grow as the economy grows but the impacts increase at a slower rate than the economy (Jackson, 2009; Parrique et al., 2019). To be a feasible solution for reducing environmental impacts, GG requires absolute decoupling of economic growth from all environmental impacts, particularly biodiversity loss, GHG emissions, and resource use, and the rate of that decoupling would have to be sufficiently fast to reduce environmental impacts below safe limits before dangerous environmental tipping points are crossed (Hickel and Kallis, 2019; Lenton et al., 2019; Parrique et al., 2019).

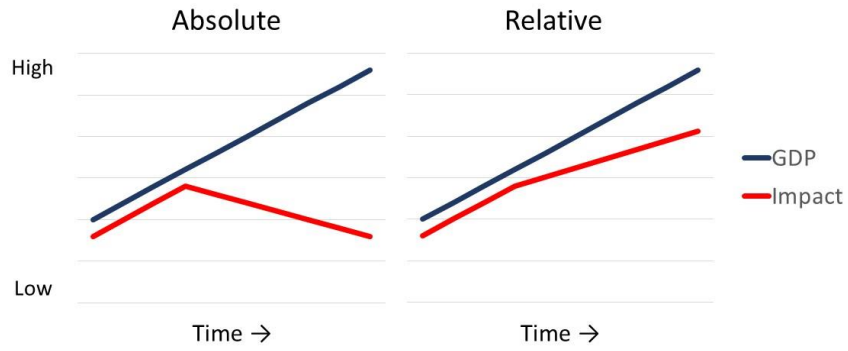

Figure 15. Difference between absolute and relative decoupling. GDP refers to the Gross Domestic Product, while impact refers to the environmentally harmful outcomes of economic activities.

The concern is whether absolute decoupling of economic growth from its environmental impacts is achievable. Recent research has found that to be unlikely (Haberl et al., 2020; Hickel and Kallis, 2019; Parrique et al., 2019; Vadén et al., 2020). A 2019 review concluded that "not only is there no empirical evidence supporting the existence of a decoupling of economic growth from environmental pressures on anywhere near the scale needed to deal with environmental breakdown, but also, and perhaps more importantly, such decoupling appears unlikely to happen in the future" (Parrique et al., 2019). Not only would decoupling have to address GHG emissions, but also the impacts on natural resources, biodiversity, and ecological services. To be socially sustainable, the estimates would also need to consider the social problems and public health issues that have been associated with consumption-growth, such as the increasing inequality (Costanza et al., 2014c; Oxfam, 2017; Wilkinson and Pickett, 2009). Further still, given the timeframe imposed by the escalating global environmental problems, decoupling the present growth system would need to be achieved "in the space of little more than a decade with no impact at all on economic expansion" (Jackson and Victor, 2019a). Based on A) historical trends of decoupling between economic growth, resource use and carbon emissions, and B) model-based projections of the future rates of decoupling, even under optimistic conditions, Hickel and Kallis (2019) have argued that "Staying within planetary boundaries may require a de-growth of production and consumption in high-consuming nations and a shift away from the narrow growth-focused development agenda in the global South".

Since absolute decoupling is a requirement for GG, these findings strengthen the case for PG in high-income countries, if the global economy is to remain within planetary boundaries as lower income countries continue to develop and grow their economies. The field of ecological economics (EE) has

for decades researched and proposed policies that seek to establish a sustainable scale and a fair distribution for the economy, by reducing throughput growth and by sharing wealth and work more equitably (Costanza et al., 2014a; Daly, 1996; Victor, 2019). The ultimate goal is to create an economy focused on wellbeing and sustainable prosperity in harmony with the environment, rather than growth of the Gross Domestic Product (GDP) (Costanza, 2020a; Daly, 2010; Jackson, 2009). In such a "post-growth" economy, GDP growth would no longer be a requirement and consumption would be brought to a level generalisable to the whole world (Costanza, 2020a; Daly, 1996). This way, at the price of substantial throughput reductions in developed nations (Jackson, 2009), social needs could be met without exceeding the planetary boundaries (Raworth, 2017; Rockström et al., 2009; Steffen et al., 2015). As economic growth is coupled with throughput, throughput reductions would imply reductions to the GDP as well.

In the present chapter, I will focus on evaluating what the surveyed scholars view to be the future of economic growth for each country income group, asking if the preferred rates correspond to those implied by post-growth research and by the pathway preferences evaluated in Chapter 4. My specific research questions are: What GDP rates do the scholars think different groups should have in the years 2025 and 2030? When, if ever, the experts think growth will end in each group, and will the end be intentional or not? And also, what are the expert attitudes toward GDP as an indicator of societal wellbeing? The purpose is to get more detail into what the experts think about the future of different country income groups and to see how the proposed rates compare to the calls for PG for HI countries.

5.3. Methods

As described in Chapter 3 and Chapter 4, I used a global survey to evaluate the preferences of sustainability scholars' regarding four future pathways and the future of growth (Full survey available in Appendix D). While Chapter 4 addressed the pathway preferences, in the present chapter I focus on the expert opinions regarding the future of growth. In contrast to earlier studies, I directed my focus on sustainability scholars and expanded the context to include different country income groups and time periods. Countries were grouped by Gross National Income following the World Bank categories, as defined in Figure 4.

To ensure that all participants were aware of the same basic information before estimating what the desirable GDP rates would be for each country income group, the participants were provided with the following definition of GDP: "GDP measures the monetary value of all finished goods and services

produced within a country during one year. It indicates changes in the total amount of production and consumption". Then, the participants were provided with background information on future population and past GDP rates (year-on-year percent change) in an interactive way. First, participants were asked to give rough estimates of what they thought future population rates would be and what they thought historical GDP rates had been. Then, tables were revealed that showed the relevant data (Table 5, Table 6) and participants were asked to compare their answers to those tables.

After interacting with the background information, the participants were asked to answer what average GDP rate each group should have in the years 2025 and 2030, and the responses were given on a slider ranging from -10.0 to 10.0. Tables of past and present GDP rates as well as future population growth rates were available for reference when participants were estimating the desirable future GDP rates. To control for the potential influence of the COVID-19 pandemic on the responses, the next question asked "Would your responses in the previous section have been different if the COVID-19 pandemic had NOT happened? And if yes, how?" The participants could respond A) No difference, I would have supported the same GDP rates overall; or B) I would have supported higher GDP rates overall; or C) I would have supported lower GDP rates overall. Worded this way, the COVID-19 question presented a counterfactual scenario.

In the next section the participants were asked to evaluate if or when economic growth will end in each group, with the end defined as some year after which the average long-term GDP rate will be 0 % or lower. The participants could choose from the following six options: 2020s, 2030s, 2040s, 2050s, sometime beyond 2060, or never. Then, for each group that the participants chose something other than never, they were asked to specify whether the end will be intentional or not, meaning whether they think the end will be the desired and controlled result of purposeful policies in each context.

To evaluate participant attitudes towards the GDP indicator, the participants were presented with the following question: "GDP measures the monetary value of production, but how good or bad is it as an indicator of societal wellbeing?" The responses were given on a 6-point scale from extremely good to extremely bad, and societal wellbeing was defined as follows: "Wellbeing is the state of being happy, healthy, and prosperous. This includes the availability of nutrition, employment, and essential man-made and ecological resources and services. We use 'societal' to refer to the overall wellbeing of a group of people."

By asking questions about the scholars' familiarity with each of three topics (SDGs, GG, and PG), I was able to create a familiarity index that helped roughly describe how familiar the participants were with each topic. The index helped aggregate four measured variables: self-assessed familiarity with the topic in question, number of publications addressing the topic, whether the participant had taught a

course addressing the topic, and whether the participant had attended a course addressing the topic (see Chapter 3 for details).

To analyse data on the future GDP rate preferences, I used four linear mixed-effects models, one for each group, with participant ID number (anonymous) as the random effect. I applied an iterative approach, starting with a full model that included 19 Individual variables, 48 2-way interactions, 2 3-way interactions, and 1 4-way interaction. I chose the interactions to cover all effects I considered to be plausible and theoretically sound. Based on this first omnibus run, I selected all variables and interactions that were significant to then run customised LMER models for each group. I used post-hoc tests to determine which pair(s) of slopes differed significantly and to calculate the estimated marginal means (means adjusted for the other model variables). I used graphical residual analysis to validate my linear mixed effects models for GDP rates, using Q-Q plots (Figure C6) and residuals vs fitted graphs (Figure C7).

I also used factor analysis of mixed data (FAMD) together with hierarchical cluster analysis to find out whether the scholars can be grouped in a meaningful way based on their positions regarding GDP. The variables used for the analyses were the preferred future GDP rates for each group and both years, if or when growth will end in each group, and the quality of GDP as an indicator of societal wellbeing (20 variables in total). FAMD is a principal component method for analysing the similarity of individuals and reducing the dimensionality of data which has with both continuous and categorical variables. After running the FAMD analysis I interpreted scree plots to determine the optimal number of dimensions to include, based on how much of the variation each dimension helped explain. I chose 9 dimensions, which cumulatively explained 70.9 % of the variation, and I used the coordinates of these data with reduced dimensionality to run the hierarchical clustering. To evaluate the optimal number of clusters to include, I visually interpreted dendrograms and then ran model-based clustering to double-check my visual evaluation. The model-based clustering identified 9 groups which agreed with my visual evaluation.

5.4. Results

5.4.1. Desirable future GDP rates in different country income groups

The preferred future GDP rates varied between country income groups and depended on the preferred future pathway, with BAU and GG supporters preferring similar rates on average, which

were higher than those preferred by AG supporters, who in turn preferred higher rates than DG supporters (Figure 16, Table 15). There was no significant difference in the preferred future GDP rates between those who supported BAU and those who supported GG in any group-year context (Figure 16, Table 15). GG and AG supporters differed from each other in all contexts, while AG supporters differed from DG supporters only in the context of HI and UMI countries, with AG supporters preferring higher GDP rates in these contexts on average (Table 15).

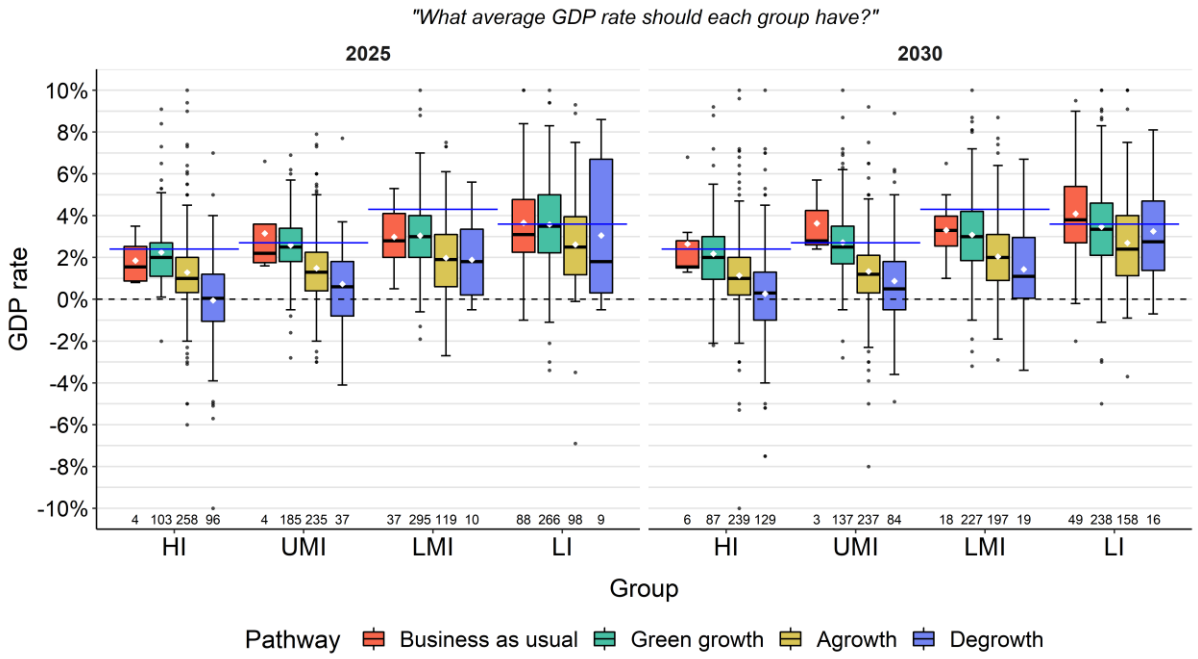

Figure 16. Boxplots of preferred GDP rates by year, country income group, and pathway choice. The black lines within the boxes indicate the medians, lower and upper hinges correspond to the first and third quartiles, whiskers extend from the hinge to the largest value no further than 1.5 * inter-quartile range from the hinge, beyond which are the outlier points. Diamonds indicate means. Numbers below boxplots indicate the number of participants who chose the pathway in that context (group + year). Blue horizontal lines indicate the average historical (2011-2019) growth rates for each group, which the panel was made aware of before responding.

Perhaps most notable was the substantial amount of variation in the preferred rates across all contexts (Figure 16). On average, the preferred rates were at or above 0 % and at or below the historical GDP rates regardless of the context or pathway choice, and lower GDP rates were preferred for HI and UMI countries than for LMI and LI countries (Figure 16). The participants were made aware of both the past (2011-2019 average) and present (2020 & 2021) GDP rates before responding (Table 6). The average historical growth rates for each group were: HI 2.4 %, UMI 2.7 %, LMI 4.3 %, LI 3.6 %. Compared to these rates, PG supporters seemed to prefer low growth (< 1 %) for HI countries in the future, on average (Figure 16). On average, the lowest GDP rates were preferred for HI countries by

those who supported DG, while the highest GDP rates were preferred for LI countries by those who supported GG or BAU.

Table 15. Wilcoxon rank sum tests results for the preferred GDP rates by pathway, for selected pairwise comparisons. Comp. specifies the comparison. P1 refers to the first pathway specified in the comparison, P2 to the second. Est. refers to the estimated difference in median (location), which is followed by 95% confidence intervals.

Comp. (P1-P2)	Year	Group	W	N (P1)	N (P2)	Median (P1)	Median (P2)	p	Sig	Est.	Conf. lower	Conf. higher
BAU-GG	2025	HI	186	4	103	1.55	2.00	0.748		-0.20	-1.50	1.30
BAU-GG	2025	UMI	373	4	185	2.20	2.50	0.982		0.00	-1.40	3.00
BAU-GG	2025	LMI	5369.5	37	295	2.80	3.00	0.874		0.00	-0.60	0.50
BAU-GG	2025	LI	11569	88	266	3.10	3.50	0.871		0.00	-0.50	0.50
BAU-GG	2030	HI	303.5	6	87	1.55	2.00	0.511		0.40	-1.10	1.40
BAU-GG	2030	UMI	271	3	137	2.80	2.50	0.349		0.80	-1.00	3.40
BAU-GG	2030	LMI	2276	18	227	3.30	3.00	0.421		0.30	-0.50	1.00
BAU-GG	2030	LI	6738.5	49	238	3.80	3.35	0.086	.	0.60	-0.10	1.20
GG-AG	2025	HI	18466.5	103	258	2.00	1.00	<0.001	***	0.90	0.50	1.10
GG-AG	2025	UMI	31482.5	185	235	2.50	1.30	<0.001	***	1.20	0.90	1.50
GG-AG	2025	LMI	23914	295	119	3.00	1.90	<0.001	***	1.10	0.80	1.50
GG-AG	2025	LI	16746	266	98	3.50	2.50	<0.001	***	1.00	0.50	1.50
GG-AG	2030	HI	14171.5	87	239	2.00	1.00	<0.001	***	0.90	0.50	1.20
GG-AG	2030	UMI	23672	137	237	2.50	1.20	<0.001	***	1.20	1.00	1.60
GG-AG	2030	LMI	29900	227	197	3.00	2.00	<0.001	***	1.00	0.80	1.40
GG-AG	2030	LI	23501	238	158	3.35	2.40	<0.001	***	0.90	0.50	1.20
AG-DG	2025	HI	16855.5	258	96	1.00	0.05	<0.001	***	1.00	0.70	1.50
AG-DG	2025	UMI	5557	235	37	1.30	0.60	0.006	**	0.90	0.20	1.30
AG-DG	2025	LMI	631	119	10	1.90	1.80	0.754		0.20	-1.30	1.50
AG-DG	2025	LI	467	98	9	2.50	1.80	0.774		0.20	-2.70	2.00
AG-DG	2030	HI	19793	239	129	1.00	0.30	<0.001	***	0.90	0.50	1.20
AG-DG	2030	UMI	12205	237	84	1.20	0.50	0.002	**	0.60	0.20	1.00
AG-DG	2030	LMI	2154	197	19	2.00	1.10	0.278		0.50	-0.40	1.60
AG-DG	2030	LI	1111.5	158	16	2.40	2.75	0.428		-0.60	-1.90	0.70

The mean and median GDP rates were close to zero for DG supporters in the context of HI during both decades (Figure 16). In other words, half of those who chose the DG pathway, which stated that countries should “focus on decreasing GDP”, did not actually support negative GDP rates, only lower rates of growth (for the specified years). Overall, the average GDP rate supported by those who chose DG was 0.1 % growth for HI. Peering a bit deeper, the average GDP rate among those who supported DG and chose positive rates was 1.3 % for HI in 2025 and 1.7 % for 2030, while the averages for those

who chose negative rates were -2.1 % and -2.2 %, respectively. For comparison, among AG supporters the respective rates were 1.6 % and 1.5 % for those who chose positive, and -1.6 % and -2 % for those who chose negative rates, with the overall average for HI being 1.6 %. Most sustainability scholars thought that HI countries should have positive (above zero) GDP rates in the near future (86 % thought this for 2025 and 84 % for 2030), and around one fifth thought that the rates should be close to zero, between -0.5 and 0.5 % (22 % thought this for 2025 and 25 % for 2030). Approximately 90 % of those who preferred the AG pathway supported positive rates for HI countries for both years, differing considerably from the DG supporters, of whom only 59 % supported positive rates for 2025, and 63 % for 2030. It therefore seems that those classified as "DG" supporters based on the pathway choice are not a unified group, but instead comprise at least two sub-groups: those who only want lower GDP rates, less growth, and those who want the scale of the economy to decline or stabilise.

After asking the participants to evaluate desirable future GDP rates for each group in the future, the scholars were asked if/how their responses would have been different if the COVID-19 pandemic had not happened. 34.5 % said they would have supported higher future GDP rates overall if the pandemic had not happened, and 14.1 % would have supported lower rates overall. Around half of the participants, 51.4 %, thought that the COVID-19 pandemic should have no overall effect on future GDP rates, although this varied by pathway choice: BAU 42.6 %, GG 43.8 %, AG 57.4 %, DG 62.3 % (on aggregate, combining pathway choices from all groups and decades).

5.4.2. The end of economic growth

Overall, economic growth was expected to end sooner in higher and later in lower country income groups (Figure 17, Table 16). As with GDP rates (Figure 16) and pathway choice (Figure 9, Chapter 4), there was more agreement among scholars for HI and LI than for UMI or LMI countries. For HI countries, most participants either thought growth would end in the 2030s, or never. This bimodality was true regardless of the chosen pathway, although those who chose never for HI were much more likely to support GG than either AG or DG, and similarly those who chose 2020s or 2030s were more likely to support DG or AG than GG (Figure 17). For UMI, most DG supporters chose 2030s, most AG supporters chose either 2040s or never, and most GG supporters chose never. Those 19 scholars who supported DG for LMI had no consensus when growth would end in that group, whereas the majority of the 197 AG supporters thought that growth in LMI would end sometime after the 2060s, and most GG supporters chose never. In the context of LI, there was more internal consistency within the pathways, and agreement between pathways, with most scholars evaluating that growth would end

sometime after 2060 or never, excepting those who supported BAU, most of whom thought growth would never end in that group (Figure 17). Those 25 DG supporters who thought growth will never end in any group supported higher GDP rates (mean = 1.50 %) for HI than those who chose that growth would eventually come to an end (mean = -0.04 %).

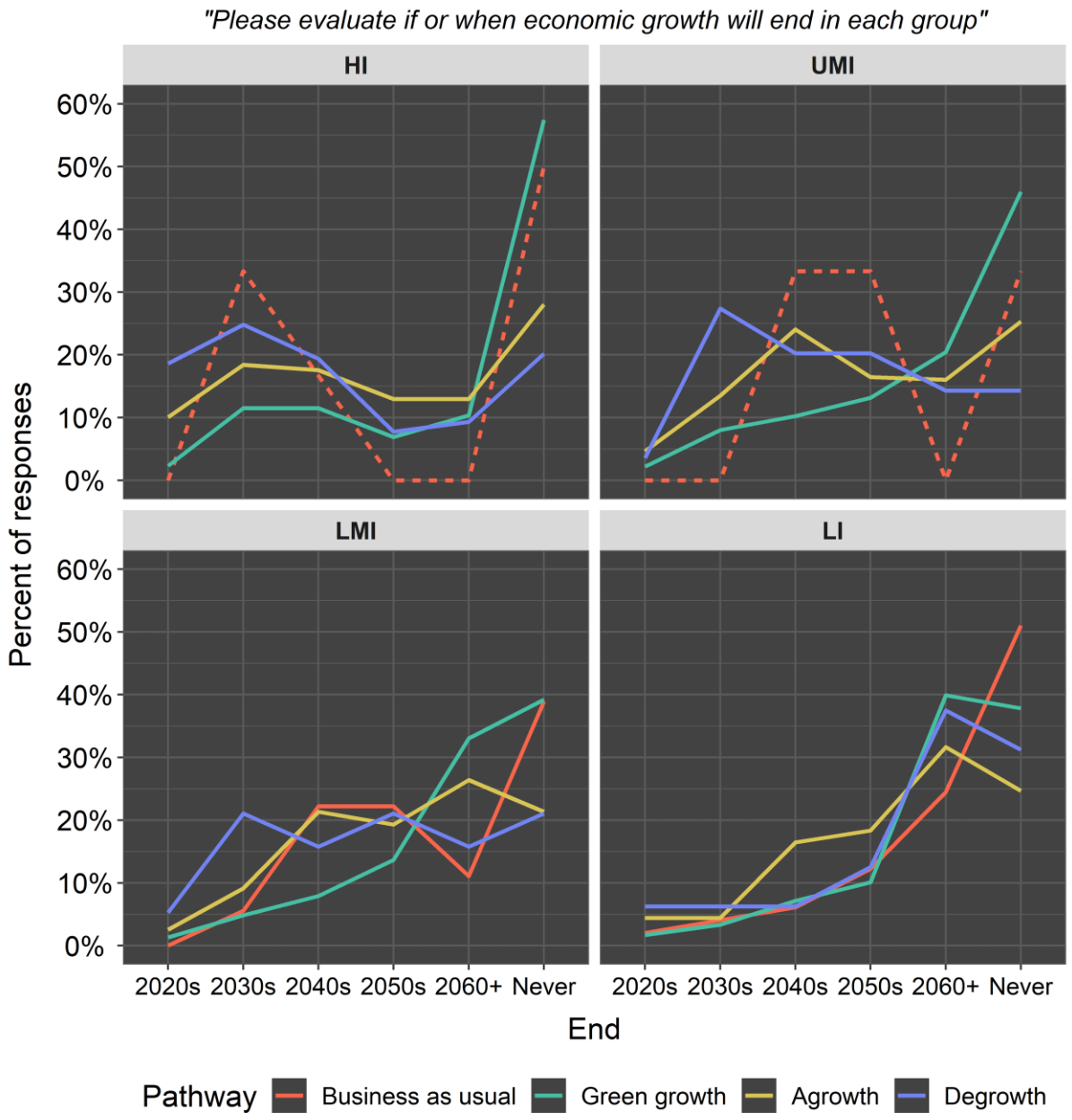

Figure 17. End of economic growth by country income group and pathway choice for the 2030s. Dashed lines indicate context specific pathway choices with a sample size less than 10.

Table 16. Chi-square test results for the end of growth by group.

Comparison	χ^2	Df	p	z 2020s	z 2030s	z 2040s	z 2050s	z 2060+	z Never
HI-UMI	32.10	5	<0.001	**4.19**	1.94	-0.94	**-2.72**	**-2.46**	0.71
HI-LMI	95.32	5	<0.001	**5.52**	**5.25**	1.00	**-2.90**	**-6.59**	0.28
HI-LI	135.32	5	<0.001	**4.83**	**7.23**	**2.98**	-1.43	**-8.64**	-0.91
UMI-LMI	29.85	5	<0.001	1.59	**3.39**	1.93	-0.18	**-4.24**	-0.43
UMI-LI	74.15	5	<0.001	0.74	**5.49**	**3.90**	1.30	**-6.37**	-1.62
LMI-LI	15.23	5	0.009	-0.86	**2.28**	**2.00**	1.48	**-2.19**	-1.19

Overall, 60 % of participants thought that growth would eventually end in all groups (they did not choose never), 14 % thought growth would end in some groups but not all, while 26 % thought growth would never end in any group. Furthermore, of those who foresaw an end to growth, 44 % thought the end would be intentional in the higher country income groups, while 31 % thought it would be intentional in the lower country income groups, with intentional meaning the desired and controlled result of purposeful policies. Of those who responded that growth would end in the 2020s or 2030s for high-income countries, 50 % thought the end would be intentional. Of those who supported BAU and who also thought that growth would eventually end, around two thirds thought that the end of growth would be unintentional in all groups, i.e., not the desired and controlled result of purposeful policies (Figure C5). The same was true for those who chose the AG pathway. Of those who chose GG or DG, around half thought that the end would be intentional in HI and UMI, whereas around 70 % thought the end would be unintentional in LMI and LI (Figure C5).

5.4.3. Explaining the differences in opinion

I used LMER models to evaluate which variables could explain the preferred future GDP rates for each group. I will present the significant variables from each model below. Tables with all results, including those not statistically significant, are available online (see Appendices section for details). Note also that when year is not explicitly mentioned in the results, it was not a significant explanatory variable and thus the GDP rates being explained are future GDP rates in general (both 2025 and 2030). As an explanatory variable, year (2025, 2030) was near to being significant for HI countries ($F_{2,\ 209.49}$=2.56, p=0.079) but not for the other groups.

The country of residence and the age of the scholar had some significant interactions in the context of UMI countries (Table 17). Specifically, 30–39-year-old scholars who were from HI countries preferred lower rates for UMI countries than scholars who were from UMI countries themselves

(EMM=-0.92, SE=0.33, p=0.027) and this effect was even clearer for 40–49-year-olds (EMM=-1.15, SE=0.35, p=0.005). The same was true when comparing 30–39-year-old scholars from HI countries to scholars from LMI or LI countries (EMM=-1.09, SE=0.33, p=0.006), with the strongest effect found again among the 40–49-year-olds (EMM=-1.7, SE=0.41, p<0.001). No statistically meaningful effects could be observed among those under or above these age groups, at least in part due to small sample sizes of scholars from outside HI countries in the younger and older age groups.

Another interaction was found between the country of residence and the year for which desirable future rates were evaluated, but only in the context of LMI countries. Scholars from LMI or LI countries preferred roughly the same rates for both years in this context, whereas scholars from UMI countries preferred higher rates for 2030 and scholars from HI countries preferred lower rates for 2030 than for 2025 in this context. The desired future GDP rates for LMI countries in 2025 were -1.1 percentage points lower when comparing scholars from HI countries to scholars who were from the lower country income groups themselves (EMM=-1.1, SE=0.25, p<0.0001), and for 2030 the rates were on average -1.46 percentage points lower (EMM=-1.46, SE=0.25, p<0.0001). When comparing, scholars from HI to scholars from UMI countries, the rates for LMI were -0.72 percentage points lower for 2025 (EMM=-0.72, SE=0.23, p=0.012) and -1.33 percentage points lower for 2030 (EMM=-1.33, SE=0.23, p<0.0001). Those who preferred not to disclose their country of residence preferred roughly similar rates for LMI countries than those who were from UMI countries for 2025, but for 2030 they preferred similar rates to scholars from HI countries.

Gender and academic level had an interaction when it came to LI countries, but only among those whose highest achievement was a masters or equivalent. Among this group, the desired future GDP rates for LI countries were on average -1.72 percentage points lower when comparing women to men (EMM=-1.72, SE=0.5, p<0.001).

I also found that an interaction between pathway preference and views regarding how COVID-19 should affect future GDP rates was a significant explanatory variable for the preferred future GDP rates, but only in the context of HI and UMI countries. Those who thought the pandemic should influence future GDP rates tended to support higher rates overall than those who would have supported the same GDP rates regardless of the pandemic, but this depended on the preferred future pathway (Figure 18, Table 17). Furthermore, based on the LMER models' linear predictions (Figure 18), GG supporters who said they would have supported lower rates if the pandemic had not happened preferred lower rates than those who would have supported higher rates if the pandemic had not happened. In other words, taking the inverse of this counterfactual scenario, those GG supporters who said they chose higher rates because of COVID-19 supported lower rates for HI and UMI countries

than those who said they chose lower rates due to the pandemic. For AG supporters this pattern was the opposite: those who chose higher rates because of the pandemic preferred slightly higher rates on average than those who said they chose lower rates because of the pandemic. DG supporters showed a similar pattern to AG supporters in the context of HI countries, but for UMI countries those DG supporters who chose lower rates due to the pandemic actually supported similar if not slightly higher rates than those who chose higher rates because of the pandemic.

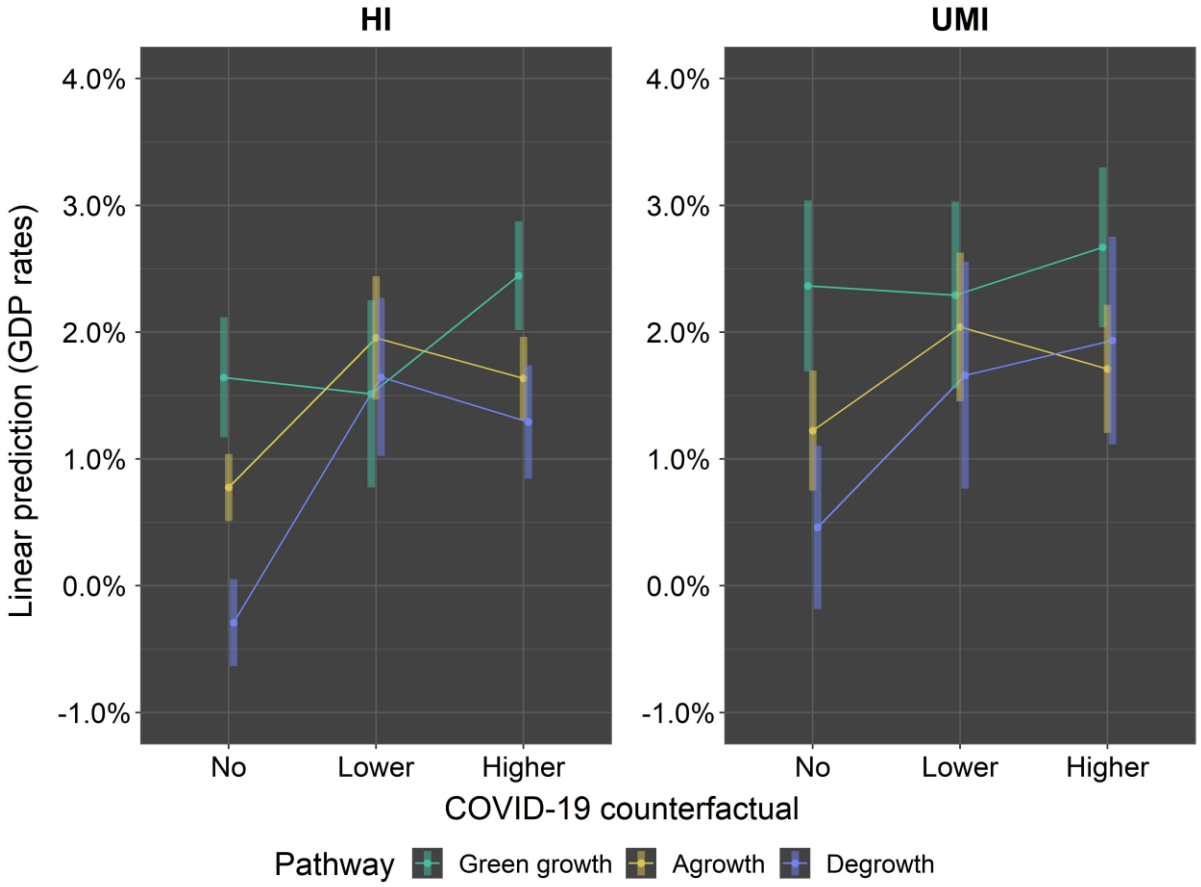

Figure 18. Interaction plot of the preferred future GDP rates and the COVID-19 counterfactual, with 95 % confidence intervals, based on the estimated marginal means of fitted LMER models. The counterfactual refers to whether the participants would have preferred the same, lower, or higher GDP rates if the COVID-19 pandemic had not happened. The interaction between COVID-19 counterfactual and pathway preference was significant in the context of high-income (HI) and upper-middle-income (UMI) countries.

An interaction between pathway preference and familiarity with PG helped explain desired future GDP rates in the context of HI countries ($F_{2,\ 234.75}$=3.94, p=0.021). Among those who supported PG pathways, familiarity with PG was associated with support for lower future GDP rates for HI countries, whereas the opposite was true for GG supporters (Figure 19, Table 17). Those participants who were

most familiar with PG and supported DG preferred clearly negative rates for HI (around -1 % to -3 %), while those who supported AG instead had a zero-growth position, and those preferring GG preferred roughly historical growth rates for HI countries. In addition to visualising the significant interactions for HI countries, Figure 19 visualises what the interaction looked like for the other groups, for which statistically significant effects were not observed.

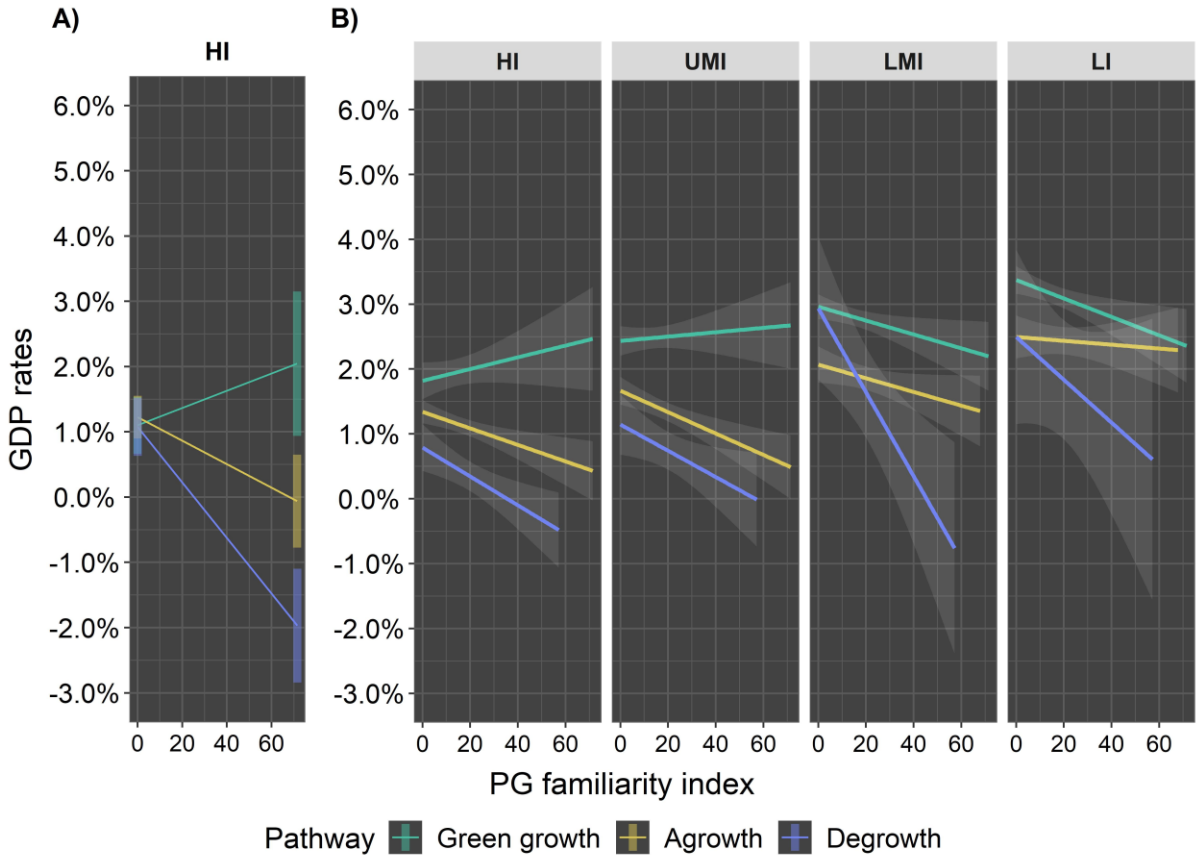

Figure 19. Preferred future GDP rates by familiarity with post-growth (PG). A) An interaction plot of the estimated marginal means of preferred future GDP rates with 95 % confidence intervals, based on fitted LMER model for HI countries. B) Regression line graphs with 95 % confidence intervals (grey) for all groups, without accounting for the influence of other explanatory variables.

I found that the desired future GDP rates for LI countries could also be explained by publication types, i.e., whether the participant had published in GG, PG, both, or neither. Scholars who had published only on PG preferred -1.92 percentage points lower rates compared to scholars who had published on both GG and PG (EMM=-1.92, SE=0.52, p=0.002). Also, the desired future GDP rates for LI countries were 1.76 percentage points higher for those who had published on GG only compared to PG only (EMM=1.76, SE=0.5, p=0.003). Similarly, those who had published on neither preferred 1.84

percentage points higher rates than those who had published on PG only (EMM=1.84, SE=0.49, $p<0.001$).

Lastly, the participant evaluations of past GDP rates were also associated with their estimates of future GDP rates in all contexts (HI: $F_{1,134.94}=19.16$, $p<0.0001$; UMI: $F_{1,\ 186.21}=15.61$, $p<0.001$; LMI: $F_{1,\ 165.3}=22.69$, $p<0.0001$; LI: $F_{1,\ 200.83}=19.16$, $p<0.0001$). The higher the scholars evaluated past GDP growth rates to have been, the higher they thought GDP rates should be in the future, in most cases (Figure 20). However, this relationship broke down for LMI and LI countries among those who supported AG or DG pathways, indicating that these scholars thought future rates should clearly differ from historical patterns. Each plot in Figure 20 is divided into four quadrants by the horizontal and vertical zero growth lines, and each point represents one participant. Participants positioned in the top right quadrant identified that the average GDP rates of the past had been positive, and they thought that future rates should also be positive. Most participants occupied this quadrant in all contexts. In contrast, those positioned in the bottom right quadrant thought that even though past rates have been positive, in the future they should be negative. Figure 20 visualises how scholars who supported PG pathways found it easier to cross the horizontal zero line, particularly in the context of rich countries.

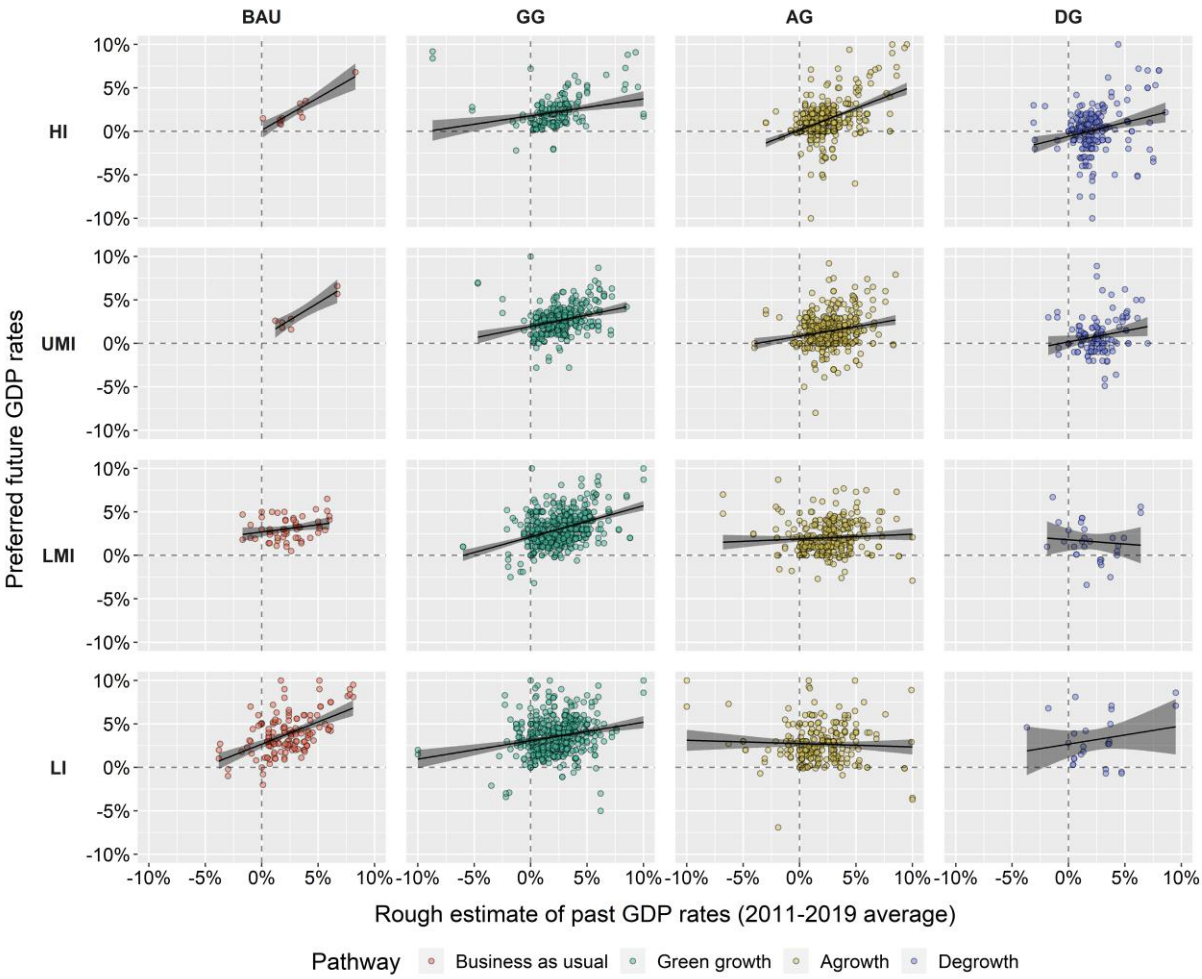

Figure 20. Preferred future GDP rates by estimated past GDP rates. Note that the significant p-values for BAU in the context of HI and UMI countries are due to small sample size, indicated by the small number of points, each of which corresponds to one scholar.

Table 17. Significant variables and interactions for explaining variation in the desired future GDP rates. Results from all four Linear Mixed Effects Models (one per country income group), sorted by average estimated marginal means (EMM) per variable and by group. Group indicates the country income group, i.e., the context. Tables with all comparison results from the full and customised models, including those not statistically significant, are available online (see Appendices section for details).

Group	Variable	Comparison	Level	EMM	SE	df	t	p
UMI	Age : C.grouped	HI to LOWER	40-49	-1.7	0.41	389.32	-4.13	<0.001
UMI	Age : C.grouped	LOWER to Not	30-39	1.43	0.54	387.74	2.67	0.04
UMI	Age : C.grouped	HI to UMI	40-49	-1.15	0.35	388.37	-3.33	0.005
UMI	Age : C.grouped	HI to LOWER	30-39	-1.09	0.33	391.7	-3.3	0.006
UMI	Age : C.grouped	HI to UMI	30-39	-0.92	0.33	394.89	-2.8	0.027
LI	Pub.type	PG.only to Both.GG.PG	-	-1.92	0.52	430.87	-3.67	0.002
LI	Pub.type	Neither to PG.only	-	1.84	0.49	430.86	3.8	<0.001
LI	Pub.type	GG.only to PG.only	-	1.76	0.5	430.79	3.54	0.003
LI	Gender : Level	F to M	MSc	-1.72	0.5	427.63	-3.42	<0.001
HI	Pathway : C19.inf	No to Higher	DG	-1.58	0.29	815.55	-5.47	<0.0001
HI	Pathway : C19.inf	No to Lower	AG	-1.18	0.28	594.95	-4.18	<0.0001
HI	Pathway : C19.inf	No to Higher	AG	-0.86	0.21	598.15	-4.03	<0.001
HI	Pathway : C19.inf	No to Higher	GG	-0.8	0.33	765.87	-2.45	0.038
HI	Pathway : C19.inf	No to Lower	DG	-1.94	0.36	781.23	-5.41	<0.0001
UMI	Pathway : C19.inf	No to Higher	DG	-1.47	0.34	810.72	-4.36	<0.0001
UMI	Pathway : C19.inf	No to Lower	DG	-1.2	0.39	806.24	-3.1	0.006
UMI	Pathway : C19.inf	No to Lower	AG	-0.82	0.25	526.46	-3.25	0.003
UMI	Pathway : C19.inf	No to Higher	AG	-0.49	0.2	569.1	-2.46	0.038
LMI	Year : C.grouped	HI to LOWER	2030	-1.46	0.25	536.17	-5.85	<0.0001
LMI	Year : C.grouped	HI to UMI	2030	-1.33	0.23	536.22	-5.68	<0.0001
LMI	Year : C.grouped	LOWER to Not	2030	1.12	0.35	536.4	3.24	0.007
LMI	Year : C.grouped	HI to LOWER	2025	-1.1	0.25	536.17	-4.41	<0.0001
LMI	Year : C.grouped	UMI to Not	2030	0.99	0.34	536.39	2.96	0.017
LMI	Year : C.grouped	HI to UMI	2025	-0.72	0.23	536.22	-3.08	0.012
LI	Year : C.grouped	HI to LOWER	2030	-1.08	0.31	503.43	-3.51	0.003
HI	Past.GDP		-	0.36	0.04	430.05	8.12	<0.0001
UMI	Past.GDP		-	0.25	0.05	379.01	5.6	<0.0001
LMI	Past.GDP		-	0.22	0.04	439	5.79	<0.0001
LI	Past.GDP		-	0.15	0.04	429.75	3.71	<0.001
HI	Year	2025 to 2030	-	0.14	0.07	439.84	2.18	0.03
HI	Pathway : fam.PG.index	GG to DG	-	0.06	0.01	856.54	4.72	<0.0001
HI	Pathway : fam.PG.index	GG to AG	-	0.03	0.01	857.16	3.19	0.004

Individual variables that were not significant but are nonetheless worth a mention include the participants' familiarity with GG, familiarity with the SDGs, academic field (aggregated to 8 groups), and the geographic focus of the participants' scholarly work. As with year, the participant evaluations

of future population growth rates variable were near to being significant for HI countries ($F_{1, 200.83}$=2.49, p=0.064), but not for the other contexts.

Overall, the majority of participants (60 %) considered GDP to be a bad indicator of societal wellbeing (Figure 21). I found that attitudes towards GDP were not a significant factor for explaining the desired future rates in any context when accounting for other explanatory variables. This may be because pathways were also used as an explanatory variable and in Chapter 4 I found that the attitudes were an important factor for explaining differences in support for different pathways. Accordingly, when observing the data visually, those who considered GDP to be a very good indicator of societal wellbeing did tend to prefer higher future rates in most contexts than those who considered GDP to be a very bad indicator (Figure C3).

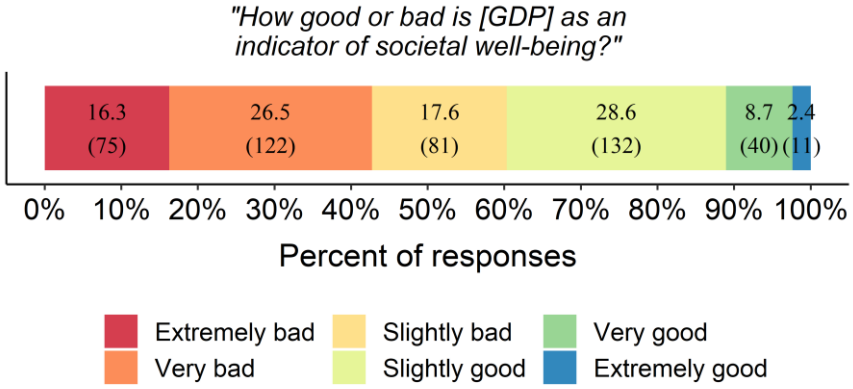

Figure 21. GDP as an indicator of societal wellbeing. Exact percentages labelled, with the number of participants in each category in brackets.

In the context of HI countries, 39 % of those scholars who thought GDP was extremely or very good thought growth would never end while 31 % of those who thought GDP was extremely or vary bad chose “never”. Among the majority who did think growth would eventually end in HI countries, only 2 % of those who thought GDP was extremely or very good thought growth would end in the 2020s, while the fraction was 18 % for those who thought GDP was extremely or vary bad. GDP attitudes also varied by country group of residence (Figure C4). 22 % of scholars from HI countries thought GDP is an extremely bad indicator of societal wellbeing, while the respective fractions were 3 % for scholars from UMI and 7 % for those from either LMI or LI countries. Also, the fraction of scholars who thought GDP is slightly good was 24 % for HI, 39 % for UMI, and 38 % for LMI/LI.

5.4.4. Clustering scholars

By performing a factor analysis of mixed data together with hierarchical clustering I found that the scholars from around the world can be divided into 9 different clusters according to their views on GDP, as indicated by three variables: 1) preferred future GDP rates for each group (2025 and 2030); 2) if or when growth will end in each group; and 3) the quality of GDP as an indicator of societal wellbeing (Figure 22).

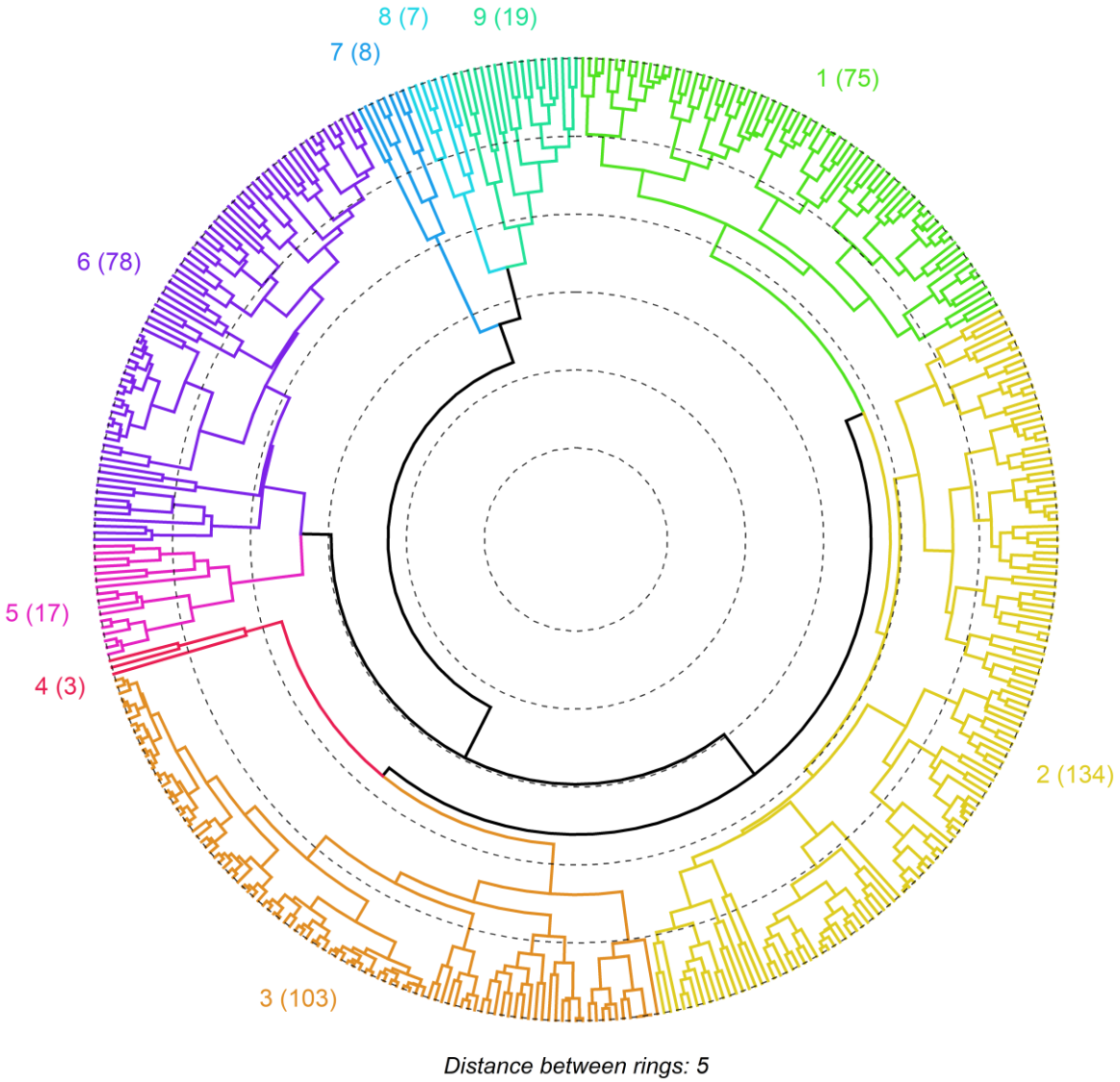

Figure 22. Hierarchical clustering according to participant views on GDP. Clustering by 9 dimensions, k=9, based on 17 variables. Number of participants in each cluster is given in brackets after each cluster number.

The majority of the scholars (70 %) were categorised into the clusters 1, 2, and 3. Scholars in these clusters supported low growth for HI and incrementally higher rates for the other groups. Scholars in clusters 1 and 2 mostly thought GDP is a bad indicator of societal wellbeing, while cluster 3 scholars were divided on this question. Cluster 1 scholars foresaw growth to end soon in HI countries and later in lower country income groups, while scholars in cluster 2 had less agreement when growth would end. Cluster 3 scholars mostly thought growth would never end in any group (Table 18).

Table 18. Differences between clusters in views regarding GDP.

Cluster	Future GDP rates	GDP indicator quality	End of growth	n
1	Low growth for HI, incrementally higher for other groups.	Bad (61 % bad)	HI: 2030s (43 %) UMI: 2040s (58 %) LMI: 2050s (54 %) or 2060+ (43 %) LI: 2060+ (75 %)	75
2	Low growth for HI, incrementally higher for other groups.	Bad (72 % bad)	HI: before 2060 (81 %) UMI: 2030-2060 (72 %) LMI: 2040s (39 %) or 2060+ (41 %) LI: 2060+ (49 %)	134
3	Low growth for HI, incrementally higher for other groups.	Divided (55 % bad)	HI: never (87 %) UMI: never (88 %) LMI: never (96 %) LI: never (94 %)	103
4	Low growth for HI and UMI, negative rates for LMI and LI.	Divided (33 % very bad, 33 % slightly good, 33 % very good)	HI: 2040s (67 %) UMI: 2050s (67 %) LMI: 2060+ (67 %) LI: at some point (67 %)	3
5	Extremely high growth for all. Increasing between decades for all but HI.	Good (65 % good)	HI: never (65 %) UMI: never (59 %) LMI: never (59 %) LI: never (65 %)	17
6	High rates for LI, historical rates for other groups.	Divided (53 % good)	HI: before 2060 (60 %) UMI: 2030-2060 (52 %) LMI: 2060+ (41 %) or never (33 %) LI: 2060+ (35 %) or never (33 %)	78
7	Equally low growth for all.	Bad (88 % bad)	HI: 2020s (75 %) UMI: 2020s (75 %) LMI: 2020s (100 %) LI: 2020s (100 %)	8

Table continues on the next page.

Table 18. *(Cont.)*

Cluster	Future GDP rates	GDP indicator quality	End of growth	n
8	Low growth for LI, zero growth for LMI, negative rates for UMI and HI.	Bad (100 % very bad)	HI: 2020s (86 %) UMI: 2020s (71 %) LMI: 2030s (100 %) LI: 2040s (71 %)	7
9	Low growth for HI, incrementally higher for other groups.	Divided (58 % bad)	HI: 2020s (26 %) or 2030s (42 %) UMI: 2030s (47 %) LMI: 2030s (94 %) LI: 2030s (68 %)	19

Figure 23 shows how the preferred future GDP rates differed between clusters. Scholars in clusters 1–3 plus those in cluster 9 preferred low growth rates for HI and incrementally higher rates for the other groups. Cluster 4 is comprised of three outliers who notably thought LI should have very negative future GDP rates. Cluster 5 scholars supported extremely high growth for all, while cluster 6 scholars supported high rates for LI but roughly historical rates for the rest. Cluster 7 scholars supported equally low growth for all. And lastly, cluster 8 scholars supported very low growth for LI and negative rates for other groups, with substantial negative rates for HI, with the rates further decreasing between decades. The seven scholars in cluster 8 also considered GDP to be a very bad indicator of societal wellbeing and mostly thought growth would end in HI and UMI countries in the 2020s, in the 2030s in LMI, and in the 2040s in LI countries.

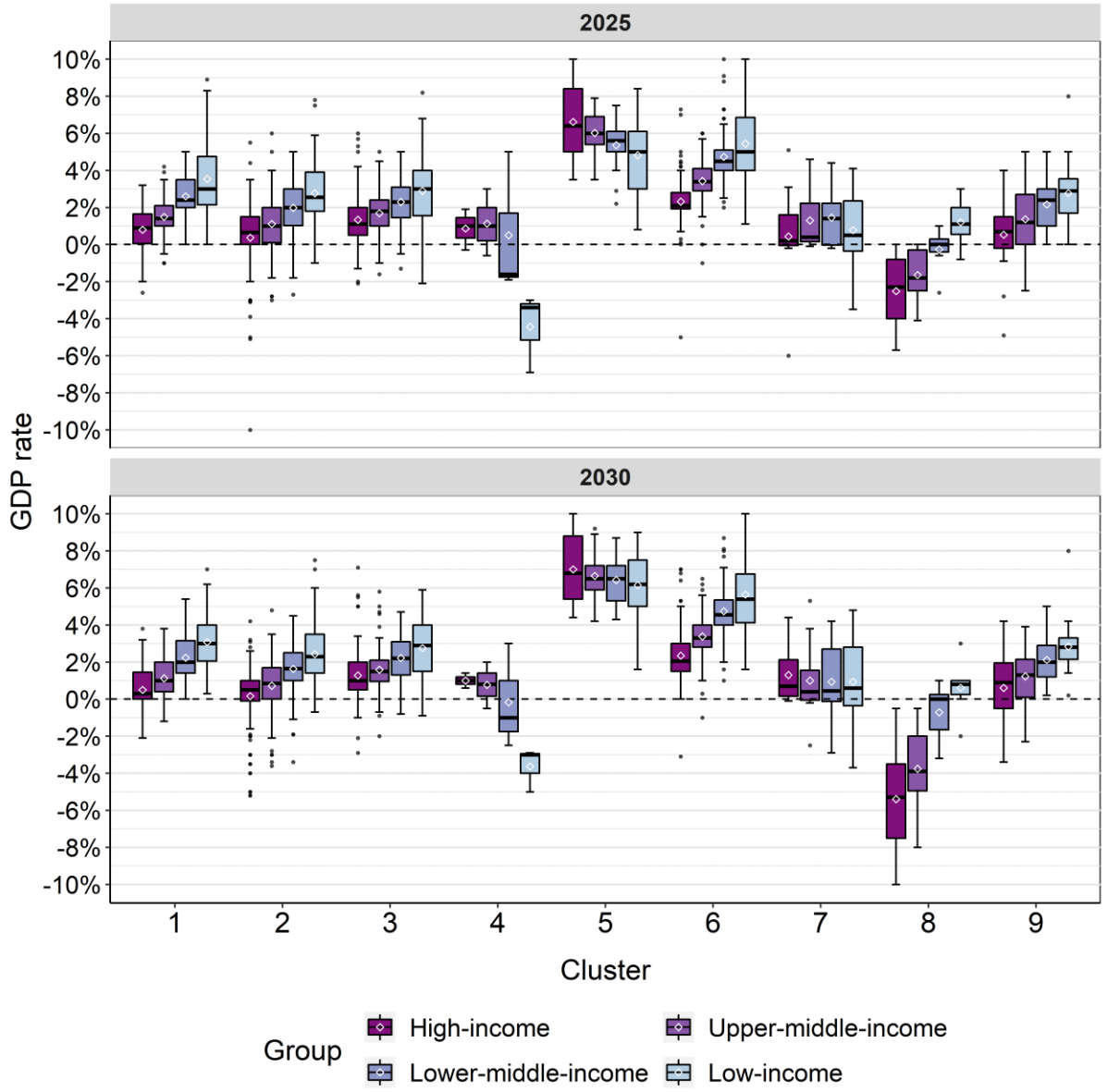

Figure 23. Preferred future GDP rates by cluster. For reference, cluster 6 scholars supported high rates for LI but roughly historical rates for the rest. Number of scholars in each cluster can be seen in Table 18.

Scholars in each cluster also had different pathway preferences, particularly for the 2020s (Figure 24). Notably, scholars in clusters 1 and 2 mostly preferred AG for HI and UMI (around 60 % support in both) but also had some support for DG (around 28 %), and for LMI and LI they mostly preferred GG (around 60 % support in both). Scholars in cluster 3 differed from the first two by preferring GG (36 %) instead of DG for HI, while the majority still supported AG (52 %). Among all clusters, scholars in clusters 4, 5, and 6 had the highest support for GG in HI (around 33 %). Those with the highest support for DG in HI were cluster 8 (57 %), followed by 9 (36 %). The pathway choices diverged between the clusters in the

context of UMI, with clusters 3, 5 and 6 mostly preferring GG and scholars in the other clusters preferring AG. For LMI and LI countries most clusters had high preference for GG (> 60 %), except for 7 and 8, which preferred AG instead (> 60 %). When considering pathway choice for the 2030s (Figure C8), support for DG increased for clusters 1 and 2 in the context of HI and UMI countries, while support for GG decreased. Among cluster 3 scholars, the majority support also shifted from GG to AG for UMI. Support for GG increased among cluster 5 scholars among HI and UMI, while their support for PG increased among LMI and LI countries. In contrast, support for DG increased among cluster 6 scholars for HI and UMI, while their support for AG increased for LMI and LI countries. The pathway preferences of cluster 7 scholars did not change at all between the decades for any group. Cluster 8 scholars also preferred the same pathways for HI and UMI, but their support for DG increased for LMI countries and their support for AG increased for LI. Cluster 9 scholars also preferred the same pathways for HI overall, but their support for AG increased for UMI and LMI countries. Their support for BAU in LI also decreased while support for PG slightly increased.

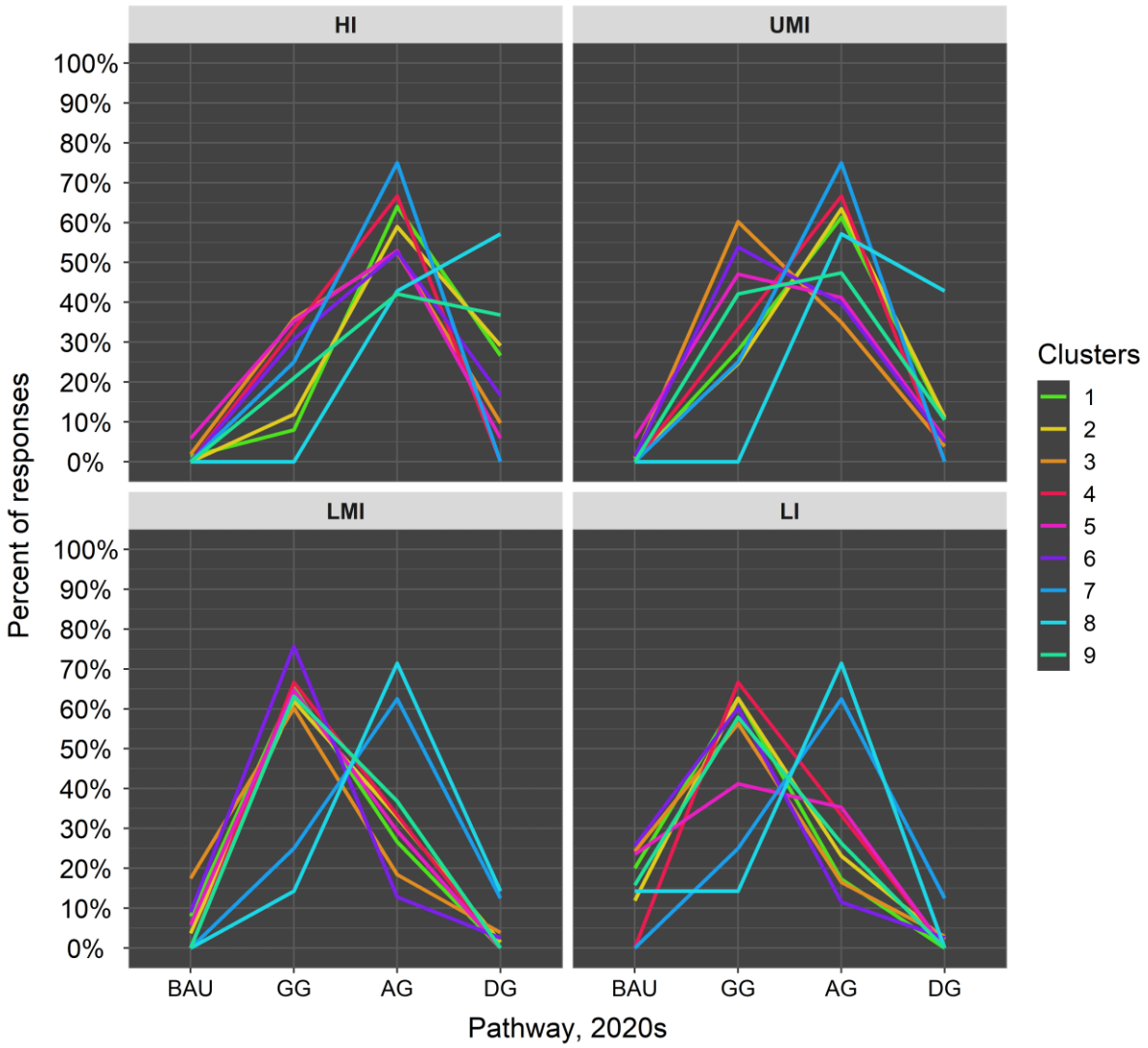

Figure 24. Preferred pathway for the 2020s by cluster. Supplementary clustering figures provided in Appendix C, including the pathway choice for 2030s by cluster.

5.5. Discussion

The purpose of this research was to understand in more detail what sustainability scholars around the world think about the future of different country income groups, specifically in terms of the future of economic growth, and how these views compare to the increasing calls for PG, particularly for HI countries. I found a substantial amount of variation across all contexts in the desired future GDP rates, which varied between country income groups and depended on the preferred future pathway. Expectedly, PG supporters preferred lower GDP rates than GG supporters overall, but on average the preferred rates were at or above 0 % and at or below the historical GDP rates regardless of the context or pathway choice. The majority of the participants also considered GDP to be a bad indicator of

societal wellbeing. Economic growth was expected to end sooner in higher and later in lower country income groups, but this was not reflected in the preferred rates for 2025 and 2030, because most did not expect growth to end before the 2030s. In the context of HI countries, the responses had a bimodality with most participants either thinking growth would end in the 2030s or never. Those who thought that growth would end sooner in HI countries were more likely to support PG than GG. Nonetheless, only half of these PG supporters thought that the end of growth would be the desired and controlled result of purposeful policies. For the supporters of other pathways, and for the other contexts, the majority view was that growth would eventually end, unintentionally.

5.5.1. Achieving global sustainability

Since the economy reflects our material relationship with each other and the environment, it is perhaps not surprising that many have identified consumption-growth as the core driver of environmental problems (CBD, 2020; D'Alessandro et al., 2020; Hickel and Kallis, 2019). All consumption demands energy and resources that ultimately source from the environment and leads to emissions and waste that ultimately end up back to the environment (Antal, 2014; Daly, 1996; Hoekstra and Wiedmann, 2014). Economic growth is therefore associated with a continuing increase of material and energy throughput (Díaz et al., 2019; Parrique et al., 2019). Or at least this has been true historically, since efficiency increases have not been able to offset the impacts caused by consumption-growth so far (Haberl et al., 2020; Parrique et al., 2019). This is why countries with the largest economies are responsible for the majority of environmental impacts, and why substantial impact inequalities exist among higher and lower income countries (Dorninger et al., 2021; Oxfam and SEI, 2020; Teixidó-Figueras et al., 2016; Wiedmann et al., 2020). Around 25-43 % of all environmental impacts are caused by the world's top 10 % of income earners, whereas the bottom 10 % only account for 3-5% of all impacts (Teixidó-Figueras et al., 2016; Wiedmann et al., 2020). The world's richest 1 % alone cause double the emissions of the poorest 50 % (Oxfam and SEI, 2020). Overconsumption by rich industrialised countries, and by affluent households within countries, has been identified as "the strongest determinant and the strongest accelerator of increases of global environmental and social impacts" (Wiedmann et al., 2020).

Because of this impact inequality and due to limits that exist for both decoupling and the circular economy (Georgescu-Roegen, 1977; Hickel and Kallis, 2019; Korhonen et al., 2018; Parrique et al., 2019), countries with high consumption will need to reduce their demand on land, natural resources, and ecosystem services, to allow ecological space for less industrialised countries to develop (Hickel,

2021a). Accordingly, Hickel and Kallis (2019) have concluded that, assuming realistic rates of future decoupling, DG may be needed in higher income countries while lower income countries may need a transition to AG in order to reduce global impacts within planetary boundaries in a just way.

Not only that, but to address the global environmental problems before dangerous planetary tipping points are surpassed, the societal transformations away from growth dependence would need to occur quick enough, within the current decade (Jackson and Victor, 2019a). This is why my research focused on just two decades, the first being the decade following the COVID-19 pandemic and preceding the end of the 2030 Agenda for Sustainable Development (2021-2029, 9 years) and the second time period being the following decade (2030-2039). The latter decade may be considered the last decade during which many countries need to achieve carbon neutrality and reduce their ecological footprints, in order to mitigate the worst effects of climate change and biodiversity loss (IPBES, 2019a; IPCC, 2022; Sachs et al., 2021).

5.5.2. Understanding the pathway choices

The hierarchical clustering results showed that only 7 scholars in cluster 8 clearly preferred DG with negative growth rates for higher income countries and AG for lower income countries (Figure 23, Figure 24). Instead, most sustainability scholars supported low growth for wealthier countries during this decade and moderate growth to poorer countries, which would imply that the scholars assume that sufficient decoupling can be achieved to make growth compatible with environmental sustainability. This contradicts recent literature on decoupling (Haberl et al., 2020; Hickel and Kallis, 2019; Parrique et al., 2019; Vadén et al., 2020). These findings would be more concerning were it not for the fact that most scholars did prefer AG for HI countries and the support for DG also increased between the two decades. Further discussions of the limits of decoupling and circularity, and the associated risks, could shift scholarly opinion further towards DG, as countries seek ways to achieve the goals of the 2030 Agenda for sustainable development.

In Chapter 4 I showed that around one quarter of the surveyed scholars chose DG for HI countries (Figure 9, Chapter 4), meaning they thought these countries should focus on decreasing GDP. A closer look at the future GDP rates in the present chapter showed that the average rate preferred by the DG supporters was 0 %, which indicates that some scholars chose the DG pathway because they recognised a need for lower (but still positive) growth rates, while others preferred negative rates on aggregate. This is consistent with the DG definition used by Belmonte-Ureña et al. (2021), who wrote

that “DG assumes resource limitations and advocates smaller growth rates, even negative, to balance the natural and the economic systems”. Further, it is important to acknowledge that DG scholars often clarify that they call for decreases to ecologically harmful sectors of the economy, while other sectors can increase if they benefit the wellbeing of people or nature (Hickel, 2021b). In this light, the aggregate GDP rates preferred by the DG supporters seem consistent.

However, it seems that at least some scholars did not associate my DG pathway phrasing with actual DG, which seeks a steady-state economy. In my survey, the phrasing for DG was that HI countries should “...focus on decreasing GDP to reduce environmental impacts, while also directly increasing societal wellbeing”, but 22 % of those who chose DG for HI in the 2020s also thought growth would never end in HI. This corroborates the fact that around one third of the DG supporters said they were only slightly or not at all familiar with PG theory, as I discussed in Chapter 4. I also found a significant interaction between pathway preference and familiarity with PG (familiarity index based on four variables: self-assessment, publication numbers, teaching, and course attending; see Chapter 3 for details), which helped explain desired future GDP rates in the context of HI countries (only). DG supporters who were the most familiar with PG were estimated to prefer lower future GDP rates, of around -2 %, than those who were the least familiar with PG, who supported rates of around 1 %. Given how the pathway was phrased, it may be that some scholars acknowledged that environmental impacts can be decreased by decreasing GDP, but they also thought that it would be sufficient to reduce growth rates to lower levels and that those rates could then be maintained forever (so that growth would never end). This could also help explain why only 52 % of the scholars who chose DG for HI, and who thought growth would eventually end, thought the end of growth would be intentional, even though DG calls for intentional reductions to the economic scale.

On the other hand, it may also be that scholars think growth is going to end in HI countries whether it is the goal or not. In fact, economic growth has slowed down in HI countries for decades (Burgess et al., 2021; World Bank, 2021b), and these slowing growth rates have been referred to as “secular stagnation” (Burgess et al., 2021; Davidson, 2016; Jackson, 2019; Summers, 2014). One explanation for the secular stagnation has been the observed concomitant slowdown in labour productivity growth (Jackson, 2019). Jackson (2019) argue that due to the slowdown in labour productivity growth, per capita GDP growth may naturally come to a halt in HI countries as early as the late 2020s, unless average working hours or the labour force are increased by, for example, increasing labour force participation or immigration. In a recent article, Burgess et al. (2021) also wrote that economic growth in developed countries might be ending, stating that “Whether slow growth is inevitable or planned, we argue that developed democracies should prepare for additional fiscal and social stress, some of which is already apparent.”

I found that GG supporters tended to think growth would end later than PG supporters, on average. Interestingly, around half of the GG supporters thought the end would be intentional in HI and UMI countries, closely reflecting the percentages observed for DG supporters. It might therefore be that half of those who supported GG in these contexts think that a post-growth approach will be adopted later on, after 2030s. My finding that most AG supporters thought the end of growth would be unintentional in all groups seems to reflect the idea that growth may stop by itself without needing purposeful policies, when societies adopt new measures of success. The findings of this chapter show that around 90 % of AG supporters do not think that prioritising societal wellbeing and the environment over GDP would lead to zero or negative growth rates during this decade. The fact that the desired future GDP rates of AG supporters were around one percent lower than the historical rates might nonetheless indicate that they recognise some trade-offs with the changing priorities.

5.5.3. Comparisons to previous survey studies

As my survey built on the approach of Drews and van den Bergh (2017, 2016), comparing my results to their findings is of particular interest. In 2015, Drews and van den Bergh (2017) asked economists and environmental scientists from around the world to evaluate their favoured GDP growth rates for "rich industrialized" countries "in the next decade". A remarkable similarity can be observed between their findings and mine, when looking at the medians of preferred future GDP rates (Table 19). This is despite the fact that the surveys were done six years apart and focused on different groups of scholars.

Table 19. Preferred future GDP rates for high-income countries by pathway choice. Comparison between my results for the years 2025 and 2030 and those of Drews et al. (2017) for the "next decade", as evaluated in 2015. Note that in both surveys the sample of scholars who chose BAU for HI was very low.

Pathway	Year	Median	Mean
BAU	"Next decade"	2.5	2.3
BAU	2025	1.55	1.85
BAU	2030	1.55	2.65
GG	"Next decade"	2	2.9
GG	2025	2	2.25
GG	2030	2	2.18
AG	"Next decade"	1	1.3
AG	2025	1	1.28
AG	2030	1	1.14
DG	"Next decade"	0	-1
DG	2025	0.05	-0.05
DG	2030	0.3	0.27

The similarities are observed despite the fact that I primed the participants in my survey with information of future population rates and historical and present GDP rates before the evaluations, which was not done in the previous study. The population estimates of the sustainability scholars very closely reflected the actual UN predictions for all groups (Figure C1). In comparison, the participant estimates of past GDP rates were near to the actual historical GDP rates for HI and UMI, but the historical rates estimated for LMI and LI countries were 1-2 percentage points lower than the historical average (Figure C2). Including this question before asking the participants to evaluate desirable future rates was intended to ensure that the participants would have an accurate and a shared reference, thereby reducing variation when estimating future rates. Nonetheless, substantial variation remained in the desired future GDP rates. I also found that the estimates of past GDP rates helped explain desired future rates, which further proves that this variable was important to control for.

Mean values showed more divergence in the comparison to the results of Drews and van den Bergh (2017) (Table 19). In particular, the mean was 1 percentage point lower in the earlier survey among DG supporters. In another publication based on the same dataset, Drews et al. (2019) used a clustering method called latent class analysis to cluster the scholars into groups based on their views regarding various statements about the economy, society, and the environment. The authors recognised three clusters: 31 % were allocated to a GG cluster, 44 % to an AG cluster, and 25 % to a DG cluster. Clustered in this way, the scholars in the DG cluster preferred on average rates closer to 0 % (Drews et al., 2019), which is more akin to my results. However, the differences may also be due to differences in how the DG pathways were phrased. According to the Drews and van den Bergh (2017) phrasing, HI countries should "…stop pursuing economic growth. Production and consumption need to be downscaled in an equitable way to achieve environmental sustainability." This may have been a better description of DG than mine, because in my pathway phrasing the term "GDP" could have been confused with GDP growth rates instead of the economic scale itself, even though I defined GDP before the question.

Drews and van den Bergh (2017) also asked their survey participants to evaluate if or when economic growth might permanently end in rich industrialized countries. Excluding participants who had no opinion (24 % of all participants), they found that 58 % thought growth would end sooner or later, while 43 % thought growth would never end. In comparison, I found that 68 % of sustainability scholars thought growth would end sooner or later for HI countries, while 33 % thought growth would never end. 25 % of the participants in the earlier survey thought growth would end before 2040, compared to 30 % in my survey. These comparisons support the interpretation that expert positions on growth may be changing.

My approach to evaluating why growth would end was simplified, focusing on the main question of intentionality. I found that 44 % of those who foresaw an end to growth thought the end would be intentional in the higher country income groups. In contrast, Drews and van den Bergh (2017) used a more detailed approach, proposing a list of specific reasons that the participants could choose from to explain why growth may or may not end. It is notable that of the 10 reasons Drews and van den Bergh (2017) provided for why growth might end, only two implied intentionality (at least indirectly): "limits to international trade" and "stringent environmental policy". These were considered to be important reasons by 68 % and 64 % of the participants, respectively (the rest chose either unimportant or no opinion). In comparison, the reasons associated with unintentionality received the most support, particularly "environmental problems" (88 %), followed by "scarcity of energy resources" (87 %), "scarcity of material resources" (87 %), and "growing inequality" (81 %). Overall, these findings corroborate my finding that more scholars think growth will end unintentionally rather than intentionally.

Drews and van den Bergh (2017) also found that two factors received by far the most support as reasons for why growth would never end. The first was that "the increase in knowledge is boundless" (87 %), while the second was similarly that "technological change has no limits" (86 %). These were followed by "all non-renewable energy resources can be replaced by renewable ones" (81 %). However, the authors found that only 20 % agreed with the statement that "technology can solve all environmental problems associated with economic growth" (Drews and van den Bergh, 2017). These findings can provide some insight into why a large minority of scholars in my survey also thought growth might be never-ending, at least in the context of HI countries.

When evaluating participant worldviews through various agreement statements, Drews and van den Bergh (2017) found that 65 % of the scholars they surveyed thought that GDP is a "flawed measure of social welfare". This too was corroborated by my findings, as 60 % of the scholars in my sample considered GDP to be a bad indicator of societal wellbeing overall. The authors also found that support for the DG pathway was associated with concerns about the "development space for poorer countries", as well as with prioritising equality and thinking that growth leads to environmental harm (Drews and van den Bergh, 2017). Both AG and DG preferences were associated with thinking that happiness, public services, and full employment can all be accomplished without economic growth (Drews and van den Bergh, 2017). In a later paper, Drews et al. (2019) found that scholars grouped into a GG cluster tended to think that growth may not be harmful and is in fact needed for environmental protection and to improve life satisfaction, and that lowering inequality should not be prioritised. In my cluster analysis, I found that scholars in clusters 4–6 had the highest support for GG

in the context of HI countries, which can also be seen reflected in the preferred future GDP rates by cluster (Figure 23), as would be expected based on the findings of Drews and van den Bergh (2017).

5.5.4. Interpreting the pandemic influence

One further difference between my survey and that of Drews and van den Bergh (2017) was that mine took place during a global pandemic. I found that the interaction between pathway choice and the COVID-19 counterfactual helped to explain the preferred future GDP rates in the context of HI and UMI countries. In Chapter 4 I already reported how the COVID-19 pandemic influenced pathway choice, so that those who thought the pandemic should affect future GDP rates were more likely to support GG over PG for HI and UMI. In the present chapter I corroboratively found that those PG supporters who thought the pandemic should affect future GDP rates were more likely to support higher rates on average than those who said they would have supported the same rates regardless of the pandemic.

Curiously, in Chapter 4 I found that those who thought that future GDP rates should be lower overall due to the pandemic (those who chose higher for the counterfactual) also had increased odds of supporting GG over AG or DG for HI countries. Accordingly, among both AG and DG supporters, those who said they supported lower rates due to the pandemic supported on average higher rates (around 1.3 %) than those who said they would have supported the same rates regardless of the pandemic (around -0.3 %), whereas those who said they supported higher rates due to the pandemic supported the highest rates (around 1.5 %), which were indistinguishable from the rates preferred by those GG supporters who also thought future rates should be higher due to the pandemic. Interestingly, I found that the scholars who thought future GDP rates should be higher due to the pandemic chose similar rates for HI countries regardless of their pathway preference (around 1.5 %), but clear differences in preferred rates were observed for those who thought that the pandemic should either not have an influence or who though the future rates should be lower due to the pandemic. For UMI countries the patterns were similar but less pronounced.

5.5.5. Caveats

For the benefit of future research, I wish to share some ideas for improvements and point out some caveats regarding my survey structure and results, relevant to the current chapter (for more general

caveats, see Chapter 3). Firstly, since I found no difference in the preferred GDP rates between years in most contexts, and as some scholars may think that the economy will decline further in the future, it would have been interesting to add more years, for example 2035 and 2040. I chose 2030 because that is the target year for achieving the SDGs, which is a task that may require DG in HI countries. Unfortunately, Qualtrics did not offer question types that would have allowed for an easy way for participants to evaluate rates for multiple years, which could have been achieved for example through interactive line graphs.

I used graphical residual analysis to validate my linear mixed effects models for GDP rates, using residuals vs fitted graphs and Q-Q plots. I found that the model fit with the data was ok for all contexts, but not great (Figure C6, Figure C7). This means that the results should be interpreted with caution, focusing on relative importance rather than absolute significance. I tried to improve the model fit by considering a different distribution family but could not find a working alternative. The GDP rates had a peaked non-normal distribution for which a beta distribution may have been the best fit. However, those R packages that allowed for beta distribution did not support random effects, so there was no way to improve the distribution assumption within the constraints of this analysis.

The question about future GDP rates was skippable in the survey of Drews and van den Bergh (2017), who reported that 43 % of their participants chose to skip the question and therefore did not state a favoured growth rate. The authors argued this non-response rate to be consistent with other survey studies, and they said it indicates uncertainty in the opinions of scholars when evaluating future GDP rates. In my survey evaluating future GDP rates was a required field. While only 4 scholars withdrew from the survey during this question, indicating that it was not an insurmountable issue, the survey could have been easier for the participants had I acknowledged that estimating GDP rates can be difficult and added extra emphasis for why the question is important. Drews and van den Bergh (2017) also found political orientation to be an important explanatory factor for scholarly views on growth, and I could also have benefitted from evaluating it.

With regard to the pandemic influence, it may have been better to ask if/how the pandemic should affect future GDP rates in each country income group separately. This way I could have evaluated if the participants thought the pandemic should affect country income groups differently. It could also have been interesting to ask the participants to evaluate the GDP indicator quality with respect to societal wellbeing separately for each country income group. The purpose of evaluating the overall quality of GDP was to focus on what it actually measures as an indicator, helping to evaluate participant attitudes towards it. It could have been better to explicitly state: “Consider the GDP indicator by itself, regardless of the context”, and this could have been done in addition to group-

specific evaluations. This way I could have distinguished those who thought GDP is good for HI countries, which may have been a more accurate sign of attitudes than the overall measure, since for the overall measure I do not know what context – if any – the participants are thinking when evaluating the indicator quality. Indeed, scholars from HI countries seemed more critical of GDP than scholars from the other country income groups (Figure C4).

With most of these improvement suggestions it is also worth noting that increasing the number or complexity of the survey questions would also have increased the potential for survey fatigue. The trade-off of extending my survey geographically and temporally to cover different country income groups and decades was that I was not able to include as many questions as for example Drews et al. did – greater extent was achieved by sacrificing some detail. Future research focusing on expert opinions in different contexts would benefit from learning from both approaches, fine-tuning this balance.

5.6. Conclusions

To quote the highly influential classical economist John Stuart Mill, "It must always have been seen, more or less distinctly, by political economists, that the increase of wealth is not boundless: that at the end of what they term the progressive state lies the stationary state, that all progress in wealth is but a postponement of this, and that each step in advance is an approach to it." (Mill, 1848). What is more, he recognised that "It is only in the backward countries of the world that increased production is still an important object: in those most advanced, what is economically needed is a better distribution" (Mill, 1848). These are rather profound observations relevant for the current debate about future growth in different country income groups. A stationary state implies a steady level of consumption and production, in proportion to the size of the population, sufficient to meet the needs of all people without exceeding the carrying capacity of the environment. It implies an end to economic growth, but as Mill (1848) already recognised, it does not imply the end of development – On the contrary, achieving the stationary state could facilitate great improvements in wellbeing, sophistication, freedom, and culture.

Most of the scholars I surveyed also foresaw and end to economic growth, sooner in higher and later in lower country income groups. While I found that most sustainability scholars think growth will continue until 2030 in all groups, the preferred rates were below historical rates and around one quarter of the participants already preferred a steady-state economy of zero growth or a degrowth

economy with declining GDP rates for HI countries for the year 2030. This should not be interpreted as a bad thing, as most scholars also considered GDP to be a poor indicator of societal wellbeing. In fact, GDP was never meant to be used as a measure wellbeing (Kuznets, 1934). A comparison of the Genuine Progress Indicator (GPI) against the GDP has revealed that economic growth no longer provides net improvements to wellbeing in HI countries, when externalised environmental and social costs are accounted for (Kubiszewski et al., 2013).

In contrast, growth in production and consumption can still improve wellbeing and reduce poverty in the lower income groups, where production does not always meet basic requirements for people to live healthy and secure lives (UN, 2020; World Bank, 2020). Therefore, HI countries would have the least to lose and the most to gain with a transition to PG economies, because the transition could simultaneously secure societal wellbeing while greatly reducing impacts on the global environment (D'Alessandro et al., 2020; Jackson and Victor, 2019b; Victor, 2019). In a PG system, the economy can decline, remain stable, or increase, as long as the changes add to the wellbeing of people without harming nature. Importantly, Jason Hickel has argued that "Debating whether environmental policy is going to improve GDP growth or constrain it is a dead end. The empirical point is that pursuing growth makes it more difficult to reduce resource use, so we should shift to a post-growth economy" (Hickel and Hallegatte, 2021). Indeed, the uncertainty and difficulty of evaluating future GDP rates was visible in the substantial amount of variation I found in the estimates of desirable future GDP rates, corroborating previous research (Drews and van den Bergh, 2017).

For global sustainability to be achieved, it is particularly important to reduce the impacts of consumption-growth in HI countries, by increasing the weight given to ecological and societal wellbeing considerations in decision making at all levels (Costanza, 2020a; Costanza et al., 2018, 2017, 2014c; Díaz et al., 2019; Victor, 2019). By using PG policies to reduce the environmental impacts caused by the richest nations, and by the rich within each nation, it might be possible to address the global environmental problems before dangerous planetary tipping points are surpassed (Lenton et al., 2019; Wiedmann et al., 2020). Furthermore, by ensuring the sustainability of international trade, industrialised nations could also end the prevailing unequal patterns of trade and resource appropriation that continue to feed growth in the global north while negatively impacting less developed countries (Dorninger et al., 2021). While research in HI and UMI countries should focus on envisioning PG futures and testing different PG policy frameworks to determine if and how they could lead to sustainable and desirable outcomes in different contexts, GG research should be redirected to focus on less industrialised LI and LMI countries, to help them achieve sufficient material standards in a socially and environmentally sustainable and economically efficient way, accounting for full costs.

Chapter 6. Envisioning a transition to a post-growth economy in the context of a specific high-income country

6.1. Abstract

For global sustainability to be achieved, high-income countries may need to transition into post-growth socioeconomic systems. However, little is known of what a post-growth future might look like and what actions would be needed to facilitate the transition in the context of a specific high-income country. To find answers to these questions, I organised a remote workshop that utilised the Delphi method with a panel of Finnish experts. The experts had consensus that Finland should focus on increasing societal wellbeing directly while also reducing environmental impacts, regardless of what happens to GDP. A new narrative vision was then created along these lines, building on pre-existing post-growth visions for Finland. Following a backcasting approach, the panellists suggested a number of practical steps for how to transition to that envisioned future, how Finnish consumption habits could be influenced, and how to increase the acceptability of the new post-growth vision among different stakeholder groups. The panel largely agreed that it would be particularly important to include externalities in prices and that consumption-based environmental harm should be accounted for. To increase acceptability for the new vision, the panel emphasized the need for open and inclusive dialogue, for structural and cultural changes, for peer pressure and leading by example, and for altering the prevailing financial incentives and social safety nets. The panel also argued that it is important to consider what term is used to describe the envisioned future, preferring wellbeing economy or moderation economy over post-growth or degrowth. I found that it was easier to reach consensus on some questions related to post-growth than on others. This research can help inform how more inclusive societal deliberations should be approached in the future.

6.2. Introduction

According to surveys, most sustainability experts from around the world now prefer post-growth pathways for affluent countries (Chapters 4–5, Drews and van den Bergh, 2017; Lehmann et al., 2022). The agrowth (AG) viewpoint is particularly popular among scholars, according to which it should not

matter whether GDP growth will continue in affluent countries, as long as environmental impacts are reduced to sustainable levels while wellbeing is secured. To ensure that environmental and social sustainability are achieved, societal focus should therefore shift from economic growth to sufficiency, stability, and wellbeing (Coscieme et al., 2019b; The Guardian, 2018).

In Europe, there are already signs of a shift towards PG thinking. A few years ago, ten members of the European Parliament, in collaboration with a number of organizations, organized a "Post-Growth 2018" conference, which sought to outline a transition to a PG economy in Europe (The Guardian, 2018). In the context of the conference, hundreds of researchers jointly published a letter urging the European Commission to abandon the goal of economic growth and focus instead on stability and prosperity (The Guardian, 2018). Recently, the Wellbeing Economy concept, which is an AG approach that seeks to shift societal focus from growth to the wellbeing of people and nature, has also received favour among several countries through the Wellbeing Economy Governments partnership (WEGo). WEGo currently includes Scotland, Wales, Iceland, New Zealand, and Finland, with many other governments following their lead (WEAll, 2021).

Finland is a particularly interesting case study for the question of what a PG economy might look like in the context of a specific high-income country. This is because Finland is already wellbeing focused and has been ranked as the happiest country in the world for the past five years in a row (Helliwell et al., 2022). Country comparisons of progress towards the SDGs have also ranked Finland first both among European countries and worldwide in 2021 (Lafortune et al., 2021; Sachs et al., 2021). With over 80 % index score across all 17 SDGs and their sub-targets, Finland already represents an example for other countries, who have committed to achieving the same sustainability goals (Lafortune et al., 2021; Sachs et al., 2021). This means that transformational change in Finland could have global reverberations.

However, as in other countries, Finland's wellbeing is built on an unsustainable foundation. In 2022, Finland's "Earth Overshoot Day" was March 31, while the world average was in July (Global Footprint Network, 2022a, 2022b) – all consumption after this day is a deficit that depletes natural capital. In international comparison, Finland ranks 130th in terms of its ecological footprint (Happy Planet Index, 2021), meaning that Finland's per capita consumption of resources and ecological services is many times over the world's carrying capacity (although, it is worth noting that the ecological footprint metric remains an incomplete indicator of environmental impacts, and its accuracy has been contested in literature. See e.g., van den Bergh and Grazi, 2015). According to the Finnish Committee for the Future, the high consumption-based environmental impacts of Finns and the unsustainable

use of natural resources are the country's main sustainability challenges (Tulevaisuusvaliokunta, 2020).

To address these issues, Finland has some of the world's most ambitious environmental goals, aiming to achieve carbon neutrality by 2035 while safeguarding biodiversity and reducing inequality (Finnish Government, 2019). The recently published Finnish Roadmap for Sustainable Development also highlighted the importance of examining overconsumption and the link between economic growth and wellbeing in Finland (Kestävän kehityksen toimikunta, 2022). The government's programme also states that indicators that describe economic, ecological and social wellbeing will be used to support traditional economic indicators in decision-making (Finnish Government, 2019).

All of the above considerations increase the likelihood that PG could be considered and eventually implemented in Finland. However, the country remains entrenched in the idea of GG, with the government programme explicitly stating that "The aim of economic policy is to increase wellbeing and prosperity. This means ecologically and socially sustainable economic growth, high employment and sustainable public finances, as well as a level of stability in the economy [that] would enable unforeseen impacts on people's wellbeing to be avoided" (Finnish Government, 2019). The problem is that "sustainable economic growth" requires absolute decoupling, which has been found to be an unrealistic goal for Finland, making the GG approach highly risky (Vaden et al., 2019), reflecting global findings (Haberl et al., 2020; Hickel and Kallis, 2019; Parrique et al., 2019). In addition, GDP growth has failed to increase genuine progress in Finland since mid-1980's (Hoffrén, 2018), which questions its relevance as a societal goal.

In previous chapters, I have argued that research in affluent countries should now focus on envisioning PG futures and evaluating how different PG policy frameworks could lead to sustainable and desirable outcomes in different contexts. Ergo, in this chapter I report findings from an expert Delphi workshop, which I used to find out what a desirable PG vision could look like for a specific high-income country (Finland) and how TC to that future state could be achieved when the national context is considered. The following list outlines the main research questions this chapter addresses:

1) When should a PG economy be achieved in Finland, if ever?
2) What kind of a PG vision would be desirable for Finland?
3) How to increase the acceptability of a PG vision among different groups in Finland?
4) How difficult is it to find consensus on these issues among experts who are interested in PG?

In the next section, 6.3, I present the methodological approach used to answer these questions. For additional details of the study area, see Chapter 3. In section 6.4 I detail the results, which I then discuss in section 6.5. I draw conclusions based on this research in section 6.6.

6.3. Methods

In November–December 2021, I organised an online workshop together with 14 Finnish scholars and experts, focusing on PG questions at the national scale, using Finland as the case example (for details, see Chapter 3 and Appendix E). The asynchronous remote expert deliberation included four rounds of questionnaires and discussions, organised through the Finnish eDelphi platform (https://www.edelphi.org/#), and an end plenary organised via Zoom (https://zoom.us). The Delphi method allows a combination of qualitative and quantitative approaches and helps to highlight and refine group estimates (Dalkey, 1969). With 14 participants this workshop was of a qualitative nature, but graphs characteristic to quantitative research were utilised throughout the Delphi method, as the numerical presentation of responses helped to visualise differences in opinions and find disagreements that were important to address in more detail, when seeking and interpreting consensus. The graphs in this chapter have the same purpose and it is therefore necessary to note that they may not be statistically meaningful.

The topics covered in the Delphi workshop included future pathways for Finland, future of growth in Finland, Finland's societal dependence on growth, narrative scenario building, and intervention assessment. In this chapter I focus on the future pathways, scenario building, and the actions needed to achieve the desired future. I address the remaining topics in Chapter 7 in more detail. To research the PG transformation, I combined the Delphi method with a backcasting method. In a backcasting analysis, the criteria for a desirable future are defined first, and the analysis is concerned with how desirable futures could be achieved, not with what futures are likely to happen based on existing forecast trends (Dreborg, 1996; Neuvonen et al., 2014). This makes the approach particularly useful for considering transformational change (Dreborg, 1996).

The future pathways were evaluated using the same four options as in Chapter 4, but since the workshop focused only on Finland, I extended the question to cover an additional decade. I approached the narrative scenario building by presenting the panel with three tasks which helped to envision what a desirable PG future could look like in Finland. First, panellists were asked to comment and discuss how the transition to PG Finland would relate to six areas of change identified by the

Finnish National Commission on Sustainable Development, which is led by Finland's Prime Minister. Finland's national sustainable development policy will be structured around these areas of change in the coming years (Finnish National Commission on Sustainable Development, 2022, 2021), as they are part of the recently developed "Agenda2030 roadmap" which will play a key role in the implementation of the Agenda2030 for sustainable development in Finland. The areas of change identified by the roadmap are:

1. A sustainable food system
2. A sustainable energy system
3. Use of forests, waters, and land to enhance biodiversity and carbon neutrality
4. Sophistication, skills, and sustainable living
5. Welfare, health, and social inclusion
6. Economy and work that foster wellbeing, with sustainable consumption.

At the end of the round, I compiled all comments into a coherent results text which helped demonstrate in narrative form the kind of future the panellists envision. This text may not exactly represent how each panellist thinks the future should be, because not all comments were separately evaluated to estimate consensus. Instead, the text provides a comprehensive view of the ideas put forward by the group of experts. All comments were considered when compiling these texts into a final report, which the panellists reviewed after the workshop. Thus, the same process of review was applied to all results texts I compiled. The final report was approved by all panellists, all of whom agreed to have their names and profile pictures included in it (Koskimäki, 2022).

In the second task, the panellists were asked to rate their agreement with a short description of a "moderation economy", which I compiled based on the writings of the Finnish Association for Nature Conservation (Latva-Pukkila, 2015). In the third task the panellists were asked to evaluate their agreement with another, more detailed vision of the future of Finland. I compiled this second vision based on the ecological reconstruction plans of the Finnish BIOS research unit, which I condensed and converted into a narrative format for this study (Box 4). I also asked the panellists to use the comment sections to share their thoughts about this narrative vision for Finland and to suggest changes to it (additions, deletions, or clarifications).

Once the panellists had evaluated and envisioned what a PG Finland should look like, the last Delphi-round focused on how the envisioned PG economy could be achieved. First, the experts were asked to assess the impactfulness of 19 actions for the PG transition in Finland. I selected these actions from the comment sections of the previous rounds, where the participants had proposed many solutions. I delimited the list to those actions that had the most relevance when considering a transition into a PG

economy in Finland, using my knowledge of the PG literature to inform my choice. After evaluating the 19 selected actions, the experts were asked to comment five concrete measures that could influence the consumption habits of Finns, affecting both the quantity and quality of consumption. Lastly, the participants were asked to comment how the acceptability of the new PG vision could be increased in Finland among A) citizens; B) MPs / decision makers; C) researchers / experts; D) entrepreneurs / investors; and E) among the elites (the rich and privileged).

6.4. Results

6.4.1. Future pathways for Finland

According to the expert workshop panel, Finland should seek to create an AG socioeconomic system already during the current decade (Figure 25). Thus, the economy can contract, stay at a steady level, or increase, depending on what actions the environment and societal wellbeing require and how these actions would influence production and consumption. For example, one comment stated that "the sensible path would naturally be to increase wellbeing and decrease environmental harm. If these goals are met, what happens to GDP is not relevant by itself". The panel had near unanimous consensus on this AG path, while Business-as-usual (BAU) received no votes, green growth (GG) only one during the current decade, and some panellists chose degrowth (DG) for the last decade (Figure 25).

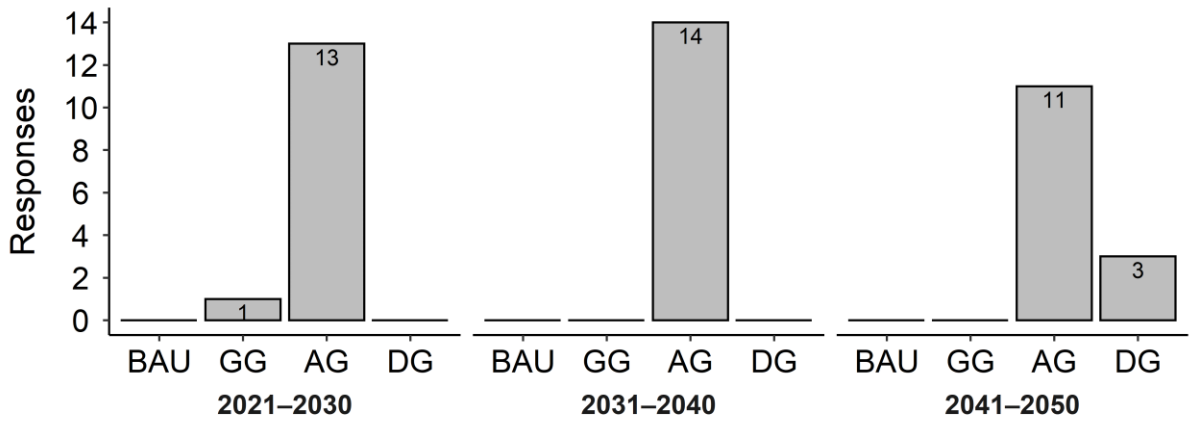

Figure 25. Support for alternative future pathways for Finland, per decade. The panellists had near unanimous consensus that agrowth (AG) would be the most desirable pathway for Finland during this decade and the ones that follow.

The panellists' explained their pathway choices by writing that while DG would be better from the perspective of environmental harm, it would be politically unrealistic, unlike AG. The current political atmosphere in Finland is so pro-growth, that policies directly targeting growth could cause a substantial backlash and increase in populistic politics. One panellist answered AG despite thinking that what happens to GDP is not inconsequential in terms of environmental harm and wellbeing, specifying that DG could be a long-term target. Another said that, paradoxically, societal wellbeing could even increase if GDP was decreased, but this may not be acceptable and possible before a couple of decades from now. Compared to this strategic approach to pathway preference, others were more indifferent about GDP, stating that GDP is not a measure of wellbeing and what happens to GDP is not interesting. "I think it is essential to primarily aim to increase social wellbeing (and harness this as the goal of the degrowth discussion as well). Not the other way around, so that the primary focus would be on reducing societal metabolism", one panellist wrote. Still others emphasized that the dependence of public revenues on GDP growth must end. We cannot be negligent about GDP when our economy remains growth dependent, but it is nonetheless possible to prioritise other goals over economic growth. The consensus was that if environmental and wellbeing targets are achieved, GDP does not matter. One panellist who didn't choose GG stated that this pathway would be acceptable only if the extremely difficult decoupling between GDP and material consumption is achievable.

When the participants were asked to evaluate the level of support for post-growth in Finland among scholars, citizens, and the members of parliament (MPs), many found this difficult to evaluate reliably and the responses varied wildly. As a percent of all belonging to each group, rounded to the nearest ten, the most support towards a PG economy was estimated to exist among scholars (mean 39.2 %, median 30 %, SD 20.6), the second most among citizens (mean 32.3 %, median 30 %, SD 23.5), and the least among MPs (mean 17.7 %, median 10 %, SD 20.5).

The panellists argued that there is more active growth-critical discussion among the scholars, who are also more likely to understand and accept the facts, but the scholars were thought to be divided and it was said that the support may depend on the field. Economists were thought to be more likely to consider growth as necessary and essential, while sustainability experts, and those with an environmental science background, were thought to be more likely to understand the need for PG, because they understand the connection between growth and environmental problems. Nonetheless, one comment stated that most research continues to be uncritical of growth because criticism is seen as unscientific activism.

Citizens were thought to be more supportive of PG due to a common sense understanding that endless growth is not possible on a finite planet, although they may not always have a socially sustainable

vision of a PG economy. The low estimated support among the MPs was explained by arguing that politicians are influenced by ratings and lobbying. They were said to follow either capital or worker interests, both of which are tied to growth. The pursuit of economic growth was considered to be an almost unchallenged self-evidentiality across parties. On the other hand, some thought that this is because politicians are concerned and knowledgeable of the factors required to currently maintain societal stability, and responsible for the implementation of statutory services which presently require growth. One panellist considered that support for PG is overall increased by the environmental crisis, while another argued that support is higher if the change is planned and ensures social security. One argued that the majority in all groups would not be able to take a stand on the issue. Reflecting earlier questions, the panellists commented that it is important to pay attention to what exactly the goal is and what term is used to describe it. This is also what the second section focused on.

6.4.2. Evaluating future terminology

Some panellists suggested that a term other than the "post-growth economy" could be better to describe the desired future. It was argued that PG may provoke a backlash and may not reflect well what is actually being pursued in the future system. Alternative terms were considered using a multiple-choice question (Figure 26). The choices were based on terms suggested or used by the panellists themselves in earlier comments, and the participants were provided with the option of commenting additional terms for consideration. The "wellbeing economy" ("hyvinvointitalous" in Finnish) received the most support with nine votes, while "moderation economy" ("kohtuutalous" in Finnish, for which an alternative English translation would be "Degrowth") received second most support with seven votes. Five panellists supported both. Most panellists thought that the word "growth" should not be a part of the chosen term, as it will not be a defining feature of the future system.

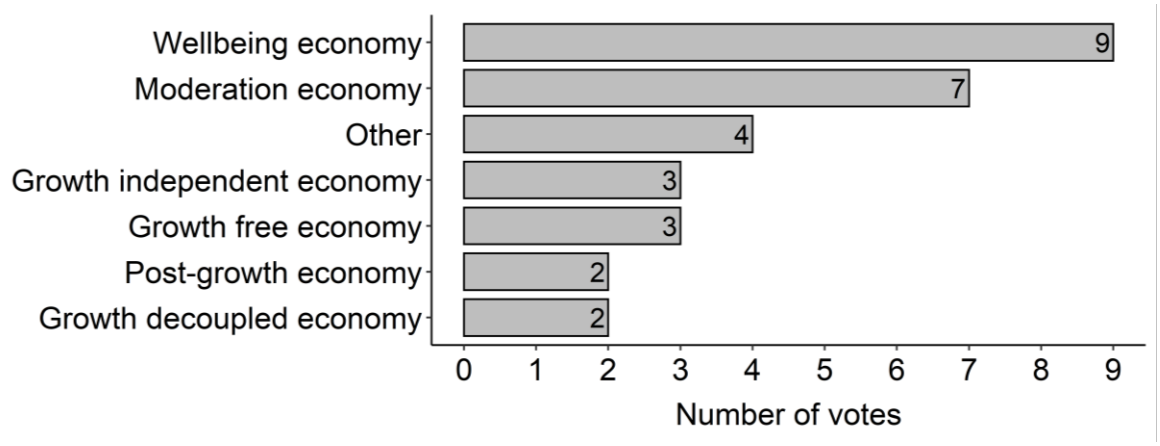

Figure 26. Alternative terms to describe the agrowth socioeconomic system of the future.

Focusing on the two most popular terms, there were 4 arguments in favour of the term wellbeing economy and 9 arguments against it, while 17 arguments were in favour of the moderation economy term with 7 against. Wellbeing economy was said to highlight what the economy should strive for, while also being the easiest to market. The ambiguity of the term was said to be an asset if it allows for the exchange of ideas between people from different starting points and attitudes. According to the counterarguments, the ambiguity can also mean that the term can be used for other purposes except for improving wellbeing. It was also argued that the term is already used in Finland and internationally to describe the current Finnish system, and thus it could mean that nothing needs to change. One panellist even argued that it is implicitly associated with the idea that wellbeing should be invested in because it adds to economic growth. The term was criticised for giving insufficient emphasis on ecological sustainability issues and biophysical limits to growth, and it would need added clarification or redefinition so that it would be understood to refer to a new kind of economy that focuses on wellbeing within ecological boundaries. However, combining the term with additional words, such as “sustainable wellbeing economy” could make it long and too rigid to be efficient as a catalyst for change.

Before considering the arguments for and against the “moderation economy” term, it is worth noting that the term is a literal translation from the Finnish compound word “kohtuutalous”, which was originally a translation of the term “degrowth” (Latva-Pukkila, 2015). Although kohtuutalous refers largely to the same arguments as degrowth, it is conceptually different as a term. It combines the words “kohtuus”, which could be translated as moderation, sufficiency, or temperance, and “talous”, which means economy. In this context temperance refers to the voluntary refraining from wasteful behaviour and excesses (conspicuous consumption or extravagant luxury), which is an old (pre-

consumerist) virtue in Finland (Soinne, 2018). “Kohtuus” can therefore be associated with a sense of content, even pride, with moderation, prudence, equity, and fairness.

Some panellist disagreed with the moderation economy term, because they considered it to be void of substance, or virtue-moralistic, or easily misunderstood to mean that everyone has to decrease their standard of living equally, or even that we should only moderately grow the economy. It was also argued that some people might associate seeking moderation with seeking cuts to welfare and going back to the Finland of the 1950s. According to the arguments supporting the “moderation economy” term, it better signals a significant change to the current ways. Because at its heart is the old virtue of temperance, it directs thinking to something largely shared and socially desirable. The term was argued to refer precisely to the need to moderate, e.g., reduce consumption, to seek an adequate level of resource consumption and prevent excessive environmental impacts, instead of only seeking more efficiency. It was also argued that the term simultaneously implies that focus needs to be on that which is essential, sustainable wellbeing, in a just way. As one panellist wrote: “I personally understand that a moderation economy specifically means a sustainable and fair wellbeing economy, because ‘kohtuus’ refers to a sustainable level and fairness. And if the term is used as a translation of the term degrowth, both of these perspectives are strongly present.” Another panellist wrote that “I do not see moderation as a return to the old, but looking ahead – what would it be like to have a good, fair life within the boundaries of the environment?” Lastly, it was argued that the term is not intuitively radical but pragmatic, it is concise and therefore practical, and it is relatively well-established in Finnish conversation. It was argued to be a good compromise, considering that all terms are limited in their own way.

The panel did not arrive at a consensus on the best term. In the end plenary it was suggested that perhaps there should be a completely new term which would have conceptual space to develop, as long as the term can be developed quickly. In the end, the term itself is not the most important thing and the panel agreed that different terms may be useful for different audiences. To maintain consistency, I will continue to use the term PG here.

6.4.3. Envisioning a post-growth future through specific areas of change

In order to understand the panellist’s views on Finland's future, they were asked to comment how the transition to a PG Finland would be reflected in six areas of change included in Finland's Agenda2030

roadmap. The panellists' responses are compiled into a coherent text below, which helps demonstrate the kind of future they envision.

1. A sustainable food system

A sustainable food system in a PG Finland would be largely self-sufficient and agroecological (utilising diverse species and different ecosystems), with less, if any, use of artificial fertilizers and pesticides. Forests would also be seen as food production areas – not just as areas for wood and pulp production. Production would favour local food while ensuring the security of supply (preparedness). Production methods with the highest carbon footprint would have been reduced by incorporating climate and other environmental damages in the prices of products and by targeting government support towards eco-friendly measures, such as the production of plant proteins instead of animal proteins. The food system would have transitioned into plant-based foods across the board, both in domestic food production and imports. As in all other sectors of transition, workers and entrepreneurs making a living off livestock would be offered support for change, decent social security, and opportunities for reskilling. The transition would be implemented in a socially just way. Remote work would enable a range of livelihoods beyond dense urban living, and food would also be produced communally, with state support.

2. A sustainable energy system

A PG Finland would run completely on green energy, especially geothermal, and decentralized solar and wind power. As Finland would have invested in carbon-neutral energy production and set limits on emissions and material consumption, the country would be completely free from burning coal and other fossil fuels. The energy efficiency of housing would have been improved, for example with the application of aerogels. Efforts would also be made to get rid of extra dams and nuclear power (although comments on the role of nuclear power as a future energy source were partly contradictory).

3. Use of forests, waters, and land to enhance biodiversity and carbon neutrality

The use of forests, waters, and land would strengthen diversity and carbon neutrality, as forestry in particular would increasingly focus on compensation services and nature conservation, e.g., through the restoration of bogs, organic forest management, the restoration of monocultural areas, and the Metso program (Ministry of Agriculture and Forestry, 2015). Biodiversity would be at the heart of forest and nature policy, and forests would be used in a variety of ways, accounting for their recreational value, carbon sinks, and biodiversity. Forest management associations would recommend continuous cover forestry. Clearcutting would be largely prohibited. The use of natural resources

would be clearly priced, so that it would no longer be “free” to wear down or pollute soil, water, and air.

4. Sophistication, skills, and sustainable living

In this area of change, education is key. Education would be completely free of charge and sufficient resources would be allocated to maintain and improve the quality of the education system. Efforts would be made at all levels of education and in all educational programs to support critical thinking and to create an understanding of sustainable development and ecological crises, to increase the understanding of nature and respect for it. People would be educated about the diverse effects of consumption choices, and education would guide people to reduce consumption. The production and use of food grown in nature would be taught as handicrafts. Primary education would create “ecological rebuilders”. Sustainable lifestyles would also be guided by public regulation, and research and development that promotes the qualitative development of the economy would be invested in and valued. Due to shorter working weeks or working hours, or, for example, harvest holidays, people would have more time to gather or grow food themselves. As an outcome of these changes, the nature connection of Finns would have been restored and Finland would respect the limits of nature when producing wellbeing. Instead of an abstract concept, nature would become a living reality and a component of livelihoods.

5. Welfare, health, and social inclusion

In a PG Finland new community-based practices would be created, with structures that support them, especially with regard to housing. New forms of community-living and activities would be supported both in cities and in the countryside, financially, and by adapting the infrastructure. Health and wellbeing would be improved through greater use of preventive measures in social and health services, as well as through the provision of free mental health services for all. Concentration skills and the awareness, regulation, and expression of emotions would be taught in schools, for example through meditation exercises. Practicing the mind would help change values and help people find satisfaction without material consumption or status competition. Conflicts between working and maintaining one’s health would be prevented by supporting career transitions and people would no longer be socially divided into the employed and the unemployed. Democracy would be developed, for example through citizens' councils and by encouraging citizens' participation in democratic decision-making.

6. Economy and work that foster wellbeing, with sustainable consumption.

Wellbeing would be the goal and the economy would be seen as a tool, not as an end in itself. In the economy, better account would be taken of stocks, i.e., capital, including natural capital, in addition to considering economic flows. The industrial base of society would have been reformed through planned industrial policy. Decision-making would take into account what kind of business activity maintains wellbeing in a regionally balanced way, and work would be directed to support sustainable food and energy systems and sustainable environmental outcomes. Building sustainable socio-ecological systems would create substantial amounts of new work that would move society away from the overuse of natural resources and fossil fuels. Taking into account local and sectoral considerations, work could be done with lower carbon footprints and according to one's own life situation. Taxation would help guide consumers towards ecologically sustainable choices. People would also consume less and build a lifestyle on moderate and reasonable consumption, keeping ecological footprints at a level that does not cross global boundaries. Taxation and other means would also enable a culture of repair to emerge, already at the level of product design, which would promote circularity in the economy. In line with international climate policy, cutting consumption-based emissions would have been raised in importance alongside regional and production-based considerations. Personal budgets for the use of carbon and natural resources would be considered.

Many panellists mentioned that it would be important for the transition to consider the interconnections between all these areas of change and to promote them in a systematic and coordinated way, while avoiding potential conflicts. Ecological boundaries should be the starting point for all activities. Basic income was mentioned as a policy that could support the transition across different areas of change.

6.4.4. Evaluating pre-existing post-growth visions

After evaluating what a PG future would look like in specific areas of change, I asked the panellists to evaluate two pre-existing PG visions for Finland. The first was a DG vision of a moderation economy, which I summarised based on the writings of the Finnish Association for Nature Conservation (**Box 3**). The second was a narrative AG vision of Finland after ecological reconstruction, which I created based on the plan for ecological reconstruction by the Finnish BIOS research unit (BIOS, 2019a, 2019b).

Box 3. The definition of a moderation economy, based on the views of the Finnish Association for Nature Conservation (Latva-Pukkila, 2015).

> The basic premise of a moderation economy is that the carrying capacity of the earth creates the boundary conditions to which the economy must adapt. The goal is an economic system that produces equitable prosperity within the limits set by the environment and in which prosperity can be secured regardless of economic growth and global competitiveness. The moderation economy questions the role of economic growth as a source of wellbeing and as a societal goal. It wants to displace economic growth as the ideology that dominates our society and our thinking. The economy must be genuinely restated to the status of an instrument. In the name of safeguarding nature and human wellbeing, the moderation economy supports a voluntary and planned reduction of production and consumption to sustainable levels. In addition to reduction, the moderation economy emphasises a qualitative change in production and consumption. We need to learn to do not only less, but better above all. Instead of emphasising consumption, materialism, and growth, a culture of moderation that fosters wellbeing and community is needed.

The majority of the panel fully agreed with the summarised vision of a moderation economy (61.5 % fully, 38.5 % somewhat agree). However, several panellists pointed out that when talking about reducing production and consumption to sustainable levels, society should not rely solely on volunteering. Instead, it would be important that reductions could also be democratically and systematically achieved by stronger means: with orders, prohibitions, charges, and taxes. The panel agreed that instead of consumption, materialism, and growth, a culture of moderation that fosters prosperity and community is needed. They also added that other species must be taken into account in the pursuit of wellbeing.

The vision of Finland after ecological rebuilding was longer and more detailed than the vision of a moderation economy. Consequently, it also set out more concrete proposals for achieving the envisioned future and it focused more closely on the effects of transition across society (Box 4).

Box 4. A narrative vision of Finland after ecological reconstruction. The text has been condensed and reformatted as a narrative vision, based on the plan for ecological reconstruction by the Finnish BIOS research unit and the associated dashboard for transition politics (BIOS, 2019a, 2019b). The majority of the text has been directly copied to accurately reflect the original material, but the order and wording of the sentences have been changed.

In this text, Finland after ecological reconstruction refers to a time when the worst consequences of climate change and other ecological crises have been avoided, while the democratic practices of society, the wellbeing of citizens, and cultural wealth have improved.

After ecological reconstruction, rapid economic growth and a high employment rate are not significant goals per se in Finland, as the main focus is on ensuring equal opportunities for a good life while keeping climate emissions and the use of natural resources at a sustainable level. Success is monitored by a number of indicators relating to the state of the environment, the economy, and society. In particular, the carbon balance, total material requirement, fiscal sustainability, societal resilience, and transition employment are closely monitored.

Several industries have disappeared as a consequence of the ecological transition, and the practices of an even greater number have changed radically. Sectoral transition policies provide re-training for workers. The relative importance of different sectors has changed, as they are viewed from the perspective of sustainability and wellbeing instead of focusing on their contribution to economic growth. A job guarantee provided by the state creates security for citizens and reinforces the idea that there is no need to accept any job regardless of what it entails. Jobs that contribute towards creating a sustainable society will always be available.

In Finland after ecological reconstruction, the glorification of competition and the unsustainable consumer culture have been replaced by civil and cultural values. Citizens are no longer called consumers, nor Finland a competitive / consumer society. In Finland after ecological reconstruction, emphasis is placed on creativity, sophistication, good education, and distinctive internationally networked cultural development. Education has been invested in widely, as it is socially recognized that aspects related to ecological and social sustainability apply to all sectors. In particular, environmental education is widely offered to individuals and communities at different stages and areas of life.

Life in a Finland after ecological reconstruction is pleasant, and it is not based on the overuse of natural resources, either in Finland or elsewhere. Life is more meaningful and satisfying than before, even though material consumption has been reduced, because life is not based on the same goals, values, desires, and dreams as before. Finns earn and consume less, but they spend more time with their loved ones, and enjoying art and hobbies, for example. Culture is no longer marked by the pursuit of abundance and ease, haste, and meaninglessness. Social and cultural life have improved while energy and material consumption have been reduced. Instead of the throwaway culture, goods are made long-lasting, which has also increased their meaningfulness.

Box continues on the next page.

Box 4. *(Cont.)*

Finnish regional development has been significantly affected by the increase in self-sufficiency and more diversified domestic production. Instead of rural impoverishment and depopulation, there has been a regional recovery, as a diversified and more viable agricultural production has provided more employment opportunities for people. Changes in the food system have also had a significant effect on rural change, as production has become less dependent on fossil fuels due to environmental impacts and the share of animal products in the Finnish diet has been significantly reduced. The use of forests in Finland after ecological reconstruction has also changed, with prioritisation given to carbon sequestration and the preservation of biodiversity. The level of felling has decreased, and wood is used especially for long-lasting products.

Lifestyles that are less harmful to nature have improved public health in a Finland after ecological reconstruction because diets are healthier and people spend more time in nature, among other reasons. Air pollution has also decreased as fossil fuels have been phased out. Better health has also been affected by the fact that overcoming growth dependence and increasing automation have freed up so much labour resources that more time and opportunities are left for care and education.

In Finland after ecological reconstruction, means of transport have been electrified and the need for private cars has been reduced by improving public transportation. The urban structure has also been changed to support public transport, walking and cycling. In the construction sector, the priority is always to utilize, repair and renovate the existing building stock, and wood construction has become more common. In construction, as in other production, recycling is already accounted for at the design stage.

The ecological transition was state-led, as only the state had enough capacity and legitimacy to guide such a large-scale change. However, the transition was carried out democratically in such a way that the decision-making processes were inclusive and had the support of the public. As a consequence, societal polarisation and identity politics have decreased in Finland after ecological reconstruction. Public authorities brought different economic actors – businesses, interest groups, and citizens – to agree about the scale and need for change and steered them in the same direction. This brought about large-scale and profound changes in the behaviour of individuals and communities.

The panel had an even higher agreement with the vision of Finland after ecological reconstruction (69 % fully, 31 % somewhat agree), but improvements were also suggested. In addition to the role of the state, the role of a strong civil society and the private sector should be recognised as agents of change and not just as participants in the decision-making processes. It should be emphasized that the economy must once again become a process that is constantly being developed under the influence of political and democratic decision-making. According to some panellists, it would also be essential for the vision to take into account the privileged classes at the “top of society” – their interests and the benefits they have achieved. The mention that people would earn less may also be unnecessary if, in the future, externalities are included in prices and the market system works better. Instead, the

vision should emphasize that income and wealth disparities are not too big and do not escalate. In addition to the carbon balance, total material requirement, fiscal sustainability, societal resilience, and transition employment, it would also be essential to closely monitor social inequalities and biodiversity.

Rather than just adding knowledge – through environmental education or otherwise – holistic changes are needed in how people are raised and educated, in order for the prevailing thinking, values, attitudes, culture, and practices to turn sustainable. According to one comment, “The understanding of people (and the whole nation) should grow to a new level, realising their own role as individual actors in the Earth’s ecosystem that are a part of and in balance with nature.”

6.4.5. Mapping the path

The panellists suggested a number of practical steps on how to transition to the envisioned future in the comments sections throughout the workshop. From the suggestions, 19 measures were assessed further by asking the panellists how impactful they would be in the transition to a PG economy in Finland (Figure 27). The comments noted that while the actions should affect everyone, they should target those who consume the most. The changes should be fair and equitable. As concrete actions are taken to reduce the environmental impacts, it is essential to decrease income and wealth gaps.

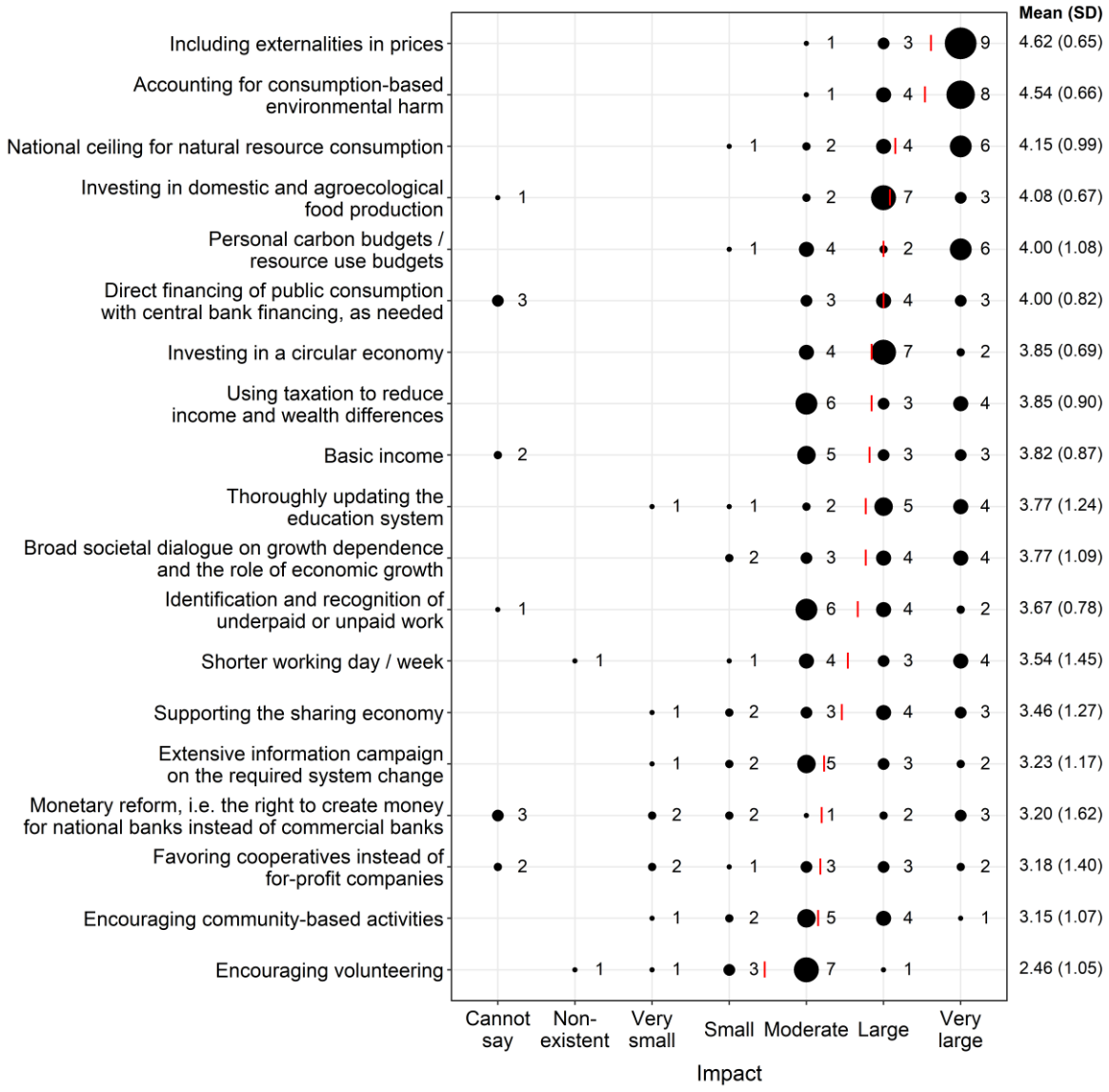

Figure 27. Panellists' assessments of the impactfulness of 19 practical measures for transitioning to a moderation economy in Finland. Arranged from most to least impactful based on the average impact (red lines). In the x-axis "non-existent" is 0 and "very large" is 5, as the "cannot say" category is not included in the calculation of the mean or the standard deviation (SD). The SD may be interpreted as indicating the level of consensus (the lower the SD, the higher the consensus).

One panellist commented that "almost all of the actions listed would clearly take us to the right direction", but the panellists noted that their assessments were influenced by evaluations of political realism, the urgency of change, specifics, time span, indirect effects, and assumptions about the international context. The panel largely agreed that it would be particularly important to include externalities in prices and that consumption-based environmental harm should be accounted for. Actions particularly common in the PG literature – such as shorter working days, recognition of unpaid work, basic income, and dialogue of growth dependence – were considered to have a moderate to

large impact. The least consensus was found on the effects of a monetary reform, favouring cooperatives over for-profit companies, and supporting a sharing economy. The panellists were somewhat divided on how effective personal budgets for emissions and resource use would be – some felt that the impactfulness would be low or moderate, while others rated it as high or very high. While one panellist argued that personal budgets could help with rebound effects, another argued that restrictions imposed on a personal level will not succeed before the crisis is concrete, and therefore restrictions should be made at the highest possible level. Citizens could then act within the set limits, with society taking care of income redistribution.

When directed to discuss in more detail the means by which Finnish consumption habits should be influenced, the panellists suggested a total of around 40 separate actions, many of which were related to transport, housing and construction, and food. I have compiled the panellists' responses below to demonstrate the range of potential actions considered by the experts. According to the comments, Finland should reduce the use of fossil energy in transport by supporting public transport, the electrification and biogas conversion of the vehicle stock, and high-quality bicycle path networks and pedestrian streets. Flying should also be intervened with. One panellist commented that it would be essential for the sustainability solutions to account for regional differences and existing infrastructure. For example, while public transport should be radically favoured, private cars would be more permitted in sparsely populated areas due to a lack of alternatives. Finland should also strive to increase the energy efficiency of buildings, especially through taxation and subsidies that would encourage the modernisation of energy systems and reduce energy intensity. In particular, the use of fossil fuels for heating homes and other buildings should be reduced. Maximum quotas could also be set for the volume of buildings. As before, relief and additional quotas could be provided for the residents of sparsely populated areas.

Community living and lifestyle were also strongly highlighted in the comments. Instead of consumption, a communal way of life would be based on sharing, caring, and preserving, which would also apply to ecosystems. Community housing and community loans should therefore be supported and facilitated. In addition, zoning and city planning should facilitate the creation of community-based senior homes, community-based housing for families with children, and efforts should be made to reduce the number of young people living alone.

The media and public debate would reinforce a holistic understanding of wellbeing, helping people to understand how consumption relates to needs and how consumption can also be detrimental to wellbeing. Finns' consumption habits could be influenced through information that emphasises the reasons for change and the means of change. All forms of advertising should be addressed, as it

creates new consumption needs. In particular, advertising targeting children and young people should be banned. Shopping would change as rules, taxes, and other incentives would support commodity repairs and upgrades, shifting the emphasis away from buying new products. Taxation should support smaller convenience stores rather than large car markets. Luxury consumption should be addressed. Consumption patterns would change with regard to food, as the prices of ecologically harmful foods should be raised sharply.

Consumption habits would also be affected by other economic and labour-related changes, such as fairly executed emissions trading, regulation and sector-specific development programs that support ecological product design, increases in public services, increases in remote working opportunities throughout Finland, and a basic income. “Let’s reduce income disparities because an unequal society feeds a culture that encourages overconsumption ... and the power of social comparison would decrease in a more equal society”, commented one panellist. Another commented that “Changing consumption, however, is not just about limiting consumption opportunities. If there are no alternatives, it will be really difficult to change consumption habits. That is why alternatives need to be invested in. If there are no alternative ecological consumption opportunities, i.e., no truly sustainable alternatives for production, then something else must be offered in place of consumption, even if that is just creating a good understanding and a sense that one is not alone in suffering from the reduced consumption: others also suffer, which makes it reasonable.” According to other comments, “Consumerism is a way of being for us, and tackling it therefore requires a profound change in culture, how we view humanity, and how we pursue wellbeing”, and “Hard and soft ways should be found simultaneously, to make people feel less forced in their choices.” The risks for rebound effects should also be considered with all actions.

6.4.6. Increasing the acceptability of post-growth

The last question of the Delphi process assessed how acceptability towards the envisioned PG economy could be increased in Finland. According to the comments, acceptance among citizens could be increased by reforming education policies and teaching so that ecological sustainability is placed at the heart of education. At the same time, attention would be drawn away from wars and industrialization as determinants of identity. Key cultural, social, and economic figures could also guide public opinion through leading by example. Those who support the vision of a moderation economy could also run for leadership roles. Citizens' opinions could be influenced through YLE (Finland's national public broadcasting company), which could serve as one forum for open and inclusive

dialogue about creating a new vision for the future. Several panellists also argued that it should be emphasised to citizens that by giving up something they will get something else in its place. It is important to "emphasise how the change will create a more secure day to day life and a more holistic wellbeing, which would also extend to future generations".

Among MPs and decision-makers, the acceptability of the envisioned future could be increased through public debate. MPs should be reassured that the people are ready to accept the transitional measures. MPs and decision-makers should be encouraged to talk about the need for fundamental change. Emphasising political legacy could also have an impact. For example, MPs could be told how the interests, vitality, and future of the people they represent can be protected by taking care of the vitality of the planet. Knowledge that the transition to a moderation economy would be fair could also increase acceptance among decision makers. According to one proposal, the decoupling of tax revenues from economic growth (of the prevailing kind) would promote the acceptability of a moderation economy within this group.

Researchers and experts are a diverse group, but they may gradually self-direct if PG becomes mainstream, which would require universally respected characters to make the conversation acceptable. Directing more funding to sustainability research could also help. The acceptability could be influenced by increasing the analysis of growth dependency in different fields, especially its presence in their basic assumptions, and by encouraging genuine interdisciplinarity. According to one comment, "There is a need for a diverse and civilised dialogue that is informed by a diverse group of experts, away from narrow thinking, and new creative research is needed as well (and funding for it)."

Among entrepreneurs and investors, a particularly important approach would be to price externalities through, for example, environmental and Pigovian taxation, and by banning the most harmful activities. Entrepreneurs should be told that they must rethink things today if they want to be entrepreneurs in the future. One panellist emphasised that "the enormity of the economic consequences of climate and environmental inaction, not only in the long term but also through short-term rapid crises (including pandemics)" should be emphasised to them. Political regulation should support the ongoing change and entrepreneurs should be encouraged to do business responsibly. One panellist wrote that there should be "New possibilities to create a shared wealth with shared risk." According to another, "In a moderation economy, the job of investors will wither … Makin a living through capital gains will be more difficult than before" but "for a small business, a growth economy is probably not essential." By providing security against increased risks, basic income could also increase the acceptability of the moderation economy vision among entrepreneurs.

The panellists were also asked how the acceptability of the moderation economy vision could be increased among the "elites" (the rich and privileged class). According to the responses, they could be affected by "peer pressure from other rich people who bequeath, create foundations, donate, or focus on investments that generate not only money but also social good." Some also emphasised the need to highlight the inability of even the elites to protect themselves from the socioecological consequences of the climate catastrophe and the loss of nature.

All of the groups discussed above could be affected by investing in "genuine dialogues in which different actors stop to hear each other and express their thoughts, even the uncertain ones." One panellist commented that "In my view, the vision would already be considered acceptable quite widely. However, there is a lot of work to be done to create actions at different levels and in different sectors based on the vision, that are cleverly targeted and fair. In addition, we need a great deal of information sharing, interpreting, listening, and discussion. The seriousness of the situation should be highlighted. The COVID-19 crisis has shown that when it comes to a serious situation, Finland has the capacity to act quite proportionately and quickly. Now it all depends on this, taking action."

6.5. Discussion

With the help of this research, I addressed what a desirable PG future might look like and how it could be achieved in the context of a specific high-income country, using Finland as the case study. According to panellists, instead on "sustainable growth", Finland should now focus on maintaining societal wellbeing and reducing its environmental impacts regardless of what happens to GDP (an AG path). This result reflects the findings from the global expert survey discussed in chapter 4. The global survey also included four additional sustainability scholars from Finland (who were not in the workshop panel), and each of them also supported the AG pathway for high-income countries, for both the 2020's and the 2030's. The workshop results revealed that in the Finnish context, the choice of AG over DG was partly a strategic choice and partly due to indifference toward GDP. The results also show that by influencing the political acceptability of PG, it may be possible to facilitate an earlier implementation of DG policies. The findings also place emphasis on the term used to describe the desired future system. Based on existing PG plans created in Finland and taking into account the specific areas of change in Finland's new Agenda2030 roadmap, the panel envisioned in detail what a growth-independent future could look like in the context of Finland. Using a backcasting approach, the panel then considered and evaluated concrete actions to achieve the envisioned future and to increase acceptability for the new vision.

6.5.1. Meeting society's commitment to sustainable development

The Finnish National Commission on Sustainable Development has created a future vision called "The Finland we want by 2050", which outlines the society's commitment to sustainable development and "a prosperous Finland with global responsibility for sustainability and the carrying capacity of nature" (Finnish National Commission on Sustainable Development, 2016). The commitment includes eight objectives: equal prospects for wellbeing, a participatory society for citizens, sustainable work, sustainable local communities, a zero carbon society, a resource-wise economy, and life choices that respect nature's boundaries and decision-making that respects nature (Finnish National Commission on Sustainable Development, 2016). This demonstrates that the PG future envisioned by the panellists reflects many core values and goals that are already mainstream in Finland, the only difference being the means by which such a future could be realised.

In Finland, major challenges remain particularly with the goal of responsible consumption and production (SDG 12), climate action (SDG 13), but also with zero hunger (SDG 2) and life on land (SDG 15), with progress having stagnated for all four (Lafortune et al., 2021). Since the zero hunger target may seem surprising, it is worth clarifying that Finland faces problems primarily with the sub-targets for the prevalence of obesity, human trophic level (energy intensity of diets, particularly due to eating animals), and sustainable nitrogen management, all of which are progressing in the wrong direction (Lafortune et al., 2021). All of these SDGs were also points of concern among the workshop panellists, who argued that Finnish production and consumption must be made globally sustainable through both qualitative and quantitative changes. Relating to the zero-hunger target, several panellists argued that the food system needs to transition into more agroecological practices and plant-based foods across the board, which could lead to healthier, less polluting, and less energy and resource intensive habits, while increasing present and future food security. Literature on the topic corroborates these arguments (IPCC, 2019, 2018; Rust et al., 2020; Tilman and Clark, 2014).

The PG approach considered in this workshop is a potential solution to these remaining sustainability challenges and should be seriously considered as a pathway to sustainable wellbeing, since the prevailing GG approach has not managed to produce sufficient progress despite decades of efforts not only in Finland but by nations worldwide (GSDR, 2019; Parrique et al., 2019; Vaden et al., 2019). For example, from 2000–2016 the carbon footprint of Finnish households would have decreased by 19 % due to technological change and qualitative changes in consumption (13 % and 6 %, respectively), were it not for rising consumption levels simultaneously increasing emissions by 31 %, resulting in a

net increase by 12 % over that period (Finnish Environment Institute, 2019). The problem is that as long as growth is a structural and a cultural requirement, consumption must increase (Costanza et al., 2017; Joutsenvirta et al., 2016).

Joutsenvirta et al. (2016) have argued that "Solving environmental problems has been unsuccessful because economic growth has been seen as the only way to prevent or reduce unemployment. As people's livelihoods depend on work, securing jobs has been seen as more important than protecting the environment. It also helps to understand why green growth and the pursuit of full employment, which safeguards aggregate demand, have proved to be more attractive options than tackling unemployment and the environment while boldly reforming the foundations of a growth-oriented economic model" (Joutsenvirta et al., 2016). The authors also argued that the seeming lack of alternatives has been influenced by the fact that high-income countries like Finland do not yet realise "what such a welfare state would look like that does not dependent on economic growth and that bears environmental responsibility" (Joutsenvirta et al., 2016). The narrative vision of a PG future created in this workshop can help fill this gap.

Although the limits of growth and the PG economy have been discussed for decades, especially in the field of ecological economics (Costanza, 1989; Daly and Cobb, 1989; Georgescu-Roegen, 1977; Meadows et al., 1972), it has only gained wider interest in the last decade or so fuelled by economic and sustainability crises (Kallis, 2011; Mastini et al., 2021; Victor, 2010, 2008). However, there are still a number of misunderstandings about the subject, perhaps precisely because of its "novelty" and demanding nature. Perhaps the most common misconception regarding the PG economy is that it would be synonymous with economic recession (Hickel, 2021b). For example, economists who evaluated alternatives to the Finnish government's economic recovery plans during the COVID-19 pandemic confused the concept of DG with economic contraction, equating it with previous economic recessions (Vihriälä et al., 2020). Thus, they did not recognize that DG and other PG economic proposals actually provide coherent policy frameworks that would safeguard prosperity and combat unemployment and inequality, while addressing ecologically harmful production and consumption (Corlet Walker et al., 2021; D'Alessandro et al., 2020; Hickel and Hallegatte, 2021; Kallis, 2011; Mastini et al., 2021). As PG pathways are designed to maintain or improve wellbeing even without growth, they would be particularly important to consider during a pandemic, not to mention the even greater ecological crises we are starting to witness. If PG policies would result in a contraction of the economy, the contraction would be the controlled outcome of purposeful policies and thus not at all like the recessions of the past. Unfortunately, alternatives to traditional growth policies were completely ignored in the Finnish economic recovery plans, without sound justification.

6.5.2. Creating a post-growth policy framework

The panel gave many solution proposals that could help Finland transition to a more resilient, secure, and sustainable system that does not require consumption growth to maintain or increase wellbeing. The arguments and suggestions for practical actions given by the panellist during the workshop could be used to create an initial PG policy framework for Finland, enhanced by existing literature on PG policies. In fact, many of the policies proposed by the panellists correspond to those discussed in the ecological economics literature, where various PG policy frameworks have been proposed (Costanza et al., 2020; Daly, 2010; Hardt and O'Neill, 2017; Mastini et al., 2021; Otero et al., 2020; Palahí et al., 2020; The Guardian, 2018).

The literature can also help complement the panel's suggestions, as some policies were either not mentioned at all by the panellists or were evaluated to be less influential than what might be expected based on the literature. For example, the panellists estimated the impact of supporting the sharing economy to be moderate on average, with responses ranging from very small to very large. This is surprising, given how sharing practices could increase resource use efficiency and circularity in the economy, allowing reductions to consumption levels, environmental impacts, and waste (Andreoni, 2020; Hickel and Kallis, 2019). However, during the end plenary it was noted that this result may have been affected by different interpretations of what a sharing economy means and how widely it is applied within the economy. Another rather surprising finding was the variation in the estimated impact of shorter working days or weeks. This is a common policy proposal in PG literature, since reductions to working hours could mitigate the fact that low or no growth would otherwise lead to a rise in unemployment, as per Okun's law (Antal, 2014; Frank et al., 2018; Jackson, 2009; Jackson and Victor, 2019b). However, the panel seemed to be rather divided on this action, with estimates of its impact ranging from non-existent to very large (the average impact was between moderate and large). The panel was also divided on whether it would be impactful to reform the monetary system or whether to favour cooperatives instead of for-profit companies, as ways to help achieve the envisioned PG system. These may be considered as particularly large-scale and drastic policy proposals, relative to the others. Based on comments from the panellists, the responses may have been influenced by how realistic the panellists considered these proposals to be, or because it may be difficult even for scholars to understand the relevance and impact of such measures.

Interestingly, addressing international trade, for example through border adjustment mechanisms, was not brought up by the workshop panellists. This is curious, because approximately half of the material flows of the Finnish economy originate from abroad (Finnish Environment Institute, 2019),

signalling that Finland is virtually importing ecosystem services and causing an increase in environmental pressures abroad (Dorninger et al., 2021; Peters et al., 2011). Border adjustment mechanisms, or ecological tariffs, could be implemented to protect the more environmentally efficient national economy from the less efficient competitors, while also preventing carbon leakage (Costanza et al., 2014a; Daly, 2010; European Commission, 2019). Carbon border adjustment mechanisms have already been considered in the European Green Deal precisely for the reason that differences in level of ambition might persist worldwide (European Commission, 2019), and the fact that the EU has been considering its own carbon border adjustments might be one reason why the panel did not mention them, although ecological tariffs should be extended beyond carbon. Promisingly, the new Agenda2030 roadmap of Finland adopted a footprint viewpoint, focusing on the avoidance of burden shifting to other countries while seeking to be a positive influence for achieving sustainability globally (Finnish National Commission on Sustainable Development, 2022).

The panel did not bring up how Finland's EU membership or its geopolitical contexts should be considered in the PG transition, which would be an important topic for additional research. The Stability and Growth Pact of the EU in particular may need to be addressed in order to achieve PG, as it places strict and artificial limits for public deficit and debt during a time when substantial investments are needed to transform the socioeconomic system while ensuring the security of people's wellbeing (European Commission, 2020; The Guardian, 2018). After the workshop took place, Finland's security environment has also changed due to Russia's attack on Ukraine and Russia's increased threats against Finland (Yle, 2022a, 2022b). Among other things, this has highlighted the importance of addressing Finland's addiction to Russian fossil-fuel imports (BIOS, 2022; Yle, 2022c), which the PG transition could help overcome by facilitating reductions to energy demand.

It is also worth noting that some of the policies proposed by the panel already have the support of the current government, more or less, such as including externalities in prices and implementing a basic income. The government has plans to reform energy and transport taxations, to promote a circular economy, and to develop an emissions-based consumption tax to direct consumption of food and other products in ways that reduce impacts on climate and the environment (Finnish Government, 2019). The objective of the consumption tax reform is to "make climate and environmental effects more visible in the prices of products and services" (Finnish Government, 2019), which is in line with the actions proposed by the expert panel. The Finnish government has also planned changes to income taxation and benefits, which would counterbalance the impacts of price changes on low-income individuals (Finnish Government, 2019). Negative income taxes ('earned income subsidies') and a second trial of basic income with a budget of 20 million € have also been in consideration

(Finnish Government, 2019). Although these existing plans are not yet at the required scale, they are important steps that can facilitate the needed system change.

6.5.3. Finding consensus on a desirable future

The panellists considered it to be very important to be careful about the term used to describe the envisioned future. This reflects the conclusions of Belmonte-Ureña et al. (2021) who have argued that "DG arguments about the need to curb growth, despite being intellectually robust, are portrayed in a manner unlikely to generate consensus for policy adoption, particularly among developing countries." According to most panellists, the DG term or any other option that uses the word "growth," would not be optimal. This has also been argued by Drews and Antal (2016) and Douglas (2022). On the other hand, Hickel (2021b) has advocated for the use of the DG term, arguing that while positive messages are needed, so are truthful ones, and the DG term is useful because it refers to "slowing down aggregate commodity production and reducing the physical throughput of the economy … in a just and equitable way", which is precisely what needs to happen in high-income economies (Hickel and Hallegatte, 2021). Hickel further argues that the use of terms can be context dependent and what matters most is the underlying policies, not the term itself (Hickel and Hallegatte, 2021). This corroborates the findings of this workshop, and the same arguments apply particularly to the moderation economy term (kohtuutalous, fin.) which originates as a translation of DG.

Although the terms wellbeing economy and moderation economy received the most support among panellists, the panel was also not entirely satisfied with them. "Eco-welfare state" could also be a potentially useful alternative term (Hirvilammi et al., 2021; Hirvilammi and Koch, 2020), as it directly reflects what is considered important while also paying attention to ecological boundaries. The term eco-welfare economy could also be derived from this term. Although the PG eco-welfare state was mentioned in one comment during the workshop, it was not brought up when the terms were discussed further during the Delphi process and in the end plenary. Combining the term eco-welfare economy with the concept of growth dependency could prove to be an effective terminology in seeking a constructive public debate on these issues. After all, the use of terms can also depend on context – what works for one audience may not work for another.

The panel's vision of a desirable future path corroborates the findings of my global survey (Chapter 4), in which I revealed that around 77 % of sustainability scholars worldwide support PG pathways for high-income countries. However, the workshop panellists evaluated the support for PG among Finnish

scholars in general (regardless of field or sustainability focus) to be much lower, around 30 %. This indicates that further, more inclusive deliberations are needed among scholars to find consensus on the desirable future pathway. Achieving a broader consensus among researchers would probably require some groundwork and a much longer process. This was also the view of the panel.

Restricting my workshop participants to experts interested in the PG economy reduced the risk of the workshop derailing due to the need to resolve fundamental disagreements and assumptions related to the topic. This approach allowed the panel to focus on envisioning what the future after growth might look like and how it could be achieved in Finland, which was the main purpose of this study. Achieving a broader consensus among scholars could be facilitated by further Delphi-studies that include more scholars from different fields and viewpoints. While this was not the focus of my workshop, my research did demonstrate that the combination of Delphi and backcasting is an effective and well-suited approach for seeking consensus on these potentially sensitive questions.

Dreborg (1996) has listed several situations that favour backcasting: (1) When the problem to be studied is complex, affecting many sectors and levels of society; (2) When there is a need for major change, i.e., when marginal changes within the prevailing order will not be sufficient; (3) When dominant trends are part of the problem – these trends are often the cornerstones of forecasts; (4) When the problem to a great extent is a matter of externalities, which the market cannot treat satisfactorily; (5) When the time horizon is long enough to allow considerable scope for deliberate choice. Given the increasingly dystopian views of the future in the 21st century, perhaps a sixth characteristic could be added: When positive visions of the future are needed to inspire action, support social cohesion, and improve societal wellbeing.

One of the main aims of this workshop was to find out how difficult it would be to reach consensus on specific questions among experts who are already interested in the PG economy. I found that it was easy to reach a consensus on some issues, but for some there were also considerable differences in opinion. It was rather easy to reach a consensus on a meaningful vision for the future with the approach I utilised, although more inclusive future deliberations might benefit from an extended process where the emerging narrative is addressed iteratively to evaluate consensus with each claim or proposal, similar to how the IPCC climate reports are written (IPCC, 2022), in which the level of agreement is expressed in brackets using five qualifiers (very low, low, medium, high, or very high agreement).

It was also easy to identify solutions and possible practical actions because these were spontaneously proposed by the panellists during the Delphi process. However, when evaluating the impactfulness of the actions, substantial variation existed in the evaluations for some, indicating either low agreement

or different interpretations of what the actions mean, which additional discussions could help mitigate. In future societal deliberations, it would be wise to start as I did, by listing solution proposals to form an outline, and then continue with a separate longer process during which the solutions are discussed in detail. Such discussions could also benefit from the participatory use of ecological macroeconomic models, which could be used to test various assumptions and the systemic and long-term outcomes of different policy combinations (e.g., D'Alessandro et al., 2020; Jackson and Victor, 2019; Nieto et al., 2020). Importantly, a 2020 report by Finland's Committee for the Future has called for ecological macroeconomic modelling of different holistic sustainability solutions that would function within the carrying capacity of the environment (Tulevaisuusvaliokunta, 2020). Ecological macroeconomic models for Finland should be a priority, as currently none of the organisations providing future modelling in Finland sufficiently consider the dynamics of the socio-ecological system, making them unable to adequately evaluate future transformational change (Vadén et al., 2021).

Assessing how much support there is for the "PG economy" in present-day Finland was considered difficult by the panellists, as was deciding what exact term should be used to describe the envisioned future. These questions would benefit from complementary research, such as surveys that directly evaluate the opinions of citizens regarding future pathways and different terms. For example, there is evidence to suggest that the panel's estimate for around 30 % support among citizens is fairly accurate, given that around 40 % of Finns disagree with a statement that "The continuity of people's wellbeing can only be based on economic growth" (original in Finnish: "Ihmisten hyvinvoinnin jatkuminen voi perustua vain taloudelliseen kasvuun"), according to an annual survey performed by the Finnish Business and Policy Forum, EVA (Alpimaa, 2020; Finnish Business and Policy Forum, 2020). Around 40 % agreed with the statement while the rest found it difficult to say. The statement had lower levels of agreement among students (25 %) and among those with higher education (27 %) (Finnish Business and Policy Forum, 2020), which also corroborates the panel's conclusion that there would be higher support for PG among Finnish scholars than among the general public. Older age, male sex, entrepreneurship, and support for right-wing political parties seem to be associated with more agreement with the above continuity of wellbeing claim (Finnish Business and Policy Forum, 2020), which is in line with the survey findings of Drews et al. (2019), who have focused on the views of citizens and scholars in Spain. The panel's estimate that only around 10–20 % of MPs would support PG in Finland also seems consistent with the fact that 170 candidates signed the electoral thesis of the Finnish degrowth movement during the 2019 elections in Finland, and 13 of those who signed were elected to parliament, corresponding to about 7 % of the current MPs (Kohtuusliike, 2019). Further efforts are therefore needed to find wider consensus on PG in Finland among different groups of scholars, citizens, and decision-makers.

6.6. Conclusions

This chapter demonstrated what a desirable PG vision could look like in the context of a specific high-income country, Finland, but the results may be widely applicable for other high-income countries as well. The methodological approach of combining Delphi with backcasting could be used to create PG visions and transition plans in other countries, which would enable interesting and useful international comparisons. We should also remember that the output of a backcasting study is not meant to define *the* desirable future or *the* blueprint for change, but instead it is meant to inform and inspire policymaking (Dreborg, 1996).

The panel had high agreement with two pre-existing Finnish PG visions: the vision of a moderation economy and the vision of Finland after ecological reconstruction, although some improvements were proposed to both and additional details of what a PG future might look like were provided through auxiliary questions. The PG future envisioned by the panel has repercussions on all six areas of change which have been identified as a part of Finland's Agenda2030 roadmap to sustainable development. In addition, the panel identified various approaches by which the acceptability of the PG vision could be increased among different groups in Finland, including through open and participatory dialogue, structural and cultural changes, by the example of leaders and peers, and by changing the prevailing financial incentives.

Finland is very committed to achieving sustainability and there may already exist a decent amount of support both among citizens and scholars for prioritising wellbeing and ecological sustainability over economic growth. The main task ahead is to first find consensus among a wider range of scholars, and then extend the deliberations to include different societal stakeholders and decision makers. My workshop demonstrated that finding consensus among the experts was easier for some questions than for others, and the same would likely apply when seeking consensus among different societal groups. This research can therefore help inform how more inclusive societal deliberations should be approached in the future. These deliberations could also benefit from the participatory use of ecological macroeconomic modelling. In addition to a shared vision of a PG future, future research should focus on creating a refined PG transition strategy for Finland. The plan should have defined stages, each with their own tasks (reforms, policies, actions) to be implemented and reports (from defined working groups) to be produced. The participation of all Finnish stakeholders must be ensured in the transition, following the best practices outlined in Chapter 2 (Table 3).

The PG approach could allow Finland to solve the main sustainability challenge facing high-income countries, which is to achieve sufficiently strong and quick environmental impact reductions while

securing societal wellbeing. This calls for transformations that address the underlying structural causes of the problems, such as the prevailing societal addiction to economic growth (Costanza et al., 2017). The PG approach envisioned by the panel would allow Finland to achieve prosperity in a way that is globally responsible and within the carrying capacity of nature. Demonstrating that a PG wellbeing economy can be achieved in Finland would be a huge milestone and an inspiration for other high-income countries who are facing largely the same sustainability challenges. Finland could also collaborate with other nations of the WEGo partnership, who too are inclined towards an AG path. And, through active participation, Finland can seek to influence the EU to support the efforts of any member country that wishes break away from the hegemony of GG and choose the safer PG approach instead, which prioritises stability and wellbeing above growth. These facts counteract the potential argument that what happens in one small country like Finland does not matter, as some might falsely claim during the transition. Achieving a PG society would be a historical achievement, if not a turning point, and Finland is in a prime position to make it come true.

Chapter 7. Addressing the growth addiction of high-income countries

7.1. Abstract

With growing evidence showing that the decoupling reliant green growth approach will not be sufficient to mitigate global environmental and social problems, a post-growth approach for high-income countries seems necessary. However, it has been argued that countries are societally addicted to economic growth, which complicates the needed transitions. Using Finland as a case example, in this study I evaluate what the current level of growth addiction is in the context of one specific high-income country, what reasons contribute to the addiction, what risks are associated with the addiction, and how the addiction could be overcome. I report findings from a Delphi workshop, in which a panel of experts found Finland's future growth to be uncertain and structural growth dependence to be high, particularly due to factors related to taxation and the sustainability of public finances, but also due to the features of the prevailing monetary system, existing political and economic interests, and habits of thought. On one hand, observations of Finland's response to the COVID-19 pandemic corroborates these findings, since the current government plans explicitly call for more growth and do not recognise possible trade-offs or limits associated with further growth, nor the various risks of growth dependence. On the other hand, the pandemic response does demonstrate that the Finnish government is capable of quickly putting in place substantial emergency measures and increase public investments when it considers the wellbeing of its citizens threatened, even at great economic cost. Lessons from the pandemic can inform future efforts to overcome the prevailing growth addiction. I discuss how Community Scenario Planning with participatory ecological macroeconomic modelling could be used as a potential approach for overcoming Finland's societal addiction to growth, drawing on lessons from the expert workshop to determine what questions future societal deliberations should focus on.

7.2. Introduction

The global environmental problems are problems of scale. They are the consequence of many individual decisions made by people acting either alone or in groups, ranging from the level of individuals and local businesses to the level of nations and multinational corporations and organisations. Instead of being free from external influence, these decisions are made within the context of systems that structurally reinforce and constrain behaviour, affecting all levels of organization (Arponen, 2014; IPBES, 2019b). Ultimately, the global environmental problems are the consequence of a global system that comprehensively fails to account for the true value of the environment, preventing us from finding equilibrium with it.

Many terms can be used to describe the current predicament. At all levels from global to the individual we can be said to be locked-in, trapped, or addicted to patterns of behaviour that scale up to detrimental direct and indirect consequences on the environment (Costanza, 1987; Costanza et al., 2017). In other words, in the prevailing system everyone is structurally incentivized, pressured, constrained, coerced, or reinforced to trade off their long-term wellbeing to maintain their short-term interests. One particularly insidious pattern of behaviour is the constant desire for more economic growth in rich industrialised countries, even though it no longer unequivocally improves societal wellbeing and has harmful effects on the environment (Díaz et al., 2019; Dorninger et al., 2021; Kubiszewski et al., 2013; Oxfam, 2017; Parrique et al., 2019; Wilkinson and Pickett, 2009). Previous studies have identified that societies are dependent on economic growth in many ways, and this reliance has been called by many names, including “growth fetish” (Hamilton, 2003), “GDP fetishism” (Stiglitz, 2009), “growth imperative” (Jackson and Victor, 2015; Richters and Siemoneit, 2019), and “growth dependence” (Corlet Walker et al., 2021; Joutsenvirta et al., 2016).

Costanza et al. (2017) have argued that the existing growth dependence can be called a “societal addiction”, because it provides short-term rewards for society while being detrimental and unsustainable in the long run. In other words, the incentives that guide individuals are inconsistent with the overall goals of society. We may call this the “consistent incentives” definition. Building on this, I would add that the societal growth addiction can also be defined through the concept of structural reliance – whether a society can meet the needs of citizens and maintain societal wellbeing without economic growth at the present time – and by the capacity to change behaviour – whether society can implement changes that benefit societal or environmental wellbeing regardless of the impacts on economic growth, i.e., society’s capacity to attain a different future state.

One of the determining factors of addiction is weakened self-control (Heilig et al., 2021). From the point of view of societal addictions, this means that the cessation or regulation of certain activities is structurally challenging for society and its actors (individuals, businesses, communities, etc.). "Structural" refers here to the system parts, processes, and rules, and the structural reasons include economic, technical, infrastructural, legal, political, cultural, social, and psychological factors, as well as the interactions of various factors. Societal addiction is therefore a systems view of dependence that does not focus only on structural reasons or only on behavioural reasons, but instead considers addiction as the emergent property of a system that is influenced by several interacting factors, just like addictions at the individual level are also the result of complex internal and external influences (Heilig et al., 2021).

What makes the addiction increasingly relevant to address is that growth rates in high-income (HI) countries have declined for decades due to structural reasons (Jackson, 2019; World Bank, 2021b). Furthermore, in the previous chapters I have also discussed in length the limits of decoupling, which influence the extent and speed by which the harmful environmental impacts associated with economic activity can be halted (Haberl et al., 2020; Hickel and Kallis, 2019; Parrique et al., 2019). This means that the prevailing green growth (GG) focus of the UN Sustainable Development Goals (SDGs) needs to be replaced with a post-growth (PG) approach when applied HI countries (Chapters 1, 4, and 5). With the PG term I refer to a socioeconomic system that is no longer reliant on economic growth to maintain societal wellbeing, and in which the primary focus of economic policy is no longer to increase consumption, production, and employment, but instead ensuring balance with the environment while maintaining social stability, security, and equality. To be able to follow PG pathways, HI countries must overcome their societal addictions to growth.

In this chapter I focus on the topic of growth addiction in the context of a specific HI country, Finland. The process of questioning societal goals and structures might be easier in Finland compared to other countries, given how prominently sustainability is already on the government agenda (Finnish Government, 2019; Lafortune et al., 2021; Sachs et al., 2021). Finland has also joined the Wellbeing economy Governments (WEGo) partnership (WEAll, 2021), which is a group of like-minded wellbeing focused governments that are trying to break free from the preoccupation with growth. However, Finland remains structurally dependent on growth and is therefore locked-in to a GG pathway, with the government programme explicitly stating that "The aim of economic policy is to increase wellbeing and prosperity. This means ecologically and socially sustainable economic growth, high employment and sustainable public finances, as well as a level of stability in the economy [that] would enable unforeseen impacts on people's wellbeing to be avoided" (Finnish Government, 2019).

To address the issue of growth addiction in Finland, I will focus on the following research questions:

1) What are the risks of growth addiction?
2) What should be the future of economic growth in Finland?
3) How dependent is Finland on economic growth, and why?
4) What actions would be needed to overcome the societal growth addiction?
5) How difficult is it to find consensus on these issues among experts who are interested in PG?

7.3. Methods

As described in Chapter 3 and Chapter 6, I organised an online workshop together with 14 Finnish scholars and experts, applying the Delphi method and focusing on PG questions at the national scale, using Finland as the case example (Details of the Delphi-process and questions are available in Appendix E). While Chapter 6 focused on pathway preferences, narrative scenario building, and intervention assessment, in this chapter I will focus on questions assessing the future of growth in Finland and how Finland's societal dependence on growth might be overcome. I complement the workshop findings with literature-based argumentation to assess what risks can be identified for the evaluated growth dependence. As noted in the previous chapter, with 14 participants this research was of qualitative nature, but graphs characteristic to quantitative research were utilised throughout the Delphi method to help visualise differences in opinions, important when seeking and interpreting consensus. The graphs in this chapter have the same purpose and it is therefore necessary to note that they may not be statistically meaningful.

I asked the workshop panellists to evaluate the desirable development for Finland's GDP (year-on-year percent change) in the future, using a line graph that showed the past GDP rates from 2000 to 2020, and which allowed the panellists to select desirable future rates every five years until 2050. I also provided the panellists access to an interactive scenario tool I created (https://teemukoskimaki.com/research/tools/delfoipaja-2021/), with which they could visualise what would happen to the level of GDP with different rates (after the first round I updated the tool to the mean rates evaluated by the panellists). I also emphasised that "If you do not know what to answer, you can also give a rough estimate or guess. The answers can be corrected later based on the discussions. The assumption of the question is that Finland will continue to calculate the GDP indicator." I also asked the panellists to evaluate if or when economic growth should end in Finland and how likely and desirable it is it that economic growth in Finland will be intentionally stopped.

The topic of societal growth dependence was evaluated during the workshop twice. First before the panellists could see the responses and comments of others and a second time after they had had a chance to consider each other's points of views and arguments. Growth dependency was defined by how challenging it would be for society to respond to the needs of its citizens and maintain social wellbeing without economic growth. The focus was therefore on the structural reliance view of societal growth addiction. The dependence was evaluated on a 6-point scale from non-existent to very high, and I asked the panellists to explain their choice in the comment section.

Lastly, as a complementary approach to evaluating the societal addiction to growth, I asked the panellists to assess how easy or difficult it would be to change the Finnish system so that societal wellbeing could be maintained without economic growth, from "Not at all difficult" to "Extremely difficult". Because the comments from the first round raised a number of reasons that would complicate change, in the last round this question was re-evaluated by dividing it into two parts: "How difficult would it be to gain the support of the majority for Finland to strive for the envisioned post-growth economy?" and "How difficult would it be to implement the required system change in practice, if the post-growth vision already had the support of the majority?"

After the Delphi part of the workshop, the panellists had the opportunity to comment on the results and their interpretation in the final Zoom seminar and by commenting the final workshop report. The final texts in the report were approved by all panellists, all of whom agreed to have their names published as panellists in the report.

7.4. Results

7.4.1. Risks and costs of growth addiction

Like with addictions at the individual level, there are several risks and costs associated with the societal addiction to growth. Below, I have identified some of the main ones from the literature that has addressed societal growth dependence. The first risk associated with growth dependence is that a sufficiently rapid reduction in environmental impacts will require strong policies, and their net influence on future rates of economic growth is uncertain due to uncertainty related to future levels of decoupling (Hickel and Hallegatte, 2021). Decoupling can be sought both between economic throughput and environmental harm and between economic throughput and economic value, both of which involve serious uncertainties (Hickel and Kallis, 2019). The less decoupling that occurs, the less

the economy can sustainably grow (Hickel and Kallis, 2019; Parrique et al., 2019; Vaden et al., 2019). PG pathways in which societal growth imperatives have been overcome would be less risky, because they do not rely on unrealistic and unlikely levels of decoupling (Keyßer and Lenzen, 2021; Vaden et al., 2019).

Another risk to future economic growth is that the ongoing global ecological catastrophe brings with it the high and uncertain costs of mitigating the environmental impacts, adapting to them, and recovering from the loss of invaluable ecosystem services (Costanza et al., 2014b, 1997; IPBES, 2019a; IPCC, 2022). To quote the World Economic Forum: "we are reaching irreversible tipping points for nature and climate, and over half of the global GDP, $44 trillion, is potentially threatened by nature loss" (World Economic Forum, 2020b). According to ecological macroeconomic modelling, GG pathways consistently result in insufficient environmental impact reductions, reduced societal wellbeing, or even socioeconomic collapse, while alternative PG scenarios could help avoid such outcomes with specific policies, which I will discuss further on (Capellán-Pérez et al., 2020; D'Alessandro et al., 2020; Jackson and Victor, 2020; Nieto et al., 2020).

A third risk associated with growth dependence is that on average economic growth has slowed in HI countries for decades (Burgess et al., 2021; World Bank, 2021b), and recently Burgess et al. (2021) warned that "Whether slow growth is inevitable or planned, we argue that developed democracies should prepare for additional fiscal and social stress, some of which is already apparent". The slowing growth rates have been explained by the concept of secular stagnation (Burgess et al., 2021; Davidson, 2016; Jackson, 2019; Summers, 2014), which may be due to the observed concomitant slowdown in labour productivity growth (Jackson, 2019). Due to the slowdown in labour productivity growth, GDP per capita growth may naturally come to a halt in high-income countries as early as the end of the 2020s, unless average work hours or the work force are increased, for example by increasing labour force participation or increasing immigration (Burgess et al., 2021; Jackson, 2019).

In Finland, the labour productivity growth has stagnated ever since the 2008 Great Recession, and the continued stagnation has been attributed to the shock faced by the electronics industry, a decline in the competitiveness of the Finnish national economy, and poor allocation of resources and capital to high-productivity units (Finnish Productivity Board, 2021, 2019). The secular stagnation experienced by HI countries may also have been affected by a number of other (partially linked) factors, including an aging and non-growing population, growing inequality, rising debt levels, saturated consumers, higher efficiency (which can lead to lower prices and spending), poorer quality of resources (especially efficiency in energy production, more specifically Energy Returned On Energy Invested; EROEI), technological unemployment, slowdown in technological development, and outsourcing of

production to lower-income countries (Burgess et al., 2021; Jackson, 2019). All of these factors add some uncertainty to the continuity of growth in the future.

The fourth risk is that the pursuit of growth may in fact lead to poorer environmental and social standards and protection, lower welfare and security, and it can therefore exacerbate environmental problems and international injustices (Joutsenvirta et al., 2016). The need to keep growing exponentially places increased pressures on public spending, which has led to cuts and privatisation demands to welfare services, as governments have tried to keep increasing productivity (Joutsenvirta et al., 2016). As one of the workshop panellists put it: “The fact that at some point the Finnish economy grew from one to two is not the same thing as it is today, when it has to grow from ten to twenty, even though the rate of growth is the same. As exponential growth progresses, it must be possible to shift gears, so to speak, and this will require continued deregulation, the merging of corporations, and seizing new areas into the market. Growth dependency thus means dependence on political activity, in which obstacles to growth are actively removed – it does not happen by itself”. One could say that this is how the growth addiction feeds itself.

With reference to historical patterns and data, Jackson (2019) has argued that the western “growth fetish” of the past 50 years has “hindered ecological innovation, exacerbated financial instability and reinforced inequality”, while only benefitting the few, and that “its legitimacy as a strategy to ensure a better life for the many is severely dented. Prosperity itself is being undone by an allegiance to growth at all costs.” This reflects the observations of Joutsenvirta et al. (2016), who argued that the system reliant on growth has not been able to guarantee sufficient welfare services and a fair income distribution. This has increased socio-political stresses and polarization, which creates risks for democracy and public health (Burgess et al., 2021; Wilkinson and Pickett, 2009).

Fifth, crises affecting economic activity can and do occur, be they recessions caused by the internal dynamics of the economic system or by “external” causes, such as the COVID-19 pandemic. The external is here in quotation marks, as it has been argued that the pandemic was in fact the result of prevailing economic practices that continue to drive habitat loss (CBD, 2020). Burgess et al. (2021) have argued that COVID-19 can slow long-term growth by curbing trade and causing permanent losses of human capital due to disruptions in the education system. This also applies to wars. A topical example is Russia's war against Ukraine, which has influenced economic growth prospects around the world (UN News, 2022; Yle, 2022d). Growth dependence may thus have slowed or curbed countries' support for Ukraine, as livelihoods depend on uninterrupted economic growth and trade. A society not dependent on continued growth to maintain employment and the wellbeing of its citizens would be more resilient to crises and could respond to them in ways that truly put the wellbeing of people

and nature ahead of the economy. Such a society could invest more in crisis preparedness, security, caring for the environment and reducing inequalities, both locally and globally, which would reduce the likelihood of crises and increase resilience against them. In a PG economic system, consumption would also be more modest, which would make it easier to meet demand even in times of crisis.

Without growth dependency, society would have the ability to take stronger policy measures and implement them more quickly, so that sustainability goals can be achieved on time. Quoting Peter Victor, "As long as economic growth remains so important to global policymakers, humanity is hopelessly constrained: the environmental policies we need face the unreasonable political hurdle that they must also be shown to promote economic growth" (Victor, 2010). The growth-independent future envisioned by the panel (in Chapter 6) would take into account the real economic, social and environmental costs and risks of production and consumption. This would result in much more self-sufficient food and energy production, based on renewable sources and sustainable practices, reducing Finland's dependence on international trade and the priority given for international competitiveness (Chapter 6). In such a system, Finland would no longer be as exposed to the economic and geopolitical threats now experienced as a consequence of the crisis in Ukraine, with increasing threats against Finland by Russia (Yle, 2022e, 2022c).

The sixth risk or cost of growth addiction is to people's quality of life, as society not dependent on growth would not have to force people to work long days and careers and reinforce them to consume more, which would free people to live more fulfilling, healthier, and less materialistic and status driven lives (Hamilton, 2003; Joutsenvirta et al., 2016). Furthermore, many of the threats facing growth addicted societies would no longer be considered as threats in a PG system. For example, technological unemployment could be embraced as progress, and population aging could be seen as something natural, which all nations will eventually go through. Society would be in a better position to take care of their elders, instead of finding ways to incentivise them to keep working, as is currently occurring in Finland (Yle, 2022f) and in other high-income countries (Corlet Walker et al., 2021). Given how people have adapted and adjusted to living in the competitive growth-economy, the worldviews of many naturally largely reflect the values this system rewards. However, the desirability of the system has long been questioned. Take for example the following quote from the classical economist John Stuart Mill:

> "I cannot, therefore, regard the stationary state of capital and wealth with the unaffected aversion so generally manifested towards it by political economists of the old school. I am inclined to believe that it would be, on the whole, a very considerable improvement on our present condition. I confess I am not charmed with the ideal of life held out by those who think that the normal state of human beings is that of struggling to get on; that the trampling, crushing, elbowing, and treading on each other's heels, which form the existing type of social

> life, are the most desirable lot of human kind, or anything but the disagreeable symptoms of one of the phases of industrial progress." – Mill (1848).

These main risks and costs of growth addiction, and the barriers to change the addiction creates, have not been taken seriously enough by the authorities that continue to seek "sustainable growth". As instructed in the new Agenda2030 roadmap, Finland's environmental impact must be reduced to a globally sustainable level (Kestävän kehityksen toimikunta, 2022). However, it is uncertain whether the policies, investments and new practices required by this transformation will lead to green economic growth in the short and long term, or whether they will lead to a stable economy through the degrowth path, or some combination of pathways. As the increasing demands of exponential growth become increasingly difficult to meet over time, a PG economy may be inevitable, whether society is prepared for it or not. As I will demonstrate in the next sections, based on the results of the workshop, there is no reason to assume that economic growth will necessarily continue, so addressing growth dependence would be justified and pragmatic, regardless of the chosen future pathway.

7.4.2. The future of growth in Finland

The uncertainty of future growth rates was particularly striking when I asked the workshop participants to estimate desirable future GDP rates for Finland, extending from 2025 to 2050. The desired GDP rates ranged from -4.0 to 3.2 for 2025 and from -9.0 to 0.6 for 2050 (Figure 28).

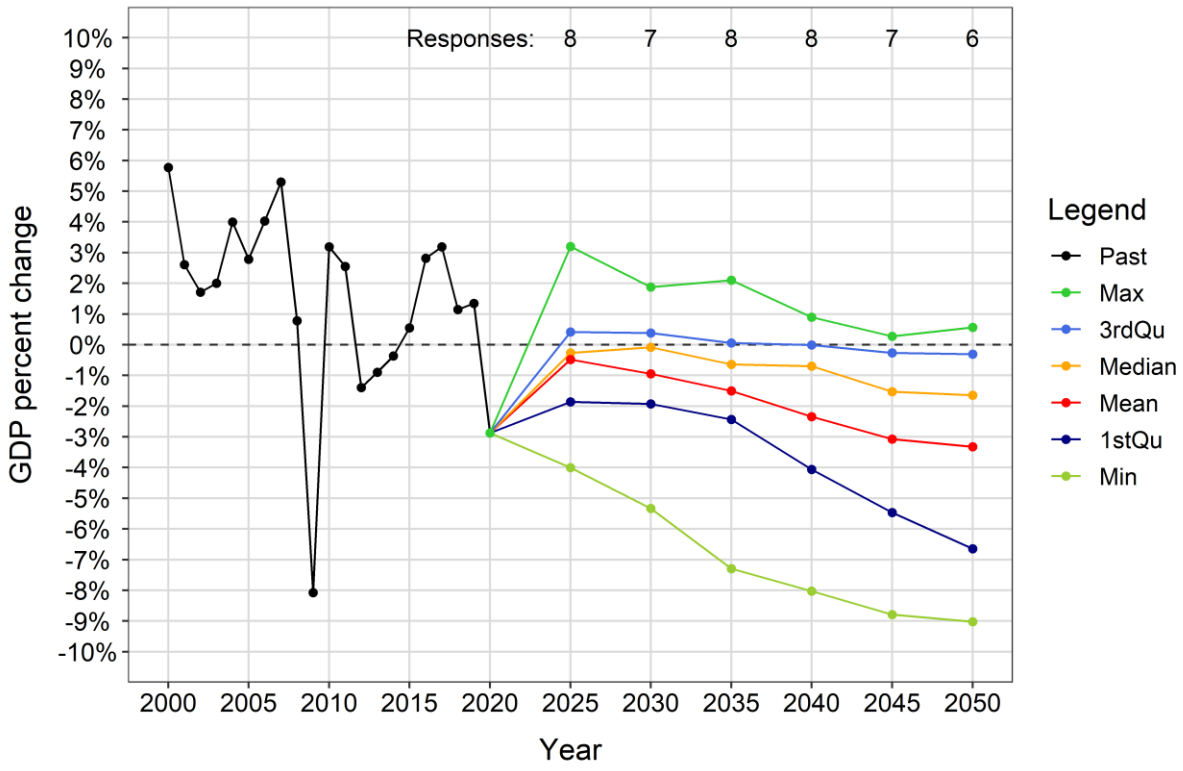

Figure 28. Desirable future GDP rates for Finland. On average, a declining trend can be observed but there was great variation in the responses. Only around half of the panellists responded to this question, for reasons explained in the discussion.

On average, lower GDP rates were preferred for later years. However, around half of the panellists did not respond to this question, explaining through the comment section that it is not meaningful to evaluate what the future GDP rates should be. The comments indicated that the rates and their potential significance depend on a number of assumptions, such as the future impact of green investment on GDP, the degree of decoupling between economic output and environmental damage, the degree of decoupling between the value and quantity of economic output, and how much net reductions are needed to the levels of production and consumption for environmental impacts to be reduce to a sustainable level. Of the non-responders, three commented that they did not know how to answer the question and four argued that GDP was not a relevant indicator to evaluate.

One participant commented that “I do not hope for any GDP trend, but I predict that with correct resource allocation, away from black and towards green, GDP will decrease in the short-term and increase in the long-term”, while another commented that “For some time, perhaps 10 years, there may be economic growth during the sustainability transformation as investments are made to renewable energy and more sustainable infrastructure, for example. It would be important to get rid of the compulsion to grow.” A third panellist commented that “The need to increase investments will

decrease over the longer term, but the growth potential of consumer demand is still unlikely to improve – because the ecological challenge is so enormous even with improved structures. Therefore, investment growth - zero growth is a likely option", while a fourth one wrote that "I would find it more meaningful to discuss what kind of spill-over effects we expect GDP to sustain if, for example, the carbon intensity of the economy is significantly reduced". Three panellists explicitly mentioned that the end goal should be a steady-state economy, while one said that current GDP per capita should be maintained, which could be done with a slightly negative GDP rate as population declines. Two panellists explicitly argued that production volumes need to decline. In the end the panel consensus was that estimating future GDP rates is not a meaningful question because what happens to GDP in the future is uncertain and depends on various assumptions, and GDP is not a relevant indicator of progress.

The panellists were also asked to evaluate if or when economic growth will end in Finland by choosing a year after which the average long-term GDP rate will be 0 % or lower. Of the eleven who responded, eight thought growth would end by 2030, one by 2040, one by 2050, and one panellist thought growth would never end in Finland. Among those who thought growth would end, the argument that growth will end when the temporary green investment levels eventually reduce was mentioned three times in the comments, while the need to quickly reduce the fossil economy was mentioned twice. Two arguments stated that economic growth should be given up as a political objective soon, after a social debate, and according to two arguments growth will end by itself as population growth ends. The panellist who responded that growth would never end argued that moderate GDP growth is not a problem in itself, even though it should not be a societal goal. Two of the three panellists who did not respond thought that evaluating what happens with GDP is not relevant, while the third considered that although we should not expect high growth rates for the next decades, an eternally non-growing economy is not necessary and it is both possible and acceptable that the economy will sometimes grow and sometimes decline, depending on the level of economic activity. The consensus of the panel was that for the same reasons as estimating future GDP rates is not relevant, it is not essential to estimate when growth might end.

When asked to evaluate the desirability and likelihood that economic growth would be brought to an end intentionally (as the desired and controlled result of purposeful policies), most participants considered it desirable but unlikely (Figure 29). Only two out of the fourteen panellists thought such a scenario would be likely. Two found the scenario neither desirable nor undesirable, and one found it slightly undesirable. On a 7-point scale from -3 to +3, the average likelihood was -1.8 (median -2, SD 1.5) while the average desirability was 1.6 (median 2, SD 1.3).

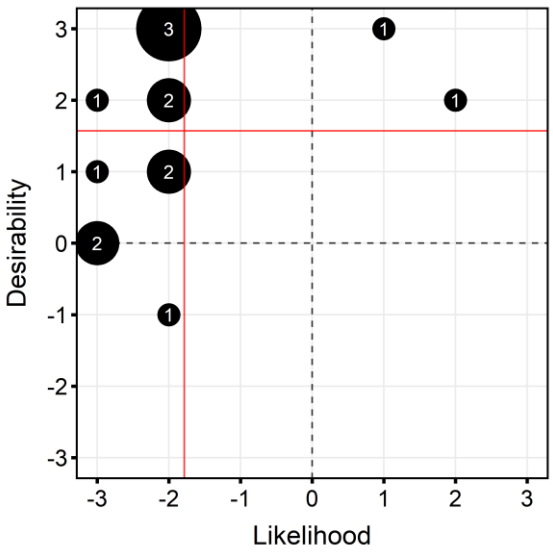

Figure 29. The desirability and likelihood of ending economic growth intentionally in Finland. Averages indicated by red lines.

According to the comments, the probability was evaluated to be low partly because capital interests have a big impact on the political system. It was also mentioned that many important Finnish institutions are occupied by neoclassically trained economists who oppose changes to their economic models – a possible solution to this was to offer alternative models. By far the most mentioned reason was that stopping GDP growth is not a politically sensible goal in a pro-growth policy climate. It was argued that proposing to stop growth would provoke backlash. It was also argued that even if society did not voluntarily give up growth as a goal, it could embrace some other goal instead of growth. Some panellists argued that growth is likely to cease as society adapts to the natural constraints of growth, or as a result of society pursuing other goals, such as a fossil-free economy, solving environmental problems, and focusing on things that directly improve wellbeing. Those who considered that ending economic growth would be an undesirable goal saw it as an indirect and bad approach to achieving change. On the other hand, some panellists found this indirect goal desirable precisely because it focuses on the root cause of the problems. It was argued that economic growth is the root cause that creates problems, threatens wellbeing, and that is currently the primary goal of Finnish society. One panellist also argued that stopping growth would be necessary to achieve sustainable development.

7.4.3. Finland's growth dependence

Rather than focusing on what might happen to economic growth in the future, the panel considered it much more important to focus on overcoming the societal dependence on growth. This issue was evaluated during the workshop twice. First before the panellists could see the responses and comments of others and a second time after they had had a chance to consider each other's points of views and arguments. Growth dependency was defined by how challenging it would be for society to respond to the needs of its citizens and maintain social wellbeing without economic growth. The focus was therefore on the structural reliance view of societal growth addiction. In the end, most panellists considered Finland's structural reliance on economic growth to be high, although some thought it is overexaggerated (Figure 30).

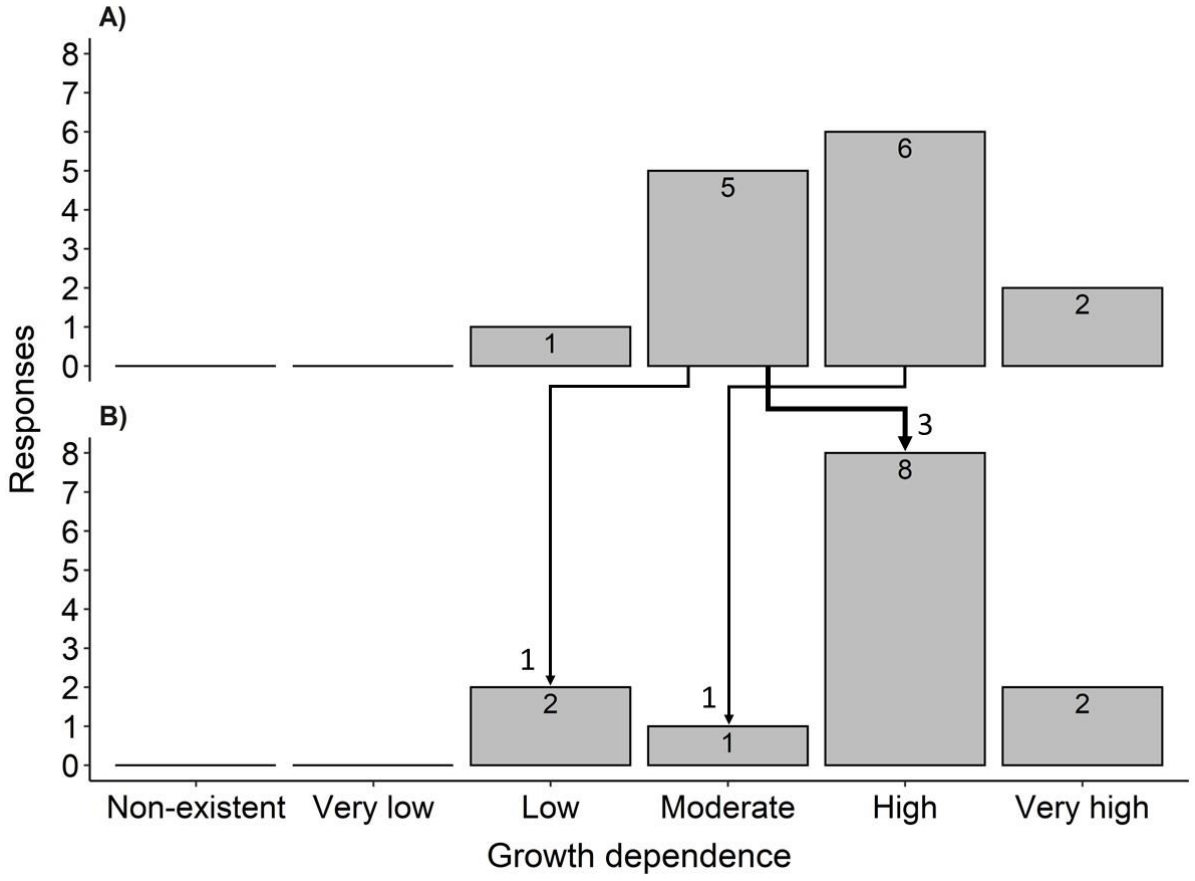

Figure 30. Finland's estimated level of dependence on economic growth during the first (A) and the last (B) Delphi round. Black arrows and numbers indicate changes in opinions. Note: One panellist who responded "moderate" during the first round could not do the re-evaluation.

According to the comments from the first round, growth dependence is made higher particularly by factors related to taxation and the sustainability of public finances (11 mentions). It was argued that tax revenues are linked to GDP especially because income taxes depend on production and the value-added tax (VAT) depends on consumption, which together account for the largest and most important share of tax revenues today. Having sufficient tax revenues is important for wellbeing, as taxes are used to pay for public services such as social security and other welfare services, to reduce economic inequality, and for environmental protection. According to the comments, the aging of the population (declining dependency ratio) and rising public sector costs – especially the rising costs for providing public services as earnings levels rise – increase the sustainability gap of public finances and thus create a dependence on economic growth to keep the tax revenues at a level that is considered sufficient.

Habits of thought (6 mentions) were also perceived as a major cause of the dependence, and prevailing political rhetoric was said to increase it. According to the comments, this involves a lack of courage on the part of leaders to think differently, and a lack of means or understanding of how wellbeing could be maintained without economic growth. One panellist commented that economic growth is imagined to be a prerequisite for the redistribution of wealth, even though sharing in itself does not require the pie to growth. Technological development is also often thought to require economic growth. The growth addiction was also said to be exacerbated because indoctrinated citizens do not know how to imagine or consider an alternative lifestyle, but instead expect to keep raising their own standard of living.

The importance of thought habits was also reflected in arguments considered to lower the growth addiction. According to these counterarguments, dependence is exaggerated in the public debate. Some commented that the dependence is mainly based on a decision that government spending could not exceed tax revenues. It was argued that in today's world this decision is not based on facts. In particular, financing with central bank debt could address the sustainability gap, which economic growth through productivity growth would not be sufficient to solve regardless. After all, central bank debts would never be allowed to default if that would threaten society or wellbeing, it was argued. Furthermore, in a central bank capitalism, in which we are already living according to one comment, states can use central bank money for green investments and for maintaining people's wellbeing, and economic overheating and inflation can be controlled through taxation. For example, environmental damage can be taxed so severely that extra money is taken out of the market, thus avoiding the risk of hyperinflation. This would produce ecological structural change, as the argument continues, but not as long as the equation is Fossil economy = GDP = Tax revenue = Government expenditure framework. It was said that the extent of the tax base depends largely on political decisions and

changes in the tax system, and therefore maintaining the tax base does not necessarily require growth, but economic activity in general.

The prevailing monetary system was also argued to increase growth addiction (5 mentions), particularly through indebtedness to private banking institutions and funding related profit expectations. The dependence was also said to be higher because the sustainability of household finances and the pension system require growth and value increases. Political and economic interests (4 mentions) were also argued to be significant, as those who benefit from the pursuit of economic growth seek to maintain the image that society depends on growth. Privatised services and natural monopolies, such as the electricity grid, were said to further increase the dependence. One argument also said that Finland's growth addiction is linked to that of other countries.

According to counterarguments, the COVID-19 pandemic has reduced the societal growth addiction, as it has made many things possible that were considered impossible before the pandemic. COVID-19 has shown what society can do if change is considered desirable and necessary. Dependence was also said to be reduced by a large public sector, a high level of material wellbeing (less need for further growth), and that not many important systems in Finland actually depend on economic growth. The pension system, for example, could be maintained in a zero-growth world with planned adjustment measures. One argument was also that Finland cannot be very dependent on growth, because even during the economic crises of the 21st century, Finnish society has been able to stay afloat in conditions of almost zero growth.

Comments during the third round reaffirmed that the main reason Finland is highly or very highly addicted to growth is that replacing the goals and values of an industrial society would require substantial changes in thinking. One panellist expressed that “In my previous answers and comments, I tried to argue that growth dependence is lower than is generally thought ... if I think about the question literally and considering the prevailing habits of thought ... the level of dependence is high in today's Finland, so high that change seems almost insurmountable.” Another wrote that “Structurally we are indeed dependent on economic growth in terms of tax revenue and the deterioration of the dependency ratio, that is, under the current system. After reading the text [summarising arguments from previous round], I now realize that thought habits may make the addiction even stronger: people do not believe that there are any alternatives to the dependence, even though alternatives do exist.”

7.4.4. Difficulty of change

As a complementary approach to evaluating the societal addiction to growth, in the first section of the Delphi workshop the panellists were asked to assess "How easy or difficult would it be to change the Finnish system so that societal wellbeing could be maintained without economic growth?" Most panellists found change to be moderately difficult to achieve, but the results ranged from "a little difficult" to "extremely difficult" (Figure 31, A). In the last section, the topic was addressed in more detail by asking: "How difficult would it be to gain the support of the majority for Finland to strive for the envisioned post-growth economy?" And "How difficult would it be to implement the required system change in practice, if the post-growth vision already had the support of the majority?" (Figure 31, B). The average estimated difficulty of implementing the change in practice was estimated to be between moderate and high (mean 6.70 / 10, median 7.5, SD 2.2) and majority support was assessed to be almost as difficult (mean 6.25 / 10, median 6.5, SD 2.1).

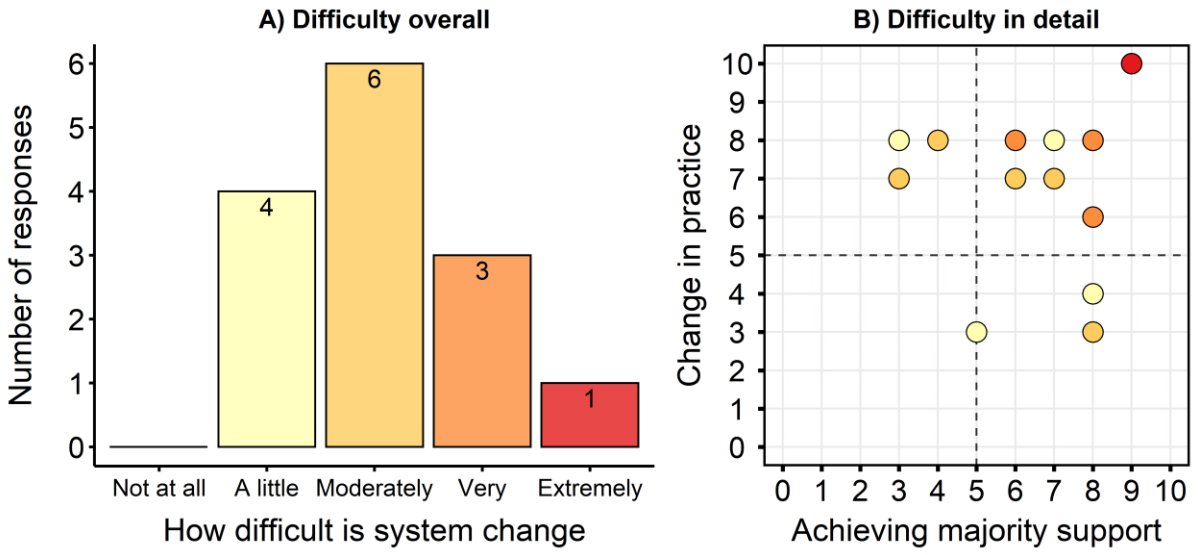

Figure 31. Difficulty in changing the prevailing system in Finland. A) Difficulty of system change at a general level, assessed in the first section. B) In the third section, the difficulty was assessed in more detail on an 11-point scale, where 0 is not difficult at all and 10 is extremely difficult, and by dividing the question into two parts. Points in B are coloured according to responses in A, so that the panellists' answers can be compared between the two.

The responses had a large amount of variation, and no consensus was reached on the difficulty of change. In the first section, one of the panellists stated that system change is extremely difficult in Finland, explaining that the values of Finns are too rooted in modern ideas of success, and that this

will not change without a catastrophic crisis. The panellist in question also argued that people can be easily intimidated by reminding them how bad things used to be in Finland. Among those who chose a very high degree of difficulty, the most cited reason was individuals and groups protecting their vested interests, which can quickly create resistance to change, especially through lobbying. It was also argued that Finns have not been taught how social change can take place and how they could take an active part in it, and that the prevailing individualism makes it difficult to organize change. Although change plans can be made easily, Finland is still far from accepting planned reconstruction as a policy priority, it was argued.

In the first section, panellists who considered change to be moderately difficult argued that the abundance of possible actions and proposals for change reduces the difficulty. One panellist also argued that COVID-19 has shown what society can do if there is enough will to bring about change. It was also mentioned that the necessary change in values is not too difficult to achieve, and although the difficulty is increased because the pension system and unemployment security need to be modified, this may need to be done in any case. Many people were said to suffer because of the current system, and therefore their attitude to change is likely to be positive. Despite these arguments, these panellists also acknowledged that growth hegemony is strong in Finland. It was said that there is not enough political will and agency, and politicians were said to fear change because they think society will collapse without growth and because the current welfare state has strong support among its citizens.

Panellists who found change to be only a little difficult also argued that the abundance of means makes change easier. One panellist argued that “The change may have already begun, as we are already living in a central bank economy where the real constraint on public finances, especially at the EU level, is not tax revenues (but the risk of inflation, among other things). Similarly, the Ministry of Finance, for example, already understands that there should be a shift from income and VAT taxes to taxing environmental impacts. Change is entirely possible; these blocks already exist. We could really invest in a green economy and the wellbeing of society and reduce the fossil economy, if these mechanisms are taken seriously.” Others thought that change depends on the political and civic will. One panellist also commented that “The biggest difficulty is probably with private equity” because “In a world of zero growth, on average capital cannot be expected to create returns.” One panellist argued that “While on average profit could not be expected, good private investment would yield a profit. So capitalist profit-making and production need not be completely abandoned, it will only become a degree more difficult” and “It would be good to develop instruments for investing private capital with the aim of generating social value and *securing* capital, not to generate a profit.” It was suggested that

companies should change their purpose of their existence from profit-making to the production of services and products as non-profits, as cooperatives are already doing, for example.

In the third section, some panellists argued that replacing the goals and values of an industrial society would require fundamental changes in thinking, and that citizens do not believe that there are alternatives to growth dependence. The resistance to change was said to be really tough and one panellist argued that the capital class and those "who think they are part of the ownership class with their few shares" would oppose the policy measures required by a PG economy, although the main resistance would be "corporations and their lobbyists". On the other hand, it was also argued that while the tax base and dependency ratio increase dependence in the current system, and although the current system is built on growth, the system can be changed, and the growth dependence is exaggerated. One panellist argued that "if people can be guaranteed a *secure* standard of living, meaningful doing and a sense of appreciation, a large proportion of people would be willing to transition into a moderation economy. In an uncertain competitive world, the transition is frightening because people are afraid of falling to the margins of society." Another commented that "Moderation is already receiving a lot of intuitive support. With a good campaigning and discussion, achieving consensus could be surprisingly easy – at the vision level. But as people realize what the change would require in practice, when structures and individuals would actually need to change, troubles surface, as people realize that achieved benefits will have to be given up, and that moderation is not just talk after all."

7.5. Discussion

In this chapter I addressed key questions related to overcoming the societal addictions to economic growth in high-income countries, focusing on Finland as a case example. From the literature I recognised six main risks and costs associated with this addiction: (1) uncertainty of future decoupling; (2) uncertain costs related to global environmental problems; (3) ongoing secular stagnation; (4) pressure to lower standards and deregulate; (5) lower resilience against crises; and (6) lower quality of life. I then reported findings from a Delphi workshop, in which a panel of experts discussed the future of economic growth in Finland and how dependent the country is on growth. Corroborating the risks of growth addiction I identified, the panel considered the future of growth to be highly uncertain in Finland. Although the panel considered it desirable for Finland to seek an intentional end to economic growth, this was considered to be a politically unrealistic goal. Rather than focusing on economic growth, the panel considered it much more important to focus on overcoming the societal

dependence on growth. The panel estimated the dependence to be high in Finland particularly due to factors related to taxation, the sustainability of public finances, and habits of thought. The panel had varying views about the difficulty of overcoming the dependence, with the average estimate being that it would both be moderately difficult to achieve majority support for the change and then also to implement the change in practice. Next, reflecting on the workshop findings, I will focus on discussing the reasons of the growth dependence in more detail, how the addiction to growth was reflected in Finland's pandemic response, and how the societal addiction to growth could be overcome.

7.5.1. Growth imperatives

Richters and Siemoneit (2019) have identified several "growth imperatives", which they define as difficult to circumvent conditions that necessitate firms, consumers, or governments to increase economic efforts to avoid existential consequences. They differentiate these from "growth drivers", which are not as coercive and instead reinforce the imperatives (Richters and Siemoneit, 2019). A discussion of their findings can help compliment the factors identified or mentioned by the panellists. When the panellists were asked to explain their evaluations of Finnish growth dependence, many emphasized the sustainability of public finances. This was also recognised by Richters and Siemoneit (2019), who wrote that "Nation states themselves do not have to achieve an income or fulfil basic needs, but they can face 'existential consequences', too: We consider the need to keep public debt at sustainable levels – and therefore the need to keep public expenditure and expected revenues basically in balance in the long run – as an objective top-level constraint for governments. A political growth imperative exists if this condition can be maintained with growth policies, while social norms make alternative policies 'unrealistic'." This latter point about social norms also reflects the second most mentioned factor by the panellists, the habits of thought.

Richters and Siemoneit (2019) also discussed other factors that the panellists did not bring up (at least directly), but which are nonetheless important to address, such as (un)employment. In market-based economies, individuals act as consumers, using their income to purchase resources, products, services, and information, which help them to maintain or enhance their personal prosperity. This continuous consumption (demand) is required to create employment through production (supply) within the circular flow of the economy (Pollitt et al., 2010). Because people's livelihoods are tied to full time employment, the security of people's wellbeing is negatively impacted when aggregate demand and supply decline and "cyclical unemployment" occurs (Frank et al., 2018). According to a rule of thumb

known as Okun's law, when the growth rate of real GDP drops 2 %, cyclical unemployment increases 1 % (Antal, 2014; Frank et al., 2018).

Furthermore, because labour is a major cost of production, firms are incentivised to optimise production processes and invest in labour and resources saving technology that increases labour productivity, creating a competitive advantage (Richters and Siemoneit, 2019). This decreases the demand for human labour and leads to a net increase in unemployment in the economy if new jobs are not created at a matching pace. This structurally incentivised process is known as "technological unemployment" (Feldmann, 2013; Postel-Vinay, 2002; Richters and Siemoneit, 2019). A report by the World Economic Forum has estimated that by 2025 half of all employees will need reskilling as 85 million jobs could be displaced and 97 million created in the 15 industry sectors and 26 advanced and emerging economies their report covered, reflecting the changing division of labour between humans, machines and algorithms (World Economic Forum, 2020c). Pressingly, if efficiency gains lower the labour requirements per unit of production, more aggregate production (economic growth) is required to keep the same number of people employed at the macro level (Antal, 2014).

The need to counteract unemployment and guarantee a minimal standard of living for everyone creates a "political growth imperative" for governments, according to Richters and Siemoneit (2019), which is also affected by social norms (such as the meritocratic principle) and concerns of fairness, which make it politically challenging to implement redistribution policies (Richters and Siemoneit, 2019). In Finland, the meritocratic principle might not be as influential as in other HI countries, as Finland is one of the most equal countries in the world, with a Gini index of around 28. A Gini index measures inequality so that 0 would mean that all incomes are completely equal, whereas an index of 100 would mean one person has all the income. For comparison, Slovenia has the lowest score in the world with 24.6, and South Africa has the highest with 63, Germany's and Japan's scores are around 32, while United States' is 41 (World Bank, 2021a). Nonetheless, the issue of unemployment remains important to discuss when considering growth dependence in Finland.

The current system has a very low resilience against slow or no growth, because when unemployment increases, spending power and demand for consumer goods are reduced, which leads to business revenues, incomes and investments being reduced, further increasing unemployment in a spiral that leads to recession and an overall decline in prosperity (Jackson, 2009). The structural feedback mechanisms of the prevailing system drive either expansion or contraction and are incompatible with a steady state of consumption and production (Jackson, 2009). This "productivity trap" (Jackson and Victor, 2011) means that socioeconomic systems without guaranteed work or income programs are reliant on increasing consumption and GDP to ensure individuals can maintain employment and

thereby protect their wellbeing. The workshop panel brought up basic income as a policy proposal which could aid Finland to overcome its growth dependence. In fact, the government has already trialled this policy with 2,000 Finns, finding that it improved the employment, economic situation, and wellbeing of the participants compared to a control group (Kangas et al., 2020). At the time, there was a 46 % support for the policy among the Finnish population (Kangas et al., 2020). The panel also brought up and evaluated the potential influence of shorter working days/weeks for achieving a PG system, which is another policy often proposed by PG scholars (Hardt and O'Neill, 2017; Jackson, 2009). Both basic income and shorter working times were evaluated by the panel to have moderate to large impacts for the transition to a PG system in Finland (Chapter 6).

Richters and Siemoneit (2019) also argue that tendencies to expand can be driven by historical or ongoing conflicts, and by existing infrastructure and institutions that have been built to attract foreign investments and capital imports (including taxation systems tailored for specific firms). These topics were not brought up by the panel. The workshop took place before the war in Ukraine had begun, and it remains to be seen how the increased tensions will be reflected in the growth addiction of Finland in the coming months and years. The Finnish economy is also very dependent on foreign trade, with exports (37.3 %) and imports (37.8 %) accounting for 75 % of GDP during 2015-2019 (Statistics Finland, 2020). Assessing whether or how this influences the growth dependency would be an important topic for future discussions and research.

In addition to the growth imperatives, Richters and Siemoneit (2019) identified several growth drivers. For nations, these include the fear of political and social instability and the associated need to maintain full employment (as discussed above) and international competitiveness. For firms, Richters and Siemoneit (2019) identified that competition between producers in the market creates a growth imperative, as continuous investments are required to maintain market shares through the creation of sufficiently modern or innovative means of production (Richters and Siemoneit, 2019). This means that, in practice and in general, producers cannot distribute and consume their accounting profits fully (which theoretically could enable non-growing firms) and most firms instead have no option but to seek to grow through investments (Richters and Siemoneit, 2019). Because the increased production is bought by consumers and encouraged by governments, the expansion of some firms is not compensated by reductions in others, leading to aggregate growth of the economy (Richters and Siemoneit, 2019). Other drivers for firms include rent seeking, to gain market leadership and political and social influence, and profit maximisation, which is a driver that facilitates investments (Richters and Siemoneit, 2019). Firms also actively seek to influence people through advertising, reinforcing consumerism (this was also flagged as an issue by the panellists). Consumers are also driven to expand consumption through interpersonal competition for opportunities and status, e.g. to gain social,

material, and mating advantages, and by the need to avoid social exclusion (Richters and Siemoneit, 2019). Interpersonal competition can also lead to increased drive to improve time use efficiency to generate more opportunities for improving wellbeing or generating income (Richters and Siemoneit, 2019).

Due to these functions of the socioeconomic system, governments (and all political parties) are structurally incentivised to support consumption-growth, from the bottom-up – through dynamics at the micro scale of individuals and firms – and from top-down – through dynamics at the macro scale of governments and international communities – regardless of whether the marginal costs of growth exceed its marginal benefits. This helps to explain why governments still insist on economic growth, even when it drives environmental decline and no longer adds to wellbeing. The Easterlin paradox has demonstrated that after a certain point, happiness does not increase with economic growth in the long-term (Easterlin et al., 2010). GDP growth ceased to increase genuine progress in industrialised nations already in the late 1970's (Kubiszewski et al., 2013). In Finland, GDP growth has failed to increase genuine progress since mid-1980's (Hoffrén, 2018). Since the socioeconomic system, as it exists today, cannot maintain people's wellbeing without growth, it is no wonder that the primary focus of the system is to increase GDP and to direct investments and technological advancements for this purpose, with secondary concern given to the consequences on the environment or societal wellbeing. In Chapter 6 I showed that the panel evaluated decision makers to be the least supportive of PG, compared to citizens and scholars. The pursuit of economic growth was considered to be an almost unchallenged self-evidentiality across parties. Some argued that this is because politicians are concerned and knowledgeable of the factors required to currently maintain societal stability, and responsible for the implementation of statutory services, which presently require growth. MPs were also said to follow either capital or worker interests, both of which are currently tied to growth.

7.5.2. Finland's addiction to growth reflected in the pandemic response

Finland's prevailing societal growth addiction can be seen reflected in the current (centre–left coalition) government's plans, which aim to achieve "sustainable economic growth" (Finnish Government, 2019). The nature and level of the dependence can also be observed in more detail by looking at the government's response to the COVID-19 pandemic, which was caused by the SARS-CoV-2 virus (CDC, 2021). Finland originally employed a "hybrid strategy" to slow down the spread of the virus with restrictive policies to protect the health system, while allowing herd immunity to incrementally develop in the lower risk portion of the population to protect the economy

(Valtiovarainministeriö, 2020a; Vihriälä et al., 2020). The government reacted promptly to the crisis by declaring a state of emergency and issuing a decree on implementing the Emergency Powers Act, imposing a two-month long lockdown, banning travel to and from the metropolitan area, and closing down institutions, schools, and businesses (for a timeline of the response, see: Wikipedia, 2022). In March 2020 the government also created a 15 billion euro economic support package to aid businesses and individuals, amid other actions (Yle, 2022g). The pandemic is still ongoing in 2022, after two years.

In 2020 the pandemic increased government expenditure by around 4.9 billion € (2.1 % of GDP), while at the same time reducing revenues to the effect of around € 1.1 billion (0.5 % of GDP) (Valtiovarainministeriö, 2020b). In the end, GDP declined by -2.9 % during the first year of the pandemic. According to the government's budget proposal for the year 2022, GDP growth was expected to be 3.3 % in 2021 and 2.9 % in 2022 (Ministry of Finance, 2021a). After the pandemic, the government plans to return Finland to "sustainable growth, high employment and sustainable public finance" (Valtiovarainministeriö, 2020c). According to the budget proposal, the "goal of Prime Minister Marin's government's economic policy is to increase wellbeing. This means ecologically and socially sustainable economic growth, high employment and sustainable public finances" and the government aims to "reverse the increase in the public debt ratio in the mid-2020s" (Ministry of Finance, 2021a).

This helps demonstrate how the Finnish government prioritises growth. Furthermore, it demonstrates that the concepts of wellbeing and economic growth are deeply intertwined in the government's eyes. Not only that, but the government also associates future economic growth with solving environmental problems, instead of further exacerbating them. This confidence may derive from the fact that the country has set a national 2035 carbon neutrality target and is developing sectoral low carbon roadmaps to inform a "green economic rebuilding" after the pandemic (Ympäristöministeriö, 2020). This is aided by Finland's Recovery and Resilience Plan, which has four priorities: green transition, digitalisation, employment and skills, and health and social services (Ministry of Finance, 2021b). The "green transition" focuses particularly on clean energy, a circular economy, and new technologies. According to the plan, "The measures will save energy, improve air quality, and ensure security of energy supply. Growth and new jobs will be created across the country, replacing work being lost as a result of structural change" (Ministry of Finance, 2021c). Looking at the government plans, there seem to be no recognition of possible trade-offs or limits associated with GG, and the various problems of growth dependence are not considered.

On a more positive note, the pandemic response does also demonstrate that the government is capable of quickly putting in place substantial emergency measures and increase public investments when it considers the wellbeing of its citizens threatened, even at great economic costs. It also shows that the Stability and Growth Pact of the EU is not immutable – at least when deviations from it are meant to be temporary and when policies that prioritise wellbeing also benefit the economy overall, compared to what the impacts would be if the policies were not implemented.

As a response to the economic impacts of the pandemic, all major areas of public spending (social security, healthcare, education and subsidies) and income (mainly income and value-added taxes and social security payments, such as pensions) were called into question by Finnish economists, who evaluated economic recovery options for the Finnish government (Vihriälä et al., 2020). The economists supported the application of a "pain package" for public finances (Vihriälä et al., 2020). When evaluating the short and long-term ramifications of the pandemic, Finland's Committee for the Future stated that the crisis threatens to exacerbate inequality if unemployment rises and if the "pain package" for public finances will further deplete resources for social security and equal education in the future (Tulevaisuusvaliokunta, 2020). Divides also exist within the Finnish population on the preferred actions: women, the less well-off, and the political left mostly oppose cuts to public spending and instead support increased taxation and public debt, whereas men, the wealthy and the political right generally prefer the opposite (Yle, 2020). The response to the pandemic might aggravate these existing divisions within the country.

Furthermore, a strategy and action plan report titled "Sustainable economic growth and the future of our wellbeing" was published recently in Finland, which claimed that "Finland's risk is that we will not succeed in international competition, and we will lose experts, production, and product development investments abroad. The main problem in the Finnish economy is the risk that the period of weak growth that has lasted for more than 10 years will continue" (Ministry of Economic Affairs and Employment of Finland, 2022). This report was written by a group of independent experts, appointed by Finland's Minister of Economic Affairs, consisting of four business leaders (3 CEO, 1 Chairman), two professors of practice from Finnish universities, and two high-ranking members of Finnish ministries (The Ministry of Education and Culture, and the Ministry of Economic Affairs and Employment), indicating how the prevailing growth addiction affects government, business, and academia. The report argued that low growth will increase the government debt ratio, hamper green investments, and soon force spending cuts or tax increases. As a cure, the experts proposed policies that would increase innovations, writing that "The road to sustainable growth is through accelerating innovation, as productivity growth is based on innovation" (Ministry of Economic Affairs and Employment of Finland, 2022). The report also proposed changes and investments to the education system to improve

and update the skills of the labour force to match the needs of the economy. These observations reflect both the growth imperatives and the risks of growth addiction discussed above. However, instead of recognising the addiction itself as the main risk and directing solutions to address that, the proposed solutions were aimed at feeding the addiction.

The workshop panel considered that instead of a return to growth as usual, or implementing austerity measures, Finland needs to begin a transition to a post-growth system in which public deficit, balanced budgets, or the amount of public debt no longer limit public investments, which are needed to reduce environmental impacts and maintain societal wellbeing during the multiple ongoing global crises which will affect Finland for decades to come. Instead of simply increasing taxes, many panellists saw the combination of central bank debt and reforms to subsidies and the tax base, such as through increasing environmental taxation, as a way to finance the needed investments. A report by the Finnish Committee for the Future, referencing the Ministry of Finance, also noted that in Finland's 2020 budget proposal (pre-pandemic), environmentally harmful subsidies totalled 3.6 billion euros, while the money allocated for promoting carbon neutrality was approximately 2 billion (Tulevaisuusvaliokunta, 2020). Plenty could therefore be done to improve the "sustainability" of public finances even without austerity. These results reflect the conclusions of Corlet Walker et al. (2021), who have also recognised that instead of austerity, the central challenge is to create a post-growth welfare system that protects and improves health and wellbeing even during times when the economic scale decreases.

The Finnish research group BIOS, whose ecological reconstruction plans were utilised during the workshop, have argued that instead of narrowly focusing on fiscal sustainability, planning the future of the Finnish economy should be based on a holistic assessment of risks (BIOS, 2020a). Risks from increasing public investments and debt, even if the amount of debt exceeds the limits of the EU Stability and Growth Pact, need to be weight against the ecological and climate risks that may result without such spending (BIOS, 2020a). The researchers have argued that decision making also needs to account for the risks that may develop for Finnish competitiveness in the future if Finland fails to transition to sustainable production, energy, food and transport systems, and if international emission targets are later strengthened (BIOS, 2020a). Recovery from the pandemic will take two thirds of the time that the BIOS group has called 'the era of transition politics' in Finland, during which the nation will need to undergo a holistic ecological reconstruction to abolish emissions and radically reduce the consumption of natural resources, while ensuring equal rights to a good life (BIOS, 2020b). Achieving these targets requires public investments, which is why reducing government spending in the following decades would be a mistake (BIOS, 2020a). The need for green stimulus presents an opportunity to build back better (Büchs et al., 2020), creating a resilient post-growth economy that is

directly focused on increasing wellbeing instead of assuming it will be the indirect consequence of endless consumption-growth (Costanza, 2020b; Costanza et al., 2018; Daly, 2010; Jackson, 2009; Victor, 2019).

7.5.3. Overcoming the societal addiction to growth

The question is, how could Finland overcome the societal addiction to economic growth and transition from the current pathway to the one supported by the expert panel? Costanza et al. (2017) have proposed Community Scenario Planning (CSP) as one potential approach for overcoming societal addictions. CSP builds on a successful individual level addiction treatment called Motivational Interviewing, which engages addicts in a positive discussion of their goals, motives, and futures, instead of using blame and mandates that can create pushback (Costanza et al., 2017). As Costanza et al. (2017) argue, confrontational interventions can often lead to denial and a lack of progress in treating addictions, and yet scientists and activists typically use just such approaches when trying to convince society to change. Therefore, when addressing addiction to growth and raising awareness of post-growth, the sensible thing would be to instead follow the four-step process of the CSP approach, which Costanza et al. (2017) define as:

i. ***Engaging:*** building relationships with diverse stakeholders to encourage change talk.
ii. ***Focusing:*** setting shared goals among those stakeholders.
iii. ***Evoking:*** helping stakeholders identify motivations for positive change.
iv. ***Planning:*** helping stakeholders move from goals to actual change.

In CSP, the "client" is comprised of all the stakeholder groups of society, while the scientific and activist communities can act as the "therapists", whose role is to engage society in positive change talk (Costanza et al., 2017). In the focusing phase, the therapists help the client set their own goals and agenda, although the therapists can express their views if they think some of the ideas are excessively ambitious or inappropriate. The therapists can also provide a preliminary plan of specific goals to the client (Costanza et al., 2017). Even if the client and therapist have different agendas, clients must have the freedom and time to conceptualise the need for change themselves, in their own words (Costanza et al., 2017). Sufficient time must therefore be allocated for the CSP deliberations. The core of the process is evoking the clients inner desire and capacity for change through strictly non-judgmental and supportive statements, affirmations, reflections, open questions, and by summarizing and "providing information and advice with permission" (Costanza et al., 2017). The client should be

receptive to the information if the engaging phase has been successful in building trust and creating a working alliance and a relationship between the client and the therapists (Costanza et al., 2017). Importantly, the CSP process does not seek to explore reasons not to change, or give equal time for all perspectives, because the therapy is about inspiring and fostering change through reflecting and strengthening change talk back to the client (Costanza et al., 2017).

In order for the therapists to be able to give guidance for society, to counsel them towards a better outcome, the therapists must know, and agree amongst themselves, how to differentiate desirable societal goals from undesirable ones. In addition, they also need to know what strategies and actions could be implemented to achieve actual change. In other words, they must know what practical steps could be implemented to achieve sustainable wellbeing without growth. This is analogous to a psychiatrist having an evidence-based strategy of specific actions that a person could take to overcome an addiction at the individual level. The capacity to see and describe a better future allows the therapist to focus the client, or patient, while knowledge of how that future could be achieved allows the therapist to evoke the patient to identify motivations for change. This is why the workshop focused on creating a new PG vision for Finland and discussing how it could be achieved (Chapter 6), in addition to evaluating Finland's dependence on growth. Importantly, the therapist is not meant to provide an "oven ready" top-down solution in the planning phase of CSP (Costanza et al., 2017). Instead, the solutions are arrived at with the client, at their own initiative and based on their specific condition. The therapist's function is to guide this process and provide evidence-based proposals for actual change, which could help the patient achieve their new goals.

By bringing together various groups with different views to discuss a common future, the CSP process of societal deliberations creates new information flows and thus addresses the leverage point (LP) of information flows and feedback loops (LP 4 of 5 in Figure 2, Chapter 2), which is often the easiest to tap into (Koskimäki, 2021; Meadows, 1999). The CSP process can then help create more acceptance for implementing critical changes to key system parameters (LP 3), with actions such as the proposed direct financing of public consumption with central bank funding, beyond levels the growth addicted status quo has found acceptable. Another example would be the accounting for consumption-based environmental harm, which would correct feedbacks and accountability. These critical parameter changes can influence the underlying socioeconomic structures and functions, leading to large changes in the whole system. The CSP is also designed to tap into the two most influential leverage points: societal goals (LP 1), which give direction and motivation for transformation, and structural goals (LP 2), which can be changed by addressing the underlying causes of problems (Chapter 2), which in this case are the factors that create the societal addiction to growth. The CSP can help the members of society to embrace a new vision of a good life, beyond consumption-growth, which can facilitate

the implementation of actions such as updating the educational system and the tax base. Changes like these would then help address the structural goals, which emerge from the incentive structure of the system. Once the transformational policies are in place, the transformed system can be optimised by policies that address flows, constants, and other parameters (LP 5).

Creating an alternative future vision and compiling a list of proposed actions early on is a priority, because these can be used not only for planning change, but also for engaging people, focusing their goals, and evoking them to want change. This is what the present workshop has provided. The narrative vision of a post-growth future and the policies and actions proposed by the expert panel can help ensure that the therapists, i.e., Finnish scholars and activists, can visualise what a desirable future could look like and have context-specific proposals at hand, when the stakeholders eventually move from formulating new goals to planning and implementing actions for change. Therefore, my expert workshop can be seen as the first step of the CSP therapy in Finland, providing a basis on which future deliberations can build on. Now that we know how to reach a consensus with experts knowledgeable on the subject of PG, the next step would be to seek a broader consensus among scholars from different fields and viewpoints, a sort of therapy among the therapists, and then extend the therapy to include other societal groups and stakeholders.

The workshop results can be used to inform which questions further research and societal debate should focus on, and which topics to avoid. Specifically, the CSP process should focus on 1) envisioning a desirable future to find common ground; 2) evaluating reasons for growth dependence; 3) discussing how the wellbeing of people and nature could be prioritised; 4) discussing ways to achieve a globally sustainable level of resource use; 5) addressing consumerism; 6) identifying obstacles to change and how to overcome them; 7) listing and ranking practical actions; and 8) discussing how the acceptability of the envisioned future could be increased among different groups. The last point is especially valuable, because it can challenge people to think about the transition from the point of view of others, helping to find common ground. Based on the workshop, topics that might lead discussions astray include (1) estimating future GDP growth rates, which are uncertain and depend heavily on assumptions; (2) estimating when growth will end, also uncertain and beside the point; (3) whether Finland should seek to end growth, may be irrelevant and is likely to side-track discussions; and (4) how much support there is for post-growth among different groups, which is also potentially side-tracking and difficult to estimate. I was able to test and then set aside these questions during the workshop, because the participants were motivated and patient scholars with a lot of common ground to begin with. With other stakeholder groups, the question or topic selection may be much more important in determining success. Although these questions should be omitted from future

deliberations, they can still be addressed indirectly through other questions, or by entirely other means such as through separate questionnaires or ecological macroeconomic modelling.

My workshop focused on the structural reliance view of societal growth addiction because the systemic addiction framework would have been more difficult to assess without a longer process. However, due to the double meaning of the Finnish word “riippuvuus”, which can be translated either as “dependence” or “addiction”, there was a fair amount of discussion on other factors contributing to the dependence beyond just structural reasons, as some panellists followed the provided definition of structural dependence less literally than others. In hindsight, it seems that a better approach could have been to approach the issue using the three complementary definitions of addiction, first evaluating the incentives to grow at different scales, then the structural factors contributing to the reliance at the present time, and then society’s capacity to change its future. Furthermore, like with the solutions proposals discussed in Chapter 6, evaluating the reasons for the growth dependence would have benefitted from a dedicated longer Delphi process, which could have iteratively sought consensus on the various causes contributing to this complex issue. The present study should be seen as exploratory research on which future work can build on.

The method of my workshop, combining Delphi with backcasting and an end seminar via Zoom, could be used as a model for the first round of broader societal deliberations. It has the benefit of allowing more people to attend, regardless of geography or schedules. It also allows for anonymity and guarantees that each participant has enough time to deliberate on the potentially difficult issues at their own pace, as CSP requires. The discussions could also benefit from utilising the TC blueprint I developed in Chapter 2, which could help provide structure to the discussions and guide them from the desired system outcomes to actions that utilise systemic leverage points and target underlying causes. Subsequent discussions following the Delphi process could also benefit from the participatory application of ecological macroeconomic simulation models, which can be used to test and demonstrate the social, ecological, and economic effects of different TC policy proposals.

7.6. Conclusions

Following the AG path favoured by the workshop panellists would mean that GDP would no longer have the same social significance as it has had since the 1950s, and instead society could focus directly on stability and prosperity (Victor, 2010). Reflecting this, hundreds of researchers have jointly suggested that the EU should replace the current Stability and Growth Pact with a new Stability and

Wellbeing Pact (The Guardian, 2018). However, prioritising societal wellbeing and ecological sustainability over economic growth is only possible if the growth dependency is addressed – and as the war in Ukraine has taught us with regard to Europe's dependence on fossil fuels, it is worthwhile to get rid of harmful societal addictions before it is too late. According to the expert panel, Finland should seek to achieve a PG economy during the ongoing decade. However, the panel also considered Finland to be currently very dependent on economic growth, particularly due to factors related to taxation and the sustainability of public finances. Habits of thought were also seen as a significant cause of growth dependence, among other factors. According to the panellists, the growth dependence could nonetheless be overcome with a combination of central bank funding, tax reforms, and a variety of auxiliary policies.

In the discussion, I proposed the CSP process (Costanza et al., 2017) as a potential way to overcome the societal growth addiction in Finland. I also emphasised that achieving a post-growth system is essential not only for the benefits it would bring, but also because it would provide security against future uncertainties related to the continuation of growth in the face of secular stagnation and global ecological decline, among other factors. Finland must reduce its the economic reliance on increased consumption levels and simultaneously change consumption patterns towards more domestically produced and less carbon, resource, and land intensive products and services, using strong policies and financial steering. At the moment, Finland's existing plans continue to rely on decoupling economic growth from its environmental impacts, which risky and unrealistic. Instead, policies should seek the much more important decoupling of wellbeing from economic growth. To achieve this, Finland needs to create a post-growth policy mix that ensures the effectiveness and implementation of the existing environmental policies while simultaneously counteracting negative effects on wellbeing.

Corroborating the theme of this chapter, in a new "Bringing Post-Growth Research into Policy" report published in the UK, Douglas (2022) has argued that "framing 'growth dependency' as a public policy problem has strong potential to influence political debate in new ways. By identifying growth as both a dependency and one which is fundamentally unsustainable, this critique may be able to frame growth as a dangerous addiction—one that politicians could and should help society to kick." Through the concept of growth addiction, the pursuit of GG can be identified as the risky path, and thus the solutions offered by PG research can be raised alongside the prevailing policy options (Douglas, 2022). It could also be emphasized how moving away from growth dependence would make it easier to respond to crises. Technological unemployment could be accepted as progress and the aging of the population would not have to be feared.

A society free of the growth imperative would no longer need to encourage people to constantly consume and produce, which would free them to spend more time outside the workplace and live more satisfying, healthier, and less materialistic and status-driven lives. This could allow Finland to achieve the kind of future long since dreamt of by Mill (1848):

> "society would exhibit these leading features: a well-paid and affluent body of labourers; no enormous fortunes, except what were earned and accumulated during a single lifetime; but a much larger body of persons than at present, not only exempt from the coarser toils, but with sufficient leisure, both physical and mental, from mechanical details, to cultivate freely the graces of life, and afford examples of them to the classes less favourably circumstanced for their growth. This condition of society, so greatly preferable to the present, is not only perfectly compatible with the stationary state, but, it would seem, more naturally allied with that state than with any other."

At present, the socioeconomic system structurally forces and reinforces people to produce and consume beyond sustainable limits, to the extent that the total volume of production and consumption is environmentally and socially harmful, resulting in an unsustainable society. It is clear that as the societal addiction to growth is overcome, the current Finnish culture, which has been widely influenced by the ideals of Western consumption for decades (Soinne, 2018), will have to undergo a fundamental change. However, this is a shift towards a better future, as the visions of a PG future discussed in this chapter help demonstrate.

The good news is that while our dependence on nature is fundamentally unavoidable, the dependence on growth is an artificial feature of the modern socioeconomic systems – and a relatively new one at that. GDP was originally developed by Simon Kuznets in the 1930's to measure the scale of the economy, and it was only through the United Nations Monetary and Financial Conference (aka. Bretton Woods) at the end of World War II, in 1944, when the System of National Accounts (SNA) and GDP were anointed as key areas of focus for all countries. GDP was consequently embraced as the ultimate measure of welfare for countries, despite Kuznets himself warning early on that "The welfare of a nation can scarcely be inferred from a measurement of national income" (Kuznets, 1934) and that "Distinctions must be kept in mind between quantity and quality of growth, between its costs and return, and between the short and the long term. Goals for more growth should specify more growth of what and for what" (Kuznets, 1962). I conclude that in Finland, and in other HI countries, the main focus of scholars and decision makers alike should now turn towards overcoming the prevailing societal growth addictions, which could help societies achieve important environmental goals and sustainable wellbeing, in time.

Chapter 8. Summary and discussion

8.1. Contribution to academic knowledge

In Chapter 1, I emphasized the societal dependence on nature and showed how the lack of sufficient progress towards sustainability with the predominant green growth approach has increased calls for transformational change and post-growth economics. I showed how this can also be observed in recent intergovernmental reports addressing global environmental problems and sustainability, reflecting the ongoing debate among scholars regarding desirable future pathways. This is what sparked me to understand the concept of transformational change better and to find out what the current opinions of sustainability experts are when the spatiotemporal context is accounted for.

In Chapter 2 I asked *how transformational change is defined and how it could be achieved,* and I observed that scholars use many of the key terms, such as "transformational change", "leverage points" and "drivers" in multiple, even contradicting ways, and found that the underlying causes of global problems are often not given sufficiently rigorous consideration. To address these issues, I provided clear definitions for key terms and created a new blueprint for transformational change that directs focus to the underlying structural causes of undesired system outcomes, demonstrating how socioecological change could be implemented, in theory, through the use of specific leverage points.

With a better foundation for understanding transformational change, I set out to evaluate what kind of global transformations would be needed to achieve sustainability, leveraging expert knowledge. I focused on alternative future pathways which have different implications for economic growth and for societies relationship with it. As detailed in Chapter 3, I achieved this goal by evaluating expert perspectives through a global survey and a national scale Delphi workshop. The global survey built on a foundation of previous surveys, facilitating comparisons, while also extending the approach to enable comparisons between country income groups and decades. The extent to which business-as-usual, green growth, agrowth, and degrowth are supported among sustainability scholars was unknown before the survey. The novelty of the expert workshop was to combine the Delphi methodology with backcasting to envision what a desirable post-growth future could look like and to evaluate barriers and needed actions for achieving it. This complementary mixed methods approach, utilising both quantitative and qualitative techniques, affirmed the need for targeted transformational change.

In Chapter 4 I asked *what future pathways do sustainability scholars support for different spatiotemporal contexts?* I found that most experts preferred growth agnosticism for high- and upper-middle-income countries already for the ongoing decade, while green growth was preferred for lower-middle-income and low-income countries. I also found that as support for post-growth increased from the 2020s to 2030s, support for green growth decreased in all contexts. Through the multinomial modelling, I found that several variables could help explain the pathway preferences. For example, scholars from the lower country income groups were more likely to prefer degrowth rather than agrowth for high-income countries for the 2020s. Lastly, I found that sustainability scholars are on average more familiar with green growth than post-growth. These results emphasise that post-growth needs to receive more attention in both research and education.

Chapter 5 addressed *how sustainability scholars view the future of economic growth in different country income groups* and I found a substantial amount of variation across all contexts in the desired future GDP rates, which varied between country income groups and depended on the preferred future pathway. The majority of sustainability scholars preferred low growth for high- and upper-middle-income countries, despite the majority support for post-growth I found in Chapter 4. Economic growth was expected to end sooner in higher and later in lower country income groups, but this was not reflected in the preferred rates for 2025 and 2030, because most did not expect growth to end before the 2030s. A fair minority of scholars also thought growth would never end in any context. The majority of the participants considered GDP to be a bad indicator of societal wellbeing. I found a significant interaction between pathway preference and familiarity with post-growth for explaining the preferred future GDP rates, with those more familiar with post-growth preferring lower future GDP rates for high-income countries. This chapter helped reveal more detail about the opinions of sustainability scholars regarding the future of different country income groups.

In Chapter 6 I asked *what a post-growth economy might look like in the context of a specific high-income country*, using Finland as a case example. Reflecting the global survey results, the workshop panellists thought that Finland should focus on increasing societal wellbeing directly while also reducing environmental impacts, regardless of what happens to GDP. Building on existing post-growth plans created in Finland and taking into account six specific areas of change in Finland's new Agenda2030 roadmap, the panel envisioned in detail what a growth-independent future could look like in Finland. Such context specific post-growth visions have been recognised as a gap in the literature (Berg and Hukkinen, 2011; Corlet Walker et al., 2021; Joutsenvirta et al., 2016; Wiedmann et al., 2020). By helping to fil this gap, this research can help inspire discussion not only in Finland but in other high-income countries as well. Using a backcasting approach, the panel evaluated concrete

actions which could help achieve the envisioned future and increase its acceptability. This effort can help guide future research and discussion in Finland around post-growth.

Lastly, in Chapter 7 I addressed *how societal addictions to economic growth could be overcome*, which is the main obstacle for following post-growth pathways. The expert panel estimated Finland's dependence on growth to be high, particularly due to factors related to taxation, the sustainability of public finances, and habits of thought. Most panellists also considered it to be at least moderately difficult to change the Finnish system so that societal wellbeing could be maintained without economic growth. At the same time, the expert panel considered the future of growth to be highly uncertain in Finland. This is one of the main risks of growth addiction, and I also recognised five others from literature. Rather than focusing on economic growth, the panel considered it much more important to focus on overcoming the societal dependence on growth, which would allow Finland to prioritise societal and environmental wellbeing. This corroborates the conclusions of Douglas (2022), who has also argued that the growth addiction framing has potential to be very influential in political debate and policy making. Likewise, Costanza et al. (2017) have shown how the addiction framework can inspire new solutions such as Community Scenario Planning (CSP), which aims to engage society in a positive discussion of the addiction instead of using blame and mandates that can create pushback. The findings of this chapter contribute to this emerging area of post-growth research and can inspire future research and discussions.

By showing that the majority of sustainability scholars prefer targeted transformational change, the findings of my thesis can help influence the future opinions of scholars, decision makers, and perhaps even the public. My results can help shift or expand the discourse and policies considered politically acceptable, both internationally and in Finland. In other words, the results of this thesis can help alter the Overton window, which refers to those ideas that are considered as legitimate by the majority and therefore politically safe to discuss (Mackinac Center, 2010). The Overton window is typically used as a model for the constraint of lawmakers who have to accommodate the public opinion, but we can extend the concept here to scientists and experts, who are judged by their peers and financiers. Locating the Overton window makes it possible for scholars and decision makers to react to it.

It is fair to say that post-growth is no longer unthinkable, neither among scholars nor politicians (Chapter 4, Chapter 6). However, it also does not seem to appear as sensible nor popular to most, and nowhere is it actual policy (yet). Rather, to the majority of scholars post-growth seems either radical or just acceptable, meaning that while some might consider it to be a worthwhile topic, others may find it too risky of a proposal when deciding what to research and discuss. As an example, while post-growth was not mentioned in the 2020 Human Development Report, degrowth was discussed in the

notes of the full report, which implied that it may be a utopian idea, inferring that there may not be enough time to realise such “imaginaries” (UNDP, 2020). Actually, as I and others have argued, it seems that given the urgency of the present global challenges, there seems to be no other option but to implement strong policies that can create fast environmental impact reductions regardless of what happens to GDP, while improving social protections that can sustain societal wellbeing. Since my findings demonstrate considerable support for post-growth, particularly growth agnosticism, they can help lower the perceived risk associated with openly considering post-growth in sustainability circles. My findings can also make it easier for experts to argue that post-growth should be seriously considered as a policy approach when researching and discussing sustainable development, when seeking funding for new research, or when providing advice for decision makers.

My findings also corroborate the conclusions of Belmonte-Ureña et al. (2021), who have argued that the UN sustainable development agenda is limited and that its targets require more detailed definitions, specifically to consider degrowth, which offers more avenues for radical policy change. Based on the results of my survey, I concur that the SDG framework should be improved, specifically to define different targets for rich industrialised countries and less developed countries, enhancing the global justice perspective of sustainability through targeted transformational change. Indeed, assuming my survey results reflect the larger community of sustainability scholars, it may well be that future iterations of the SDGs will account for the need for targeted transformational change, since sustainability scholars may have a key role in informing the implementation and further development of the SDGs beyond the 2030 Agenda. In this sense, the evaluation of expert perspectives may have helped to indicate the potential direction of global change, although the future remains highly uncertain. By demonstrating the demand for post-growth among sustainability scholars, my findings can also help direct intergovernmental reports further towards growth agnosticism and the decoupling of wellbeing from economic growth, which has thus far been only nascently discussed in the reports (Chapter 1).

In this thesis, I focused on expert perspectives on sustainability both globally and in the Finnish context. Particularly in Finland, decision makers listen to the guidance of experts, which emphasises the importance of evaluating how they envision the future to be. By providing a positive narrative of the coming decades in the Finnish context, the new vision of a post-growth eco-welfare economy can help inspire change and direct attention to the prevailing growth addiction. Addressing the growth dependence would also make it easier to end other societal addictions, such as the addiction to fossil fuels, by allowing societies to reduce their energy demand in a safe way. This is particularly relevant in Europe now, where growth dependent countries have found it difficult to help Ukraine by ending fossil fuel imports from Russia.

8.2. Need for socioeconomic adaptability

The social, economic, and ecological dynamics we observe result from the various interactions between the public, private and financial sectors, and the environment. The components that contribute to environmental stability, such as the biological stocks (e.g., forests or animal populations) and the biogeochemical flows (e.g., the water or carbon cycles), interact with components that contribute to socioeconomic stability, such as the consumption and production of goods and services in the circular flow of the economy. Because the environmental and economic components of system (in)stability interact, both need to be considered when evaluating the future sustainability of macroecological and macroeconomic systems in the 21st century.

The most prevalent threats to nature are habitat loss and degradation, overexploitation, invasive species, pollution and emissions, climate change, and biodiversity loss (CBD, 2020; IPBES, 2019a; IPCC, 2018; Steffen et al., 2015; WWF, 2020). Habitat loss directly leads to the loss of ecosystem services and biodiversity, and since biodiversity is key to maintaining natural systems that are functional and resilient, a feedback loop can form where the loss of diversity further threatens natural and anthropogenic systems (CBD, 2020; IPBES, 2019a). In addition, several potential threats exist, which have been covered in the planetary boundary framework: biogeochemical flows (H_2O, P, N), ocean acidification, atmospheric aerosol loading, stratospheric ozone depletion, and novel entities (Rockström et al., 2009; Steffen et al., 2015). The needed transformational change must address all of these issues, not just climate change, which is often the only environmental dimension considered in economic models.

The exceeding of environmental boundaries and the simultaneous failure to meet many of the requirements for social sustainability (GSDR, 2019) has meant that the prevailing global system has drifted away from its habitable zone, the boundaries of which are defined by the system's ability to meet social needs without exceeding planetary limits. Although already recognized in the influential Limits to growth study (Meadows et al., 1972), these days this concept is commonly known as "doughnut economics" (Raworth, 2017). Due to the failure to perceive these boundaries, it has been argued that the prevailing consumption-growth system can no longer provide the conditions for prosperity in the intermediate to long term (Jackson, 2009). The prevailing system is failing to keep us within the doughnut's "ecologically safe and socially just space in which all of humanity has the chance to thrive" (Raworth, 2017).

Corroborating the need for targeted transformational change, Dorninger et al. (2021) have also found that global trade structurally maintains unequal exchange and a net appropriation of value from lower

to higher income regions, which enables high-income countries to experience biophysical and economic growth at the cost of maintaining and deepening global inequality between countries and regions (Dorninger et al., 2021). Instead of being transitional, the authors found this effect to be a systemic and pervasive feature of the prevailing structure of the global economy (Dorninger et al., 2021). In this way, the reliance on economic growth and trade can also increase the likelihood of international conflicts. The authors argued that "High-consumption lifestyles exist at the expense of people elsewhere (thereby creating a question of intragenerational justice) and of future inhabitants of our planet (intergenerational justice). Current trajectories of resource consumption in the high-income nations can neither be sustained indefinitely nor globalized".

The IPCC reports that the current nationally determined contributions will lead to a catastrophic global warming of 3°C (IPCC, 2022). To remain below 2°C global warming, Steffen et al. (2018) have suggested that "a deep transformation based on a fundamental reorientation of human values, equity, behavior, institutions, economies, and technologies is required", and recent studies have started to call for the IPCC to consider post-growth climate mitigation scenarios in order to make the task less risky (Hickel et al., 2021; Keyßer and Lenzen, 2021). In recognition of this, the most recent IPCC report argued that not enough post-growth climate models have been submitted for their evaluation (IPCC, 2022). My findings could inspire climate modellers to critically evaluate the growth assumptions implicit in their models, in a targeted way. The fact is that we have run out of time to adequately address the climate emergency a long time ago. We now need to implement the strongest and safest approach possible, which is targeted transformational change. The unprecedented, though temporary, emissions reductions and other environmental improvements seen during the 2020 COVID-19 lockdowns (Quéré et al., 2020) have also been a practical demonstration of the effectiveness of reducing impacts by decreasing economic throughput.

The most suitable approach for each country will depend on what empirical evidence and modelling deems necessary to reach a globally sustainable level of production and consumption in the required time. Some research has already attempted to evaluate this. For example, O'Neill et al. (2018) have found that no country has yet met the needs of its population using only their fair share of global resources. The authors also argue that the ecologically safe and socially just space for humanity may be vanishingly thin (O'Neill et al., 2018). To move closer to the safe and just zone, the authors propose focusing on sufficiency in resource consumption since significant reductions could be made without impacting social outcomes in wealthy nations (O'Neill et al., 2018). Consider the following quote, which substantiates the arguments made throughout this thesis: "A focus on sufficiency would involve recognizing that overconsumption burdens societies with a variety of social and environmental problems, and moving beyond the pursuit of GDP growth to embrace new measures of progress. It

could also involve the pursuit of 'degrowth' in wealthy nations, and the shift towards alternative economic models such as a steady-state economy" (O'Neill et al., 2018). Extending on the analysis of O'Neill et al. (2018), Hickel (2019) has argued that it would be possible to achieve a good life for all without exceeding the Earth's carrying capacity, in all countries, but only if rich countries achieve dramatic 40–50 % reductions in their biophysical footprints. Moreover, Hickel (2019) argues that such reductions are unlikely without complementing efficiency with sufficiency, abandoning growth as a policy objective.

Societies must recognise the risks of growth addiction and work to overcome this harmful dependence, while also recognising that our economies depend in many ways on the Earth's limited resources and its ecosystem services which have fundamentally limited rates of renewal (Costanza et al., 1997; IPBES, 2019a). After this recognition is achieved, the core challenge is to adapt the socioeconomic sub-systems so that they are capable of keeping the economic throughput of matter-energy in balance with the limits of the natural system at all times. It is vitally important to recognise that economic systems should be allowed to change. In fact, social and environmental sustainability both require that economic systems can adapt, or can be changed, as needed. The nature of the economic process may change without changing the function of the social system, which is (or should be) to meet people's needs and maintain their wellbeing. I have opted to use the term socio-ecological system throughout this thesis, because it implies that economic systems are a part of social systems, the renewal of which the economy is meant to facilitate. The increasing support for growth agnosticism among experts can help to reinstate the economy in its rightful place as a tool with which other goals can be realised, not an end in itself, which is what the addiction has turned it into over the years.

8.3. Achieving change

We should recognise that people exist and play their parts within a context of structural incentives, pressures and constraints, often without recognizing what system goals their actions are serving (Meadows, 1999) or what the indirect consequences of those actions are. The problem is not that people are "bad" or that they do not value nature enough, the problem is not human nature, it is that people value the familiar socioeconomic structures on which they rely, which reward and reinforce self-serving and short-sighted behaviour that has harmful systemic consequences. Ecologically maladjusted cultural values and behaviours have coevolved with the ecologically maladjusted socioeconomic structures and supporting them may not be a conscious decision. As the authors of the

IPBES global assessment report on biodiversity and ecosystem services recognised: “Decisions – made at the individual or institutional level and at different scales – are necessarily embedded in a given value system, historically rooted in the socio-cultural context and power relations; yet, such value systems may not be explicitly reflected upon” (IPBES, 2019b).

In addition to material needs, the psychological needs and worldviews of people and businesses are also tied to the status quo, which has created a “social logic of consumerism” and materialism (Jackson, 2009). As (Jackson, 2009) has written, “The culture of consumerism is conveyed through institutions, the media, social norms and a host of subtle and not so subtle signals encouraging people to express themselves, seek identity and search for meaning through material goods.” Questioning ingrained worldviews can be painful and lead to denialism and opposition, which is why “Fixing the economy is only part of the problem. Addressing the social logic of consumerism is also vital” (Jackson, 2009).

Overcoming societal growth addictions would allow societies to take advantage of the two highest leverage points for change, the first being societal goals, which can lead and motivate transformation, and the second being structural goals, which relate to the underlying structural causes of problems (Chapter 2, Figure 2). Changing societal goals would mean collectively redefining what it means to lead a good life within planetary boundaries and how people relate to each other. It means questioning whether or not our lives should be preoccupied with social comparisons, status competition, profit maximisation, materialism, conspicuous consumption, and individualism, or would it be more beneficial to find meaning in modesty, sharing, cooperation, empathy, equality, and community. To some this might seem alien in today’s competitive market economies, but in many ways it speaks to the traditional values held virtuous in many countries before the great acceleration of the Anthropocene (Soinne, 2018; Wilkinson and Pickett, 2009). Because this new worldview can directly improve the wellbeing of individuals, families, and communities, it can help drive bottom-up demand for post-growth. In fact, this is already occurring to some extent through the downshifting phenomenon, despite opposing structural incentives, with people intentionally reducing their work hours and consumption to improve their quality of life (Investopedia, 2021). Overcoming societal growth imperatives could make it much easier for more people to voluntarily join this trend.

These days most policies (implemented or suggested) focus on actions such as switching to electric cars, encouraging consumers to prefer local produce, or investing in the development and uptake of green technology, for example. In other words, they mostly aim to address threats and pressures, or sometimes the drivers of negative system outcomes, without considering the underlying causes that work against sustainable choices and restrict the available solution space. Consequently, the solutions

fail to address consumerism, the fossil fuel industry continues to be subsidised, and cheaper ecologically harmful products continue to be imported, shifting burdens abroad. By overcoming the societal addiction to growth, it would be possible to consider transformative actions such as: (1) consuming less and sharing more, which would help reduce resource and energy demand directly while also increasing use-efficiency, (2) limiting harmful advertising that pressures people to consume, (3) ending subsidies to harmful sectors of the economy, (4) sharing workloads to facilitate lower rates of unemployment, (5) achieving a more just distribution of income and wealth, and (5) internalising externalities and correcting telecouplings through ecological taxation and the establishment of strong ecological border adjustment mechanisms. The last point is particularly relevant for targeted transformational change, as global trade impedes the application of effective domestic policies in growth dependent high-income countries, while also impeding the development of lower income countries through burden shifting and unfair appropriation of resources (Dorninger et al., 2021).

Through policies like these and new social norms that facilitate sharing and downshifting while guaranteeing adequate social protections, unsustainable production and consumption could be reduced while incentivising the economic development towards sharing and increased circularity. The discomfort and pain of changing worldviews away from the deeply ingrained culture of consumerism and materialism will need to be carefully managed during the transition, with investments to education and awareness-raising. With empathy and the iron law of politics in mind, the frameworks will also need to pre-emptively mitigate the opposition created by those communities, businesses, and vested interests that will lose their traditional or long-established livelihoods, status, competitiveness, or even whole markets, as the inevitable consequence of socioeconomic transformation. Of particular importance is to consider the difficulties of transitioning large fractions of the workforce to new labour roles. The transition into a post-growth system could be designed to be gradual to facilitate the needed shifts in employment, production and consumption habits (Victor, 2019).

The growth imperatives cannot be reduced without addressing income and job security (Jackson, 2009; Victor, 2019). Therefore, the main challenge associated with reducing consumption-growth and trade to sustainable levels is to simultaneously ensure the security of employment and income, and the sufficient supply of food, clean energy, and other basic needs. In addition, the transformational policy frameworks will need to ensure sufficient sources of government revenue when aggregate production and consumption are reduced, to enable the needed investments in ecologically sustainable production and infrastructure. Critical discussion of public finance is needed, from tax reforms to new ways of understanding public debt. In the latter case, lessons could be drawn from discussions that seriously consider the tenets of Modern Monetary Theory (Kelton, 2021).

One factor that can help scholars find consensus on future pathways is the fact that there is a fair amount of overlap in the policy proposals of green growth and post-growth advocates, despite some key differences. For example, disagreements might arise with policies such as central bank funding and work time reductions, when they directly conflict with the growth objective. This is natural and will doubtless continue to be an important area of future research and discussion, as consensus on post-growth continues to form. While addressing these disagreements is important, it is equally important to recognise common ground and shared objectives.

As the workshop panellists recognised, the terms used to describe the desired future can have an important role in directing the discussions. Promisingly, alternative terms to "green growth" are often used these days, such as "green economy" or "circular economy". This may be beneficial for finding common ground among scholars since these concepts can more easily allow the redirection of priorities away from growth. For example, the UNEP has stated that "An Inclusive Green Economy is an alternative to today's dominant economic model, which generates widespread environmental and health risks, encourages wasteful consumption and production, drives ecological and resource scarcities and results in inequality" (UNEP, 2020b). This is not too far off from the arguments presented in the degrowth literature, which is just more explicit about the underlying assumptions, risks, and empirical realities surrounding economic growth and its environmental and social impacts. Likewise, the terms "wellbeing economy" or "moderation economy", or the "eco-welfare economy" (Chapter 6), which are terms used to refer to post-growth systems, could facilitate scholars to find common ground easier than the terms degrowth or post-growth.

My results demonstrate that there now exists a high demand for post-growth solutions. Scholars should respond to this demand by focusing more on detailing such solutions and less on criticizing the status-quo. It would also be important for scholars from different points of view to respond to the constructive criticism being presented, so that the proponents of green growth would address the risks related to the growth addiction, while post-growth proponents would elaborate how wellbeing could be safely decoupled from growth in each rich industrialised country, and how it could be made more politically appealing. New post-growth visions tailored to the context of specific countries need to be created, and these efforts can build on the approach of my workshop. When guiding the transformation of societies away from growth addiction, my blueprint could also be used to demonstrate how transformations could be approached strategically.

8.4. Limitations

When interpreting the results of this thesis, it is necessary to acknowledge some limitations (see also Chapter 3). Some of these considerations can also help improve future research efforts. First of all, the expert perspectives evaluated through the global survey are those of sustainability scholars from around the world, but due to the publication output of each region, there is a bias towards scholars from high-income countries. Furthermore, the results only reflect the opinions of those scholars who decided to respond and complete the survey. A self-selection bias may thus exist, as is common in survey studies of this kind (Drews and van den Bergh, 2017). It is also worth to note that as the workshop discussions made clear, interpreting what the preferred future GDP rates mean is complicated by various assumptions that can influence those rates, including the extent and impact of green investments, for example, and thus need to be interpreted with care.

The workshop results in turn reflect the views of a group of Finnish experts who were already knowledgeable of sustainability and interested in post-growth. The workshop should therefore be seen as the first step on which more inclusive and future deliberations can build on. Restricting the workshop participants to experts interested in the post-growth economy reduced the risk of the workshop derailing due to the need to resolve fundamental disagreements and assumptions related to the topic. This approach allowed the panel to focus instead on envisioning what the future after growth might look like and how it could be achieved in Finland, which was the main purpose of this study. Achieving a broader consensus among researchers would probably require some groundwork and a much longer process, which was also the view of the panel. This workshop tested whether consensus could first be reached among researchers who have already shown interest in the topic, and my workshop can therefore be seen as a part of the groundwork required to build a broader consensus on post-growth in Finland.

All research involves trade-offs, which in my case were related to keeping the length of the survey and the workshop short enough to encourage participation and to avoid survey fatigue. Many additional questions could have been asked to delve deeper into the reasons behind the expert perspectives, and as such much room still exists for future research. Lastly, I want to emphasise that instead of following the current opinions of sustainability scholars, as reported in this thesis, the choice between agrowth or degrowth for rich industrialised countries should be made based on empirical evidence and modelling. The expert opinions have value in helping to guide and encourage further discussion and research, but they are not immutable nor necessarily “correct”. As science progresses and evidence compiles, the scholarly opinions are likely to change.

8.5. Future research

A number of opportunities for further research can be identified based on my research and the associated discussion. Both the survey and the workshop could be developed and extended. For example, it would be interesting to test whether the results of the global survey would differ if it was directed at the general public – would people from different country income groups also prefer targeted transformational change? How would their preferences compare to those of scholars?

The Delphi workshop could also be extended in two ways. Firstly, it would be highly beneficial to repeat the Delphi study in other country income groups to gain a more detailed idea of how the transformational change should be targeted in each group, according to local experts. Secondly, the inclusivity of the workshop could be increased. Including more stakeholders to the scenario planning process could increase the acceptance of the created visions and proposed changes. The next step would be to seek a broader consensus among scholars from different fields and viewpoints, a sort of societal growth addiction therapy among the therapists, and after this, the therapy should be extended to include other societal groups and stakeholders. Indeed, backcasting studies typically include and address various stakeholders that all play a role in the transition towards the new vision, which is created and detailed to widen perspectives of what the future could be and to "highlight consequences of strategic choices in society (the opening or closing of future options)" (Dreborg, 1996). Belmonte-Ureña et al. (2021) have proposed that future research should look for "creative ways to address the tensions between theory driven degrowth, policy driven green growth and practitioner-driven circular economy; particularly in the context of developing economies". I agree and propose that the Delphi methodology I utilised could provide one creative way to accomplish this.

Furthermore, based on the results of this thesis, I propose that future surveys and workshops should shift their focus on evaluating the issue of growth dependence and reasons for the growth imperatives, instead of focusing on GDP rates. They could also focus more thoroughly on other potential obstacles to change – obstacles for green growth in lower and obstacles for post-growth in higher country income groups. It would be useful to find a way to quantify and measure the growth addiction of countries by creating a growth addiction index, which could be calculated for all countries of the world that have publicly available data on specific economic, social, and environmental variables which relate to the addiction. In addition to evaluating why countries around the world are addicted to growth, this could help inform how close societies may be to being able to overcome their growth reliance.

Future workshops could also benefit greatly from the participatory use of ecological macroeconomic models, which could be used to test various assumptions and the systemic and long-term outcomes of different policy combinations (e.g., D'Alessandro et al., 2020; Jackson and Victor, 2019; Nieto et al., 2020). By testing different post-growth policy frameworks and simulating their potential outcomes for key variables, including employment, inequality, public debt, and carbon emissions, these models can demonstrate secure ways to end the consumption-growth reliance. This could help increase the appeal of the proposed actions among different sectors and stakeholders. In the words of R. Buckminster Fuller: "You never change things by fighting the existing reality. To change something, build a new model that makes the existing model obsolete." Many countries, such as Finland, currently lack such models, and I recognise this as a key area for future research. The IPCC has also discussed how there is currently a scarcity of post-growth climate models, and the future GDP rates preferred by scholars in my global survey could provide an interesting global scenario for such modelling, to see what the global environmental outcomes would be when assuming different rates of future decoupling in different country income groups.

Chapter 9. Conclusions

Scholars have been divided on the question of superseding growth since the time of the classical economists of the 19th century. While Smith and Ricardo saw the prospect of eventual stabilisation as dismal, Mill saw it as an opportunity, as the next step in humanity's development – a chance to improve the art of living, not just the art of getting on (Costanza et al., 2014a; Mill, 1848). Mill wrote that "If the earth must lose that great portion of its pleasantness which it owes to things that the unlimited increase of wealth and population would extirpate from it, for the mere purpose of enabling it to support a larger, but not a better or a happier population, I sincerely hope, for the sake of posterity, that they will be content to be stationary, long before necessity compels them to it" (Mill, 1848). This very same consideration inspired my thesis, the difference being that now humanity does find itself compelled by necessity to transform.

The main focus of this dissertation was to find out how sustainability scholars currently see the future, specifically in terms of future pathways and the future of economic growth for different country income groups, with special focus on high-income countries. Through the global expert survey, I found that most experts think global sustainability may be achieved through targeted transformational change. This means that post-growth pathways, specifically growth agnosticism and low growth rates, should take place in higher country income groups, while lower country income groups focus first on green growth and later increasingly on agrowth. This is one of the key takeaways of this thesis. While most scholars found GDP to be a poor indicator of societal wellbeing and thought that growth would end sooner or later in all country income groups, I found a substantial amount of variation across all contexts in the desired future GDP rates.

My thesis mostly focused on the next two decades, because this is the crucial time period in which the long-held concepts of development and progress need to change in order to achieve balance with the faltering Earth system. The current decade follows the COVID-19 pandemic and precedes the end of the 2030 Agenda for Sustainable Development, and decisive actions must take place during the 2020s for humanity to change course. Meanwhile, the 2030s may be considered as the last decade during which many countries need to achieve carbon neutrality and sufficiently reduce their ecological footprints to mitigate the worst effects of climate change and biodiversity loss.

Since the quest for green or sustainable economic growth seems to be unrealistic and risky (Jackson and Victor, 2019a; Parrique et al., 2019; Vaden et al., 2019), approaches to achieve further efficiency need to be combined with approaches that seek sufficiency. In this way, reductions to the scale of the

economy could help achieve sufficient environment impact reductions, fast enough to avoid surpassing dangerous planetary tipping points (Lenton et al., 2019; Wiedmann et al., 2020). According to the post-growth literature, high-income countries should overcome their societal addictions to growth already during the ongoing decade (Hickel and Kallis, 2019; Jackson and Victor, 2019a). This corroborates the findings from the expert workshop and the global survey.

Societal transformations in high-income countries must now occur in the shadow of pandemic recovery, war, and ongoing global ecological breakdown, but post-growth could help societies respond to all of these crises. Compared to the lower country income groups, economic and employment policies in high-income countries will need to address very different sustainability challenges, focusing particularly on sustainable levels of economic throughput, a just distribution of income and wealth, and the sharing of work. Overcoming the societal addiction to growth would increase the available solution space, allowing for the application of critical policy changes that would internalize externalities, correct telecouplings, and remove harmful behavioural reinforcements (Daly, 2010; Díaz et al., 2019; Dorninger et al., 2021; Jackson, 2009; Richters and Siemoneit, 2019). By showing that the majority of sustainability scholars prefer targeted transformational change, the findings of my thesis can help shift or expand the discourse and policies considered academically and politically acceptable both internationally and in Finland.

This thesis focused on theory of change, global justice, and how to find possible dialogues and leverage points for transformational change. While concrete immediate actions were at times discussed, they were not the main focus of this thesis. If my thesis is successful, its findings will nonetheless make the reader ponder actions through which targeted transformations could be achieved in practice, what other stakeholders beyond academics think about these issues, and how the needed changes could be made socially acceptable in different contexts. These are all worthwhile questions for future research.

Specifically, I found that post-growth scholars need to focus more on detailing the post-growth solutions and less on criticizing the status quo. Scientists have been giving out warnings, but as Costanza et al. (2017) have argued, confrontational warnings and judgements are not an effective way to motivate change when it comes to addictions, and may even prolong the destructive behaviour. Embracing a post-growth path, specifically in high-income countries, could be a safer, less risky, more just, and a more effective way to reduce emissions, resource use, and waste outputs (and to make it easier to achieve those reductions) while maintaining or improving societal wellbeing. This is what should be emphasised.

According to recent research, we should not assume that growth will necessarily continue (Burgess et al., 2021; Jackson, 2019). My findings corroborate these conclusions. Because post-growth in high-income countries may be inevitable due to structural factors, whether it is intended or not, overcoming societal addictions to growth may be argued through the lens of security. When addressing the growth addiction of high-income countries, I identified several risks and costs associated with it, including the (1) uncertainty of future decoupling; (2) uncertain costs related to global environmental problems; (3) ongoing secular stagnation; (4) pressure to lower standards and deregulate; (5) lower resilience against crises; and (6) lower quality of life. Combining the societal addictions framing with risk management could be an effective way to influence political debate and policy making.

The point that emerges from my thesis is that it shouldn't matter what the future GDP will be, as long as environmental impacts are reduced to sustainable levels while wellbeing is secured. This was the conclusion from both the global survey and the workshop. However, it should be emphasised that while growth agnosticism has its benefits, we should not become growth negligent – we must recognize the growth addiction and find cures to it. Indeed, one of the core messages of my thesis is that even though the societal addiction to growth runs deep, it can be overcome. The first step in this process is to acknowledge its existence. This is what was done in the expert workshop. The expert panel estimated Finland's dependence on growth to be high, particularly due to factors related to taxation, the sustainability of public finances, and habits of thought. The panel also estimated that overcoming the addiction would be at least moderately difficult in Finland.

Community Scenario Planning has been proposed as one potential way to facilitate high-income countries to overcome societal addictions (Costanza et al., 2017). Future research could combine Community Scenario Planning with the approach used in my workshop, to create shared socioeconomic post-growth pathways through inclusive deliberations. The narrative vision of a post-growth Finland created in the workshop, and the discussed policies, can also provide a foundation on which further deliberations can build on. In this thesis I also provided clarified definitions for several terms relevant for transformational change discourse and created a new blueprint for transformational change that directs focus to the underlying structural causes of undesired system outcomes. This blueprint helps illustrate how transformational change could be planned and implemented, and it could therefore be used to structure future societal deliberations on transformational change. In addition, future societal deliberations could be further enhanced through the participatory use of ecological macroeconomic simulation models, which can be applied to test and demonstrate the social, ecological, and economic effects of different transformational post-growth policy frameworks (e.g., D'Alessandro et al., 2020; Jackson and Victor, 2019; Nieto et al., 2020).

Testing the policy outcomes through modelling is particularly necessary since a transition into a growth indifferent society would be the first of its kind. So far no country has tested post-growth policy approaches in practice, although several nations now seem open to the idea, including Scotland, Wales, Iceland, New Zealand, and Finland, with many other governments following their lead (WEAll, 2021). I recognise the further development of ecological macroeconomic models as an extremely important area for further research, because these models can help demonstrate secure practical ways for countries to end the consumption-growth reliance, thereby increasing the appeal of the proposed actions and new future visions among people from different viewpoints.

I conclude that the main focus of scholars and decision makers alike should now turn towards overcoming the prevailing societal growth addictions, particularly in high-income countries. While societal dependence on nature cannot be overcome, our dependence on growth can be. This could help societies achieve important environmental goals and sustainable wellbeing, in time.

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Appendices

Appendices included below

Appendix A – Supplementary information about the global survey

Appendix B – Chapter 4 supplementary information

Appendix C – Chapter 5 supplementary information

Appendix D – Global expert survey questions and metadata

Appendix E – Supplementary information about the expert workshop

Appendices available online:

- Data files and R code
- All results from multinomial models
- All results from LMER models

Link and QR-code to Google Drive file folder:

https://drive.google.com/drive/folders/18RbqkPHEOpJIizldoHeOBP3nIiPWLAwE?usp=sharing

Appendix A – Supplementary information about the global survey

Table A1. Out of 8,748 unique publications, 6,281 had at least one citation. However, the percent of papers cited was lower in more recent years. Year refers to the year the paper was published. Publications refers to the number of publications published that year. Cited refers to publications with at least 1 or 20 citations. Percent refers to the percent of publications with at least 1 or 20 citations.

Year(s)	Publications	Cited >0	Percent >0	Cited >19	Percent >19
2015-2018	2,295	2,113	92.1	656	28.6
2019	1,790	1,571	87.8	306	17.1
2020	2,814	1,972	70.1	118	4.2
2021	1,849	625	33.8	3	0.2
Total	8,748	6,281	71.8	1,083	12.4

Table A2. The categorisation of academic fields (expertise).

Options in survey	**Category**	**Code**
Agricultural Sciences	Applied Sciences	AS
Anthropology	Social Sciences	SO
Arts	Humanities	HU
Astronomy	Natural Sciences	NS
Business	Applied Sciences	AS
Chemistry	Natural Sciences	NS
Computer Science	Formal Sciences	FS
Decision Sciences	Social Sciences	SO
Ecological economics	Ecological Economics	EE
Ecological macroeconomics	Ecological Economics	EE
Ecology	Natural Sciences	NS
Econometrics and Finance	Conventional Economics	CE
Energy	Applied Sciences	AS
Engineering	Applied Sciences	AS
Environmental economics	Conventional Economics	CE
Environmental management	Applied Sciences	AS
Environmental Science	Natural Sciences	NS
Genetics	Natural Sciences	NS
Geography	Social Sciences	SO
Health professions	Applied Sciences	AS
History	Humanities	HU
Languages	Humanities	HU
Law	Humanities	HU
Literature	Humanities	HU
Macroeconomics	Conventional Economics	CE

Table continues on the next page.

Table A2. *(Cont.)*

Materials Science	Applied Sciences	AS
Mathematics	Formal Sciences	FS
Medicine	Applied Sciences	AS
Microbiology	Natural Sciences	NS
Microeconomics	Conventional Economics	CE
Molecular biology	Natural Sciences	NS
Neuroscience	Natural Sciences	NS
Pharmacology, Toxicology and Pharmaceutics	Applied Sciences	AS
Philosophy	Humanities	HU
Physics	Natural Sciences	NS
Planetary Science	Natural Sciences	NS
Political science	Social Sciences	SO
Psychology	Social Sciences	SO
Public health	Social Sciences	SO
Sociology	Social Sciences	SO
Space sciences	Natural Sciences	NS
Systems science	Systems science	SS
Technology	Applied Sciences	AS
Theology	Humanities	HU
Veterinary science	Applied Sciences	AS
Applied Sciences, other	Applied Sciences	AS
Economics, other	Conventional Economics	CE
Formal sciences, other	Formal Sciences	FS
Humanities, other	Humanities	HU
Natural sciences, other	Natural Sciences	NS
Social sciences, other	Social Sciences	SO

GLOBAL DISTRIBUTION OF SUSTAINABILITY SCHOLARS

Using the same Scopus search query that I used for the direct invites, and limiting the results to 2015-2021, I was able to export a table which included the number of documents per country. When I did the query (25 Aug 2021), the number of results included the countries of 9,515 documents, with a total of 16,546 identified countries for authors and co-authors. I used this list to calculate the percent of documents in each county, which I used to create Figure A1. This can be compared to Figure A2, which has the same percentage categories but for the response data. It should be noted that this is only a rough comparison since one document with multiple authors can be associated with multiple countries. Moreover, not all scholars in my survey study chose to disclose their country of residence.

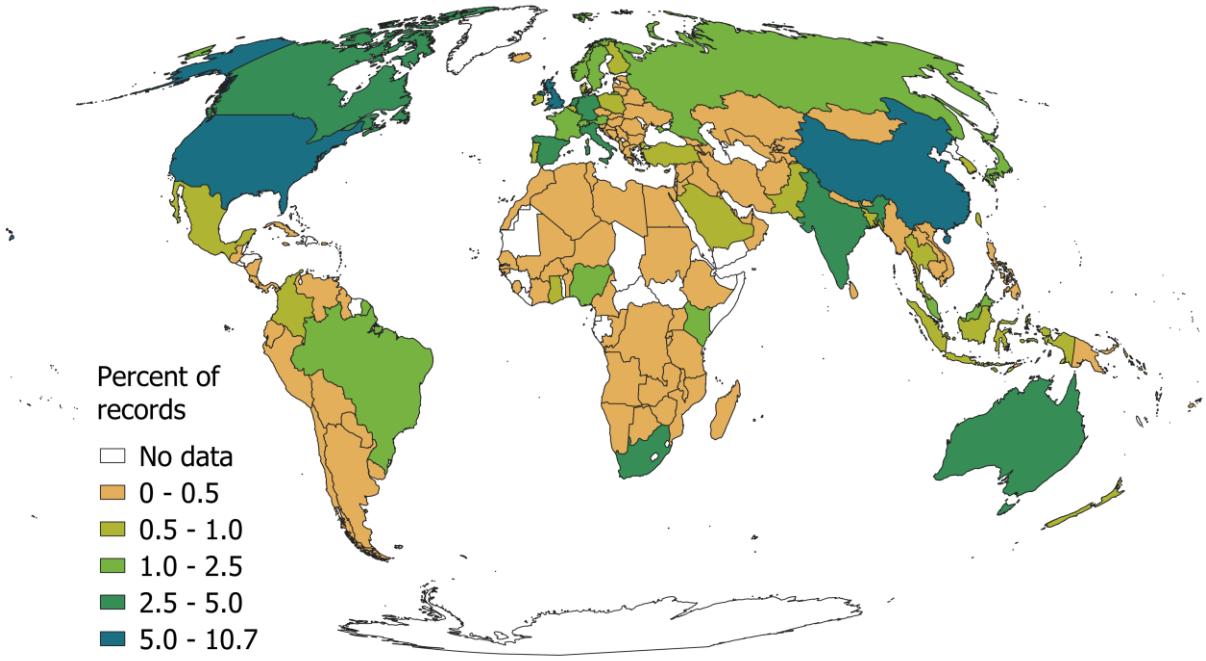


Figure A1. Global distribution of sustainability scholars, based on a Scopus search.

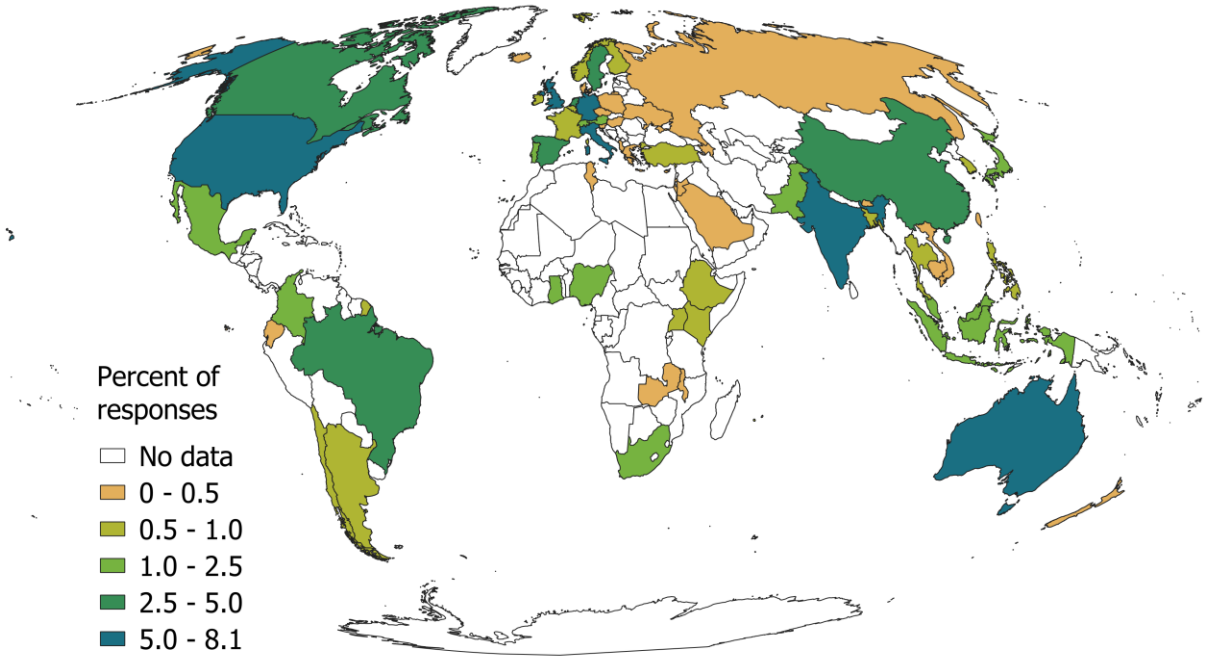


Figure A2. Global distribution of scholars who responded to the survey, using the same percentage categories as in Figure A3 to facilitate comparisons.

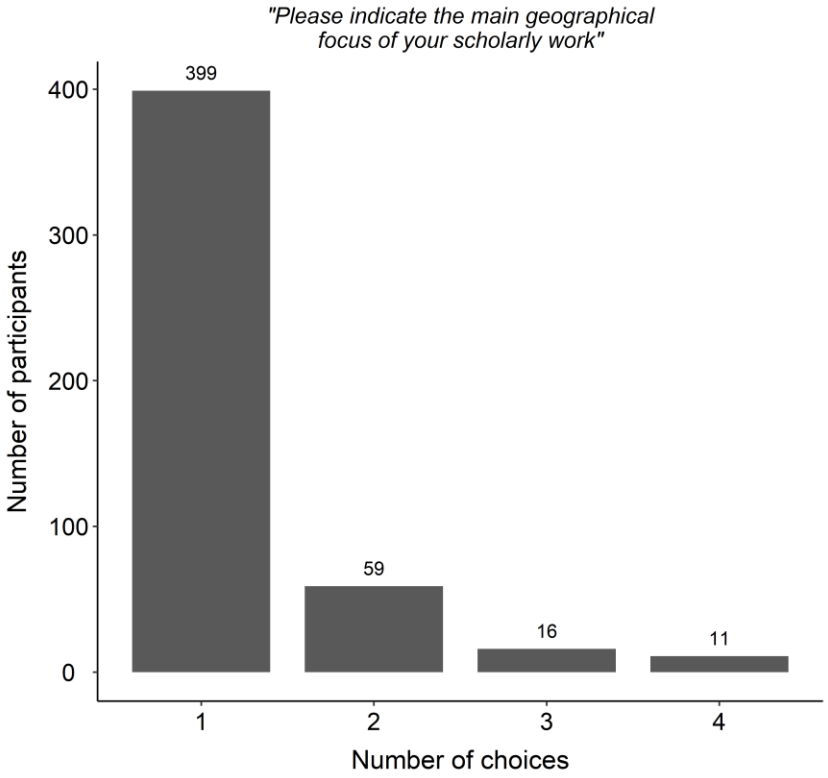


Figure A3. The vast majority of participants selected only one option from the alternatives as their choice for main focus. The multiple-choice options were: High-income, Upper-middle-income, Lower-middle-income, Low-income, Global, Prefer not to say.

DIRECT INVITES

Scopus search with filters

TITLE-ABS-KEY (("sustainable development goals" OR "SDG*")) AND PUBYEAR > 2014 AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "re")) AND (LIMIT-TO (SUBJAREA , "SOCI") OR LIMIT-TO (SUBJAREA , "ENVI") OR LIMIT-TO (SUBJAREA , "ECON") OR LIMIT-TO (SUBJAREA , "EART") OR LIMIT-TO (SUBJAREA , "ARTS") OR LIMIT-TO (SUBJAREA , "MULT") OR LIMIT-TO (SUBJAREA , "DECI"))

INDIRECT INVITES

I did not end up using the responses collected through indirect means due to the small response rate. However, I detail my approach below for the benefit of future research which may learn from my approach and improve upon it.

I identified relevant university affiliations from Scopus by using the same search terms as when I searched for individual authors, but this time I did four searches, one for each country income group, in each case adding relevant country income group identifiers and the names of all countries in the respective group. After removing polytechnics, academies, research centres, and other institutions, only keeping universities, I ranked the universities based on the country income group in which they were located and by the number of documents they had published that mentioned the SDGs. For example, when selecting contact universities for the LI group, I preferred universities located in LI countries over universities from other country income groups, even if the other universities had a higher number of relevant publications for that country income group.

The result was a list of universities ranked by relevance for each country income group. I selected the top 10 most relevant from each group (Figure A1), but because low-income countries only had five relevant universities from unique countries, I filled the remaining five slots with the most relevant universities from the other groups, preferring LMI and UMI over HI. All other groups had enough unique countries with universities, so they all only had universities from the same group. Because HI countries had such a high number of relevant universities, the preference for universities from the same group left out many universities that had published a lot of documents relevant for the SDGs in various country income groups. I decided to treat these as a fifth group, selecting the two most relevant universities for UMI, LMI and LI each (Figure A1). With the same methodology, I also selected contacts from my own university (Figure A1), which I knew to have expertise in Asia and the Pacific.

I identified a total of 430 universities, so selecting the top 10 from each group + 7 resulted in a sample size of around 11% of all identified universities. When searching for the contacts from the universities, I prioritised selecting institutes or centres that stated their focus to be either on sustainability, development, global change, or public policy. If I did not find specialised units, I selected relevant faculties or schools. Then departments, or in the case of some universities in lower income countries, relevant colleges, focusing on economics, environment, and social science.

SEARCH TERMS

Below are the search terms I used to identify relevant institutions from each country income group.

Searches done through Scopus.

After limiting to HI: 1,235 document results

TITLE-ABS-KEY (("sustainable development goals" OR "SDG*") AND ("Aruba" OR "Andorra" OR "United Arab Emirates" OR "Antigua and Barbuda" OR "Australia" OR "Austria" OR "Belgium" OR "Bahrain" OR "Bahamas, The" OR "Bermuda" OR "Barbados" OR "Brunei Darussalam" OR "Canada" OR "Switzerland" OR "Channel Islands" OR "Chile" OR "Curaçao" OR "Cayman Islands" OR "Cyprus" OR "Czech Republic" OR "Germany" OR "Denmark" OR "Spain" OR "Estonia" OR "Finland" OR "France" OR "Faroe Islands" OR "United Kingdom" OR "Gibraltar" OR "Greece" OR "Greenland" OR "Guam" OR "Hong Kong" OR "Croatia" OR "Hungary" OR "Isle of Man" OR "Ireland" OR "Iceland" OR "Israel" OR "Italy" OR "Japan" OR "St. Kitts and Nevis" OR "Korea" OR "Kuwait" OR "Liechtenstein" OR "Lithuania" OR "Luxembourg" OR "Latvia" OR "Macao" OR "St. Martin" OR "Monaco" OR "Malta" OR "Northern Mariana Islands" OR "Mauritius" OR "New Caledonia" OR "Netherlands" OR "Norway" OR "Nauru" OR "New Zealand" OR "Oman" OR "Panama" OR "Palau" OR "Poland" OR "Puerto Rico" OR "Portugal" OR "French Polynesia" OR "Qatar" OR "Romania" OR "Saudi Arabia" OR "Singapore" OR "San Marino" OR "Slovak Republic" OR "Slovenia" OR "Sweden" OR "Sint Maarten" OR "Seychelles" OR "Turks and Caicos Islands" OR "Trinidad and Tobago" OR "Taiwan" OR "Uruguay" OR "United States" OR "British Virgin Islands" OR "Virgin Islands" OR "High-income countr*" OR "High income countr*" OR "High-income nation*" OR "High income nation*")) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "re")) AND (LIMIT-TO (SUBJAREA , "SOCI") OR LIMIT-TO (SUBJAREA , "ENVI") OR LIMIT-TO (SUBJAREA , "ECON") OR LIMIT-TO (SUBJAREA , "EART") OR LIMIT-TO (SUBJAREA , "ARTS") OR LIMIT-TO (SUBJAREA , "MULT") OR LIMIT-TO (SUBJAREA , "DECI")) AND (LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017) OR LIMIT-TO (PUBYEAR , 2016) OR LIMIT-TO (PUBYEAR , 2015))

After limiting to UMI: 1,408 document results

TITLE-ABS-KEY (("sustainable development goals" OR "SDG*") AND ("Albania" OR "Argentina" OR "Armenia" OR "American Samoa" OR "Azerbaijan" OR "Bulgaria" OR "Bosnia and Herzegovina" OR "Belarus" OR "Belize" OR "Brazil" OR "Botswana" OR "China" OR "Colombia" OR "Costa Rica" OR "Cuba" OR "Dominica" OR "Dominican Republic" OR "Ecuador" OR "Fiji" OR "Gabon" OR "Georgia" OR "Equatorial Guinea" OR "Grenada" OR "Guatemala" OR "Guyana" OR "Indonesia" OR "Iran" OR "Iraq" OR "Jamaica" OR "Jordan" OR "Kazakhstan" OR "Lebanon" OR "Libya" OR "St. Lucia" OR "Maldives" OR "Mexico" OR "Marshall Islands" OR "North Macedonia" OR "Montenegro" OR "Malaysia" OR "Namibia" OR "Peru" OR "Paraguay" OR "Russian Federation" OR "Serbia" OR "Suriname" OR

"Thailand" OR "Turkmenistan" OR "Tonga" OR "Turkey" OR "Tuvalu" OR "St. Vincent and the Grenadines" OR "Venezuela" OR "Samoa" OR "Kosovo" OR "South Africa" OR "Upper-middle-income countr*" OR "Upper middle income countr*" OR "Upper-middle-income nation*" OR "Upper middle income nation*")) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "re")) AND (LIMIT-TO (SUBJAREA , "SOCI") OR LIMIT-TO (SUBJAREA , "ENVI") OR LIMIT-TO (SUBJAREA , "ECON") OR LIMIT-TO (SUBJAREA , "EART") OR LIMIT-TO (SUBJAREA , "ARTS") OR LIMIT-TO (SUBJAREA , "MULT") OR LIMIT-TO (SUBJAREA , "DECI")) AND (LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017) OR LIMIT-TO (PUBYEAR , 2016) OR LIMIT-TO (PUBYEAR , 2015))

After limiting to LMI: 1,542 document results

TITLE-ABS-KEY (("sustainable development goals" OR "SDG*") AND ("Angola" OR "Benin" OR "Bangladesh" OR "Bolivia" OR "Bhutan" OR "Ivory Coast" OR "Cameroon" OR "Congo" OR "Comoros" OR "Cabo Verde" OR "Djibouti" OR "Algeria" OR "Egypt" OR "Micronesia" OR "Ghana" OR "Honduras" OR "India" OR "Kenya" OR "Kyrgyz Republic" OR "Cambodia" OR "Kiribati" OR "Lao People's Democratic Republic" OR "Sri Lanka" OR "Lesotho" OR "Morocco" OR "Moldova" OR "Myanmar" OR "Mongolia" OR "Mauritania" OR "Nigeria" OR "Nicaragua" OR "Nepal" OR "Pakistan" OR "Philippines" OR "Papua New Guinea" OR "West Bank and Gaza" OR "Senegal" OR "Solomon Islands" OR "El Salvador" OR "São Tomé and Principe" OR "Eswatini" OR "Timor-Leste" OR "Tunisia" OR "Tanzania" OR "Ukraine" OR "Uzbekistan" OR "Vietnam" OR "Vanuatu" OR "Zambia" OR "Zimbabwe" OR "Lower-middle-income countr*" OR "Lower middle income countr*" OR "Lower-middle-income nation*" OR "Lower middle income nation*")) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "re")) AND (LIMIT-TO (SUBJAREA , "SOCI") OR LIMIT-TO (SUBJAREA , "ENVI") OR LIMIT-TO (SUBJAREA , "ECON") OR LIMIT-TO (SUBJAREA , "EART") OR LIMIT-TO (SUBJAREA , "ARTS") OR LIMIT-TO (SUBJAREA , "MULT") OR LIMIT-TO (SUBJAREA , "DECI")) AND (LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017) OR LIMIT-TO (PUBYEAR , 2016) OR LIMIT-TO (PUBYEAR , 2015))

After limiting to LI: 468 document results

TITLE-ABS-KEY (("sustainable development goals" OR "SDG*") AND ("Afghanistan" OR "Burundi" OR "Burkina Faso" OR "Central African Republic" OR "Congo" OR "Eritrea" OR "Ethiopia" OR "Guinea"

OR "Gambia" OR "Guinea-Bissau" OR "Haiti" OR "Liberia" OR "Madagascar" OR "Mali" OR "Mozambique" OR "Malawi" OR "Niger" OR "Rwanda" OR "Sudan" OR "Sierra Leone" OR "Somalia" OR "South Sudan" OR "Syrian Arab Republic" OR "Chad" OR "Togo" OR "Tajikistan" OR "Uganda" OR "Yemen" OR "Low-income countr*" OR "Low income countr*" OR "Low-income nation*" OR "Low income nation*")) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "re")) AND (LIMIT-TO (SUBJAREA , "SOCI") OR LIMIT-TO (SUBJAREA , "ENVI") OR LIMIT-TO (SUBJAREA , "ECON") OR LIMIT-TO (SUBJAREA , "EART") OR LIMIT-TO (SUBJAREA , "ARTS") OR LIMIT-TO (SUBJAREA , "MULT") OR LIMIT-TO (SUBJAREA , "DECI")) AND (LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017) OR LIMIT-TO (PUBYEAR , 2016) OR LIMIT-TO (PUBYEAR , 2015))

Appendix B – Chapter 4 supplementary information

Table B1. Akaike information criterion comparisons for multinomial models.

Reference	Context	Full model AIC	Custom model AIC	Difference
GG	HI in 2020s	895.70	849.15	-46.55
GG	UMI in 2020s	763.98	744.19	-19.80
GG	LMI in 2020s	854.90	855.62	0.72
GG	LI in 2020s	854.92	819.55	-35.37
GG	HI in 2030s	895.70	849.15	-46.55
GG	UMI in 2030s	763.98	744.19	-19.80
GG	LMI in 2030s	854.90	855.62	0.72
GG	LI in 2030s	854.92	819.55	-35.37
AG	HI in 2020s	916.77	896.95	-19.81
AG	UMI in 2020s	903.83	886.52	-17.31
AG	LMI in 2020s	875.49	867.73	-7.76
AG	LI in 2020s	968.83	938.46	-30.37
AG	HI in 2030s	916.77	896.95	-19.81
AG	UMI in 2030s	903.83	886.52	-17.31
AG	LMI in 2030s	875.48	867.73	-7.75
AG	LI in 2030s	975.98	938.46	-37.52
	Averages	879.7	857.3	-22.5

Table B2. Wilcoxon rank sum tests results for the preferred GDP rates by pathway overall, without considering interaction with group. Comp. specifies the comparison. P refers to pathway. Est. refers to the estimated difference in median (location), which is followed by 95% confidence intervals.

Comp. (P1-P2)	Year	W	N (P1)	N (P2)	Median (P1)	Median (P2)	p	Sig	Est.	Conf. lower	Conf. higher
BAU-GG	2025	61779.5	133	849	3	3	0.080	.	0.30	0.00	0.60
BAU-AG	2025	71720.5	133	710	3	1.4	<0.001	***	1.70	1.40	2.00
BAU-DG	2025	17303	133	152	3	0.3	<0.001	***	2.80	2.40	3.30
GG-AG	2025	439409	849	710	3	1.4	<0.001	***	1.40	1.20	1.50
GG-DG	2025	107889	849	152	3	0.3	<0.001	***	2.50	2.20	2.90
AG-DG	2025	72691.5	710	152	1.4	0.3	<0.001	***	1.10	0.80	1.40
BAU-GG	2030	31680.5	76	689	3.5	2.9	0.003	**	0.70	0.30	1.20
BAU-AG	2030	49688.5	76	831	3.5	1.4	<0.001	***	2.00	1.60	2.50
BAU-DG	2030	15842.5	76	248	3.5	0.5	<0.001	***	3.00	2.50	3.50
GG-AG	2030	405238	689	831	2.9	1.4	<0.001	***	1.30	1.10	1.50
GG-DG	2030	135226	689	248	2.9	0.5	<0.001	***	2.30	2.00	2.60
AG-DG	2030	133734.5	831	248	1.4	0.5	<0.001	***	1.00	0.70	1.20

Table B3. Variable codes and descriptions for Figure 10.

Variable code	Short description	Long description
Age.L	Age (linear)	Linear polynomial of the ordered factor variable Age
Age.Q	Age (quadratic)	Quadratic polynomial of the ordered factor variable Age
Gender_M	Male (/Female)	Male gender, compared to Female.
Level_MSc	MSc (/Dr)	Highest degree or academic position achieved: MSc, compared to Dr.
Level_As.Prof	As. Prof. (/Dr)	″ Associate professor, compared to Dr.
Level_Prof	Prof. (/Dr)	″ Professor, compared to Dr.
C.grouped_UMI	From UMI (/HI)	Country income group of residence of the participant: Upper-middle-income, compared to high-income
C.grouped_LOWER	From LMI or LI (/HI)	″ Lower-middle-income or Low-income
C.grouped_Not	From unknown (/HI)	″ Prefer not to say
C19.inf_Higher	Higher GDP C-19 (/Same)	COVID-19 influence on desired future GDP rates: Those whose responses would have been higher if the COVID-19 pandemic had NOT happened, rather than the same.
C19.inf_Lower	Lower GDP C-19 (/Same)	COVID-19 influence on desired future GDP rates: Those whose responses would have been lower if the COVID-19 pandemic had NOT happened, rather than the same.
Field_AS	Applied Sci. (/Econ.)	Aggregated main field of expertise: Applied sciences compared to Economics.
Field_NS	Natural Sci. (/Econ.)	″ Natural sciences compared to Economics.
Field_SO	Social Sci. (/Econ.)	″ Social sciences compared to Economics.
Field_OTHER	Other fields (/Econ.)	″ Other fields compared to Economics.
Focus_Fo.lo	Focus LI (/HI)	If the main focus of scholarly work is low-Income countries instead of only high-income.
Focus_Fo.hi.lo	Focus HI & LI (/HI)	″ both high and low-Income countries instead of only high-income.
Focus_Fo.g	Focus global (/HI)	″ global instead of only high-income.
GDP.att_-2	GDP very bad (/good)	Attitude towards GDP as an indicator of societal wellbeing. Range from -2 to +2., compared to 1 (those who thought GDP is slightly good).
GDP.att_-1	GDP bad (/good)	″
GDP.att_2	GDP very good (/good)	″

Table continues on the next page.

Table B3. *(Cont.)*

fam.GG.i	GG familiarity index	Index that describes how familiar the participant is with green growth. Weighed as follows: self-assessed familiarity -20%, publishing +100%, course teaching +50%, course attending 0%.
fam.PG.i	PG familiarity index	″ for PG
fam.SDG.i	SDG familiarity index	″ for SDGs
NeverCat_All	End in none (/All)	Categorical variable indicating whether the participant chose that growth would never end in any group (chose Never for all). Compared to those who thought growth would eventually end in each group.
NeverCat_Some	End in some (/All)	Categorical variable indicating whether the participant chose that growth would never end in some groups, but not all. Compared to those who thought growth would eventually end in each group.
Min_<6	<6 min (/10-20)	Categorical variable for the duration it took participants to complete the survey: <6, 6-10, 10-20, 20-30, 30-60, >60 min. Reference category: 10-20 min.
Min_6-10	6-10 min (/10-20)	″
Min_20-30	20-30 min (/10-20)	″
Min_30-60	30-60 min (/10-20)	″
Min_>60	>60 min (/10-20)	″

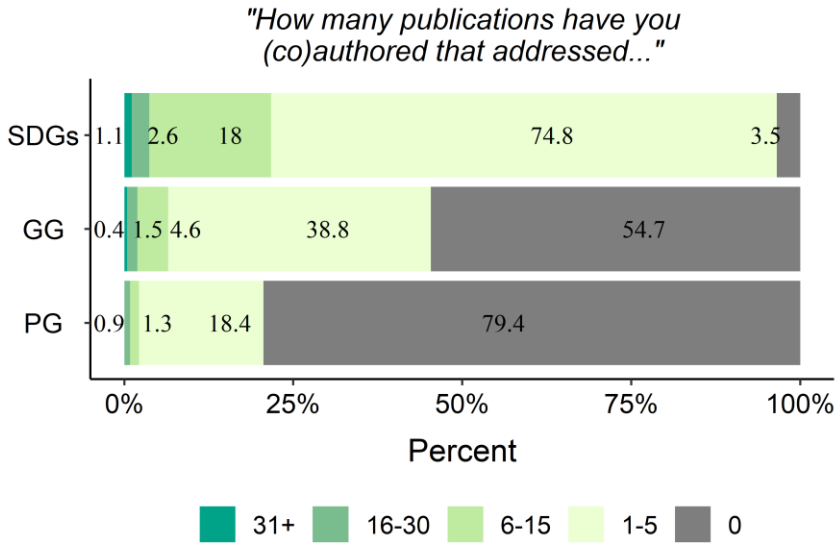


Figure B1. Number of publications addressing the UN Sustainable Development Goals (SDGs), green growth theory (GG) and post-growth theory (PG). N = 461 for each topic.

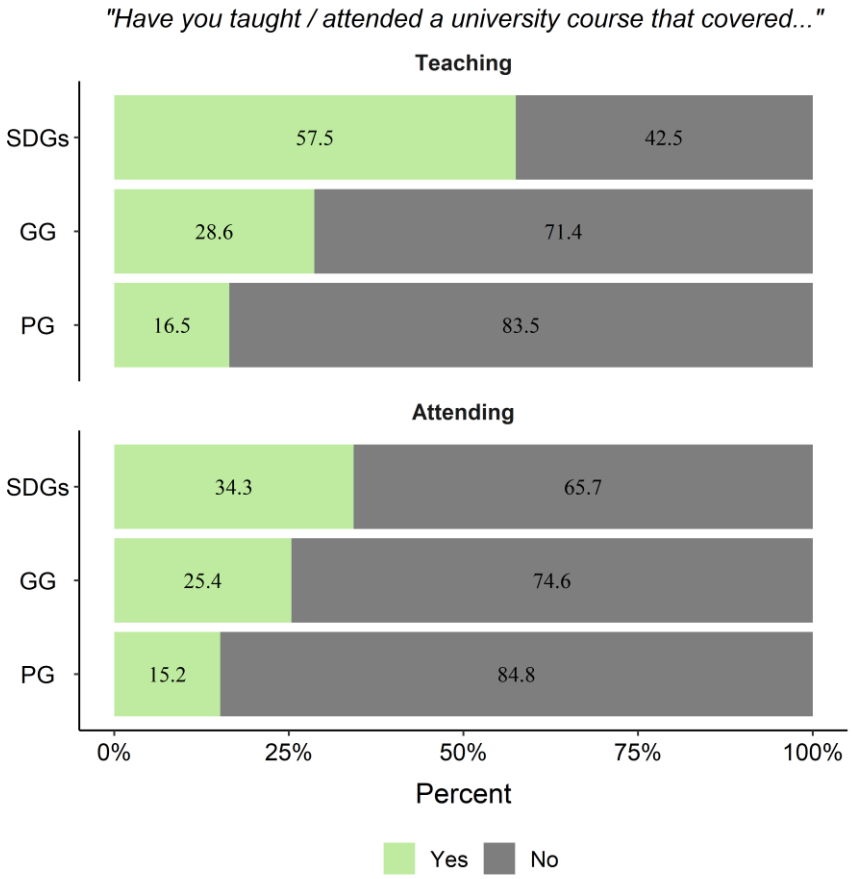


Figure B2. Percent of participants that had either taught or attended courses covering the UN Sustainable Development Goals (SDGs), green growth theory (GG) and post-growth theory (PG). N = 461 for each topic.

Appendix C – Chapter 5 supplementary information

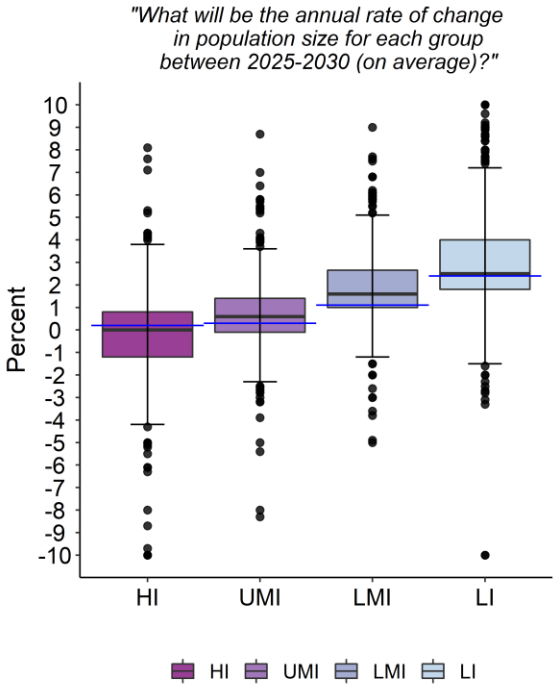


Figure C1. Participant estimates of future population change rates for different country income groups compared to the UN medium fertility variant marked with blue horizontal lines (UN, 2019).

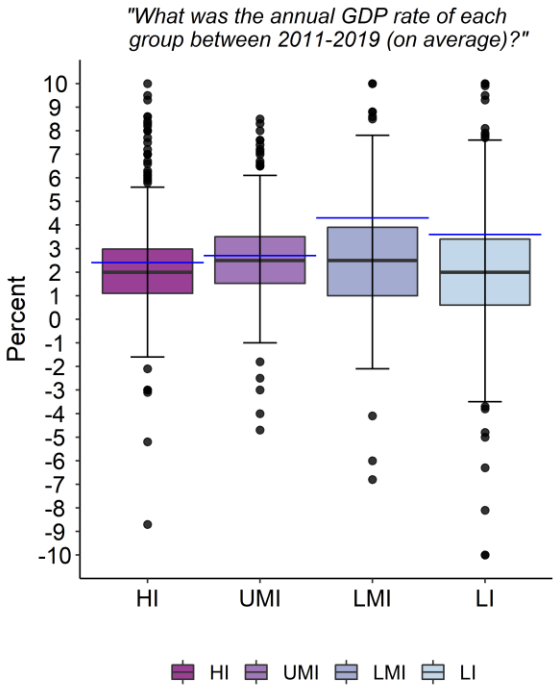


Figure C2. Participant estimates of past GDP rates for different country income groups compared to the historical rates reported by in the International Monetary Fund's (IMF) World Economic Outlook (IMF, 2021).

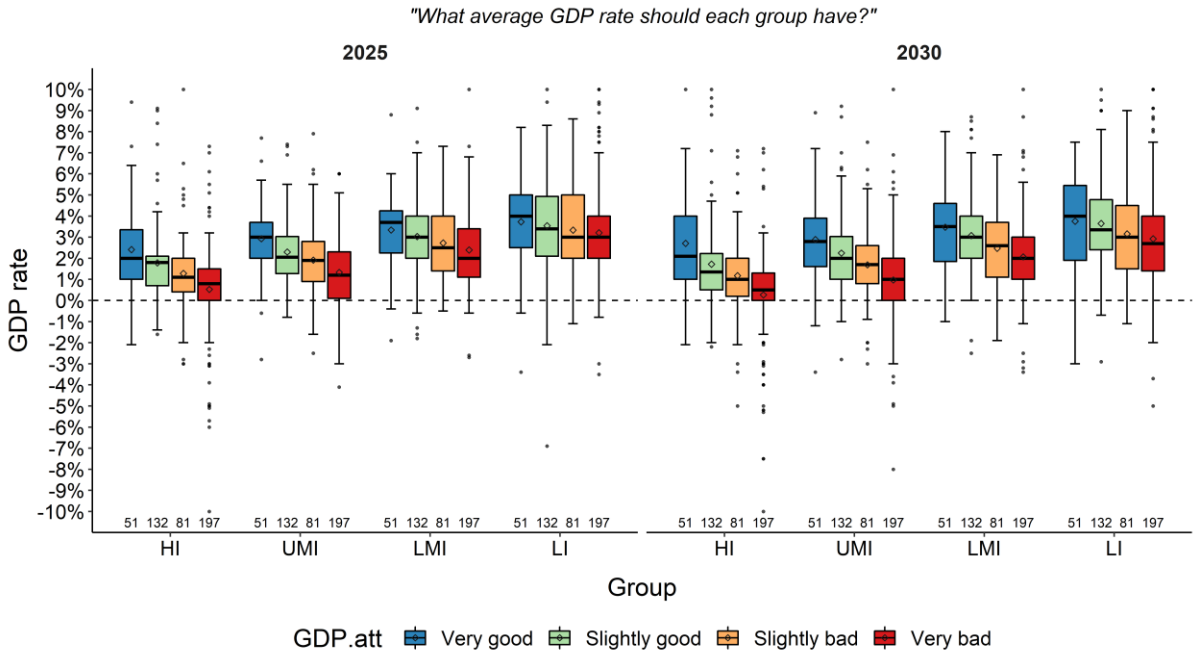


Figure C3. Preferred future GDP rates by group, year, and attitudes towards GDP as an indicator of societal wellbeing.

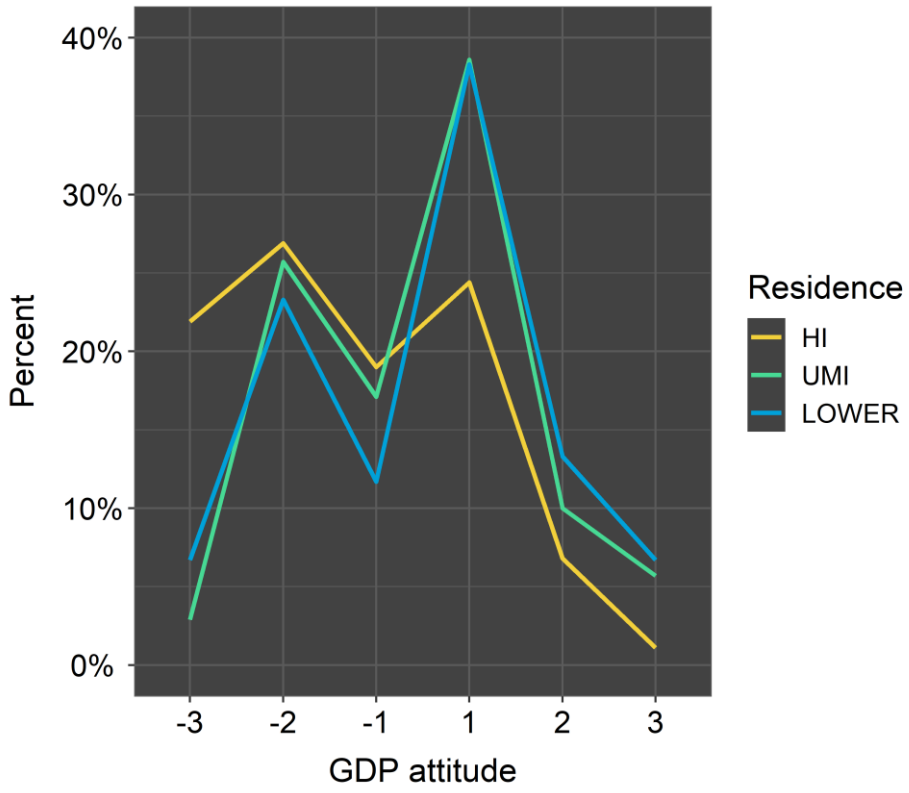


Figure C4. GDP attitudes by country group of residence.

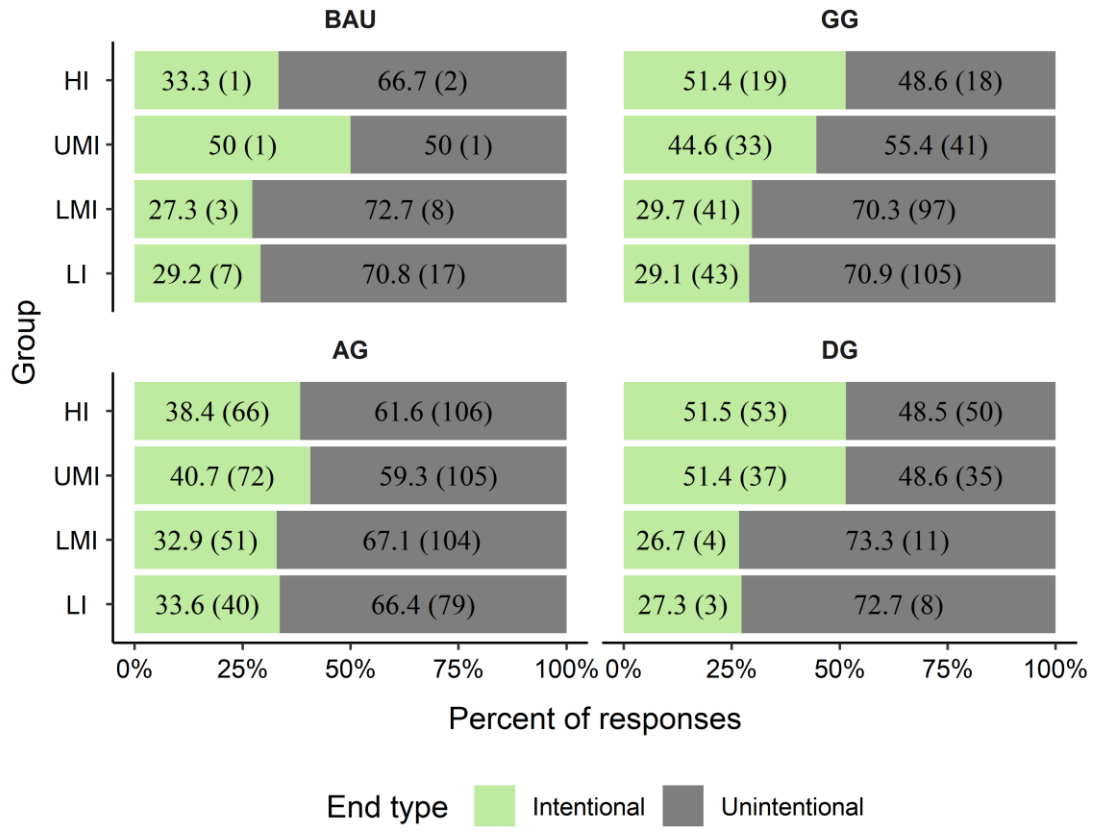


Figure C5. Stacked bar graphs for the intentionality of the end of growth. Numbers outside brackets indicate the percentage and numbers within are the sample size (number of participants who made that choice in that context.

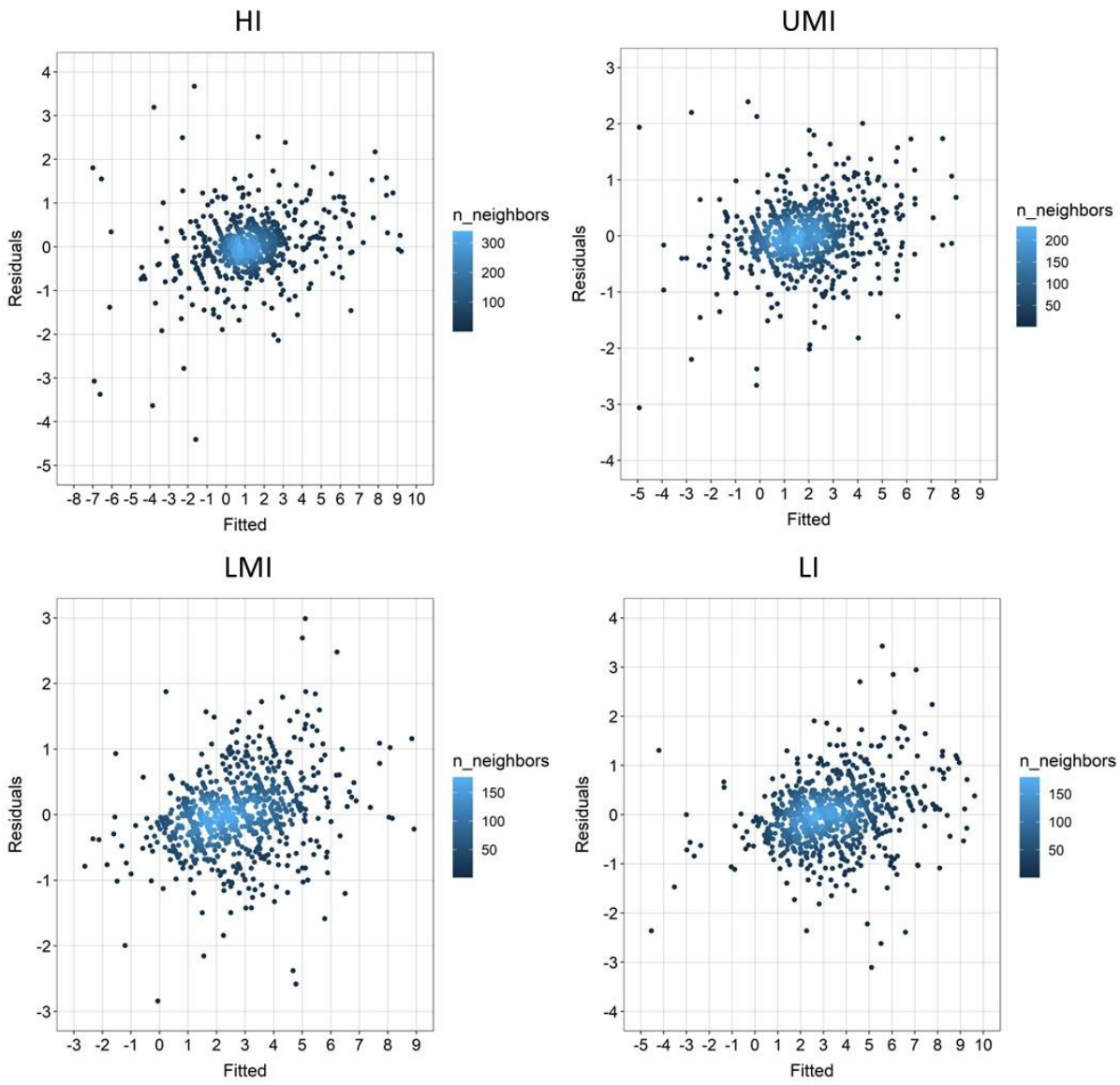


Figure C6. Q-Q plot of residuals for the four LMER models, one per country income group.

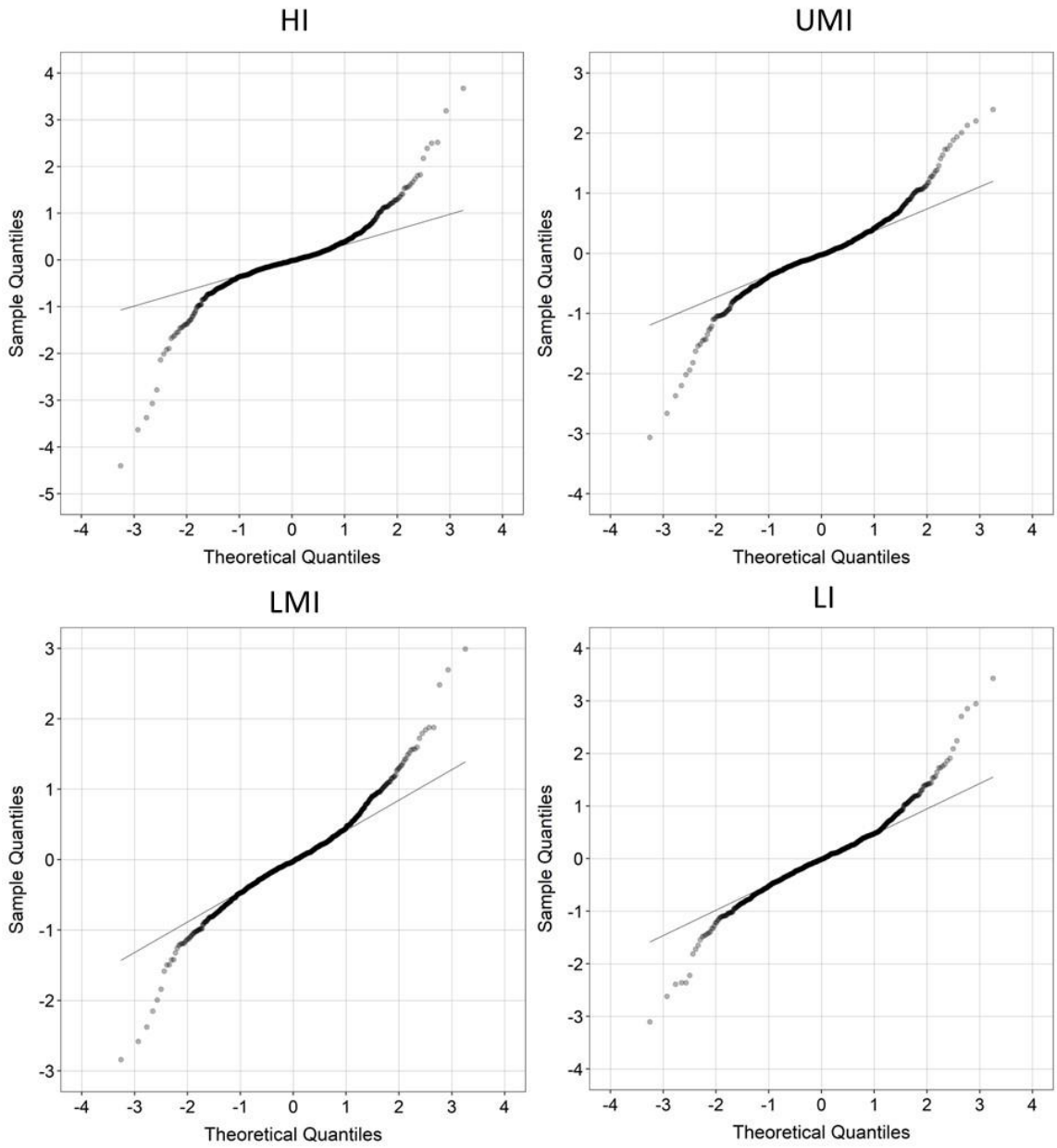


Figure C7. Density plot of residuals v fitted for the four LMER models, one per country income group.

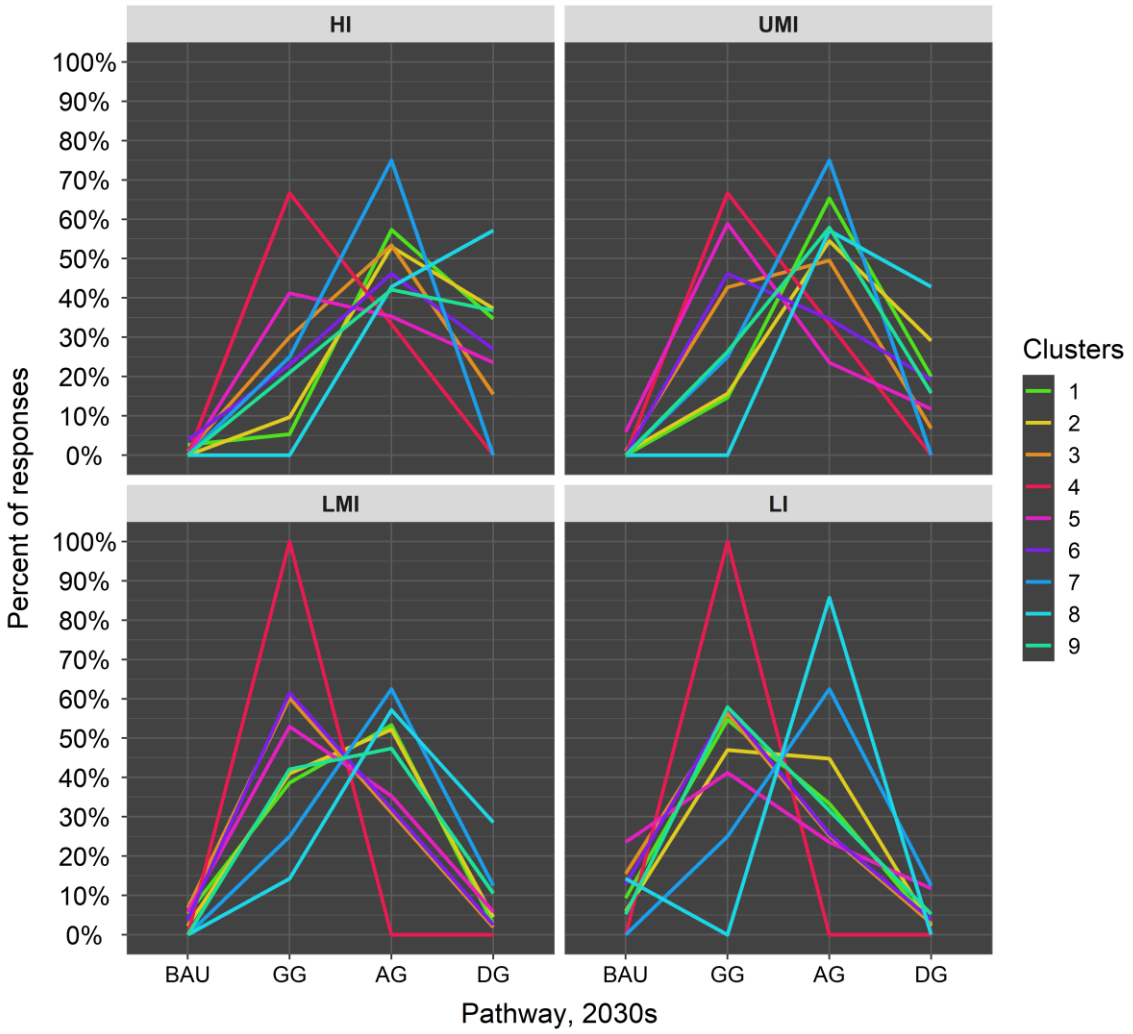


Figure C8. Preferred pathway for the 2030s by cluster.

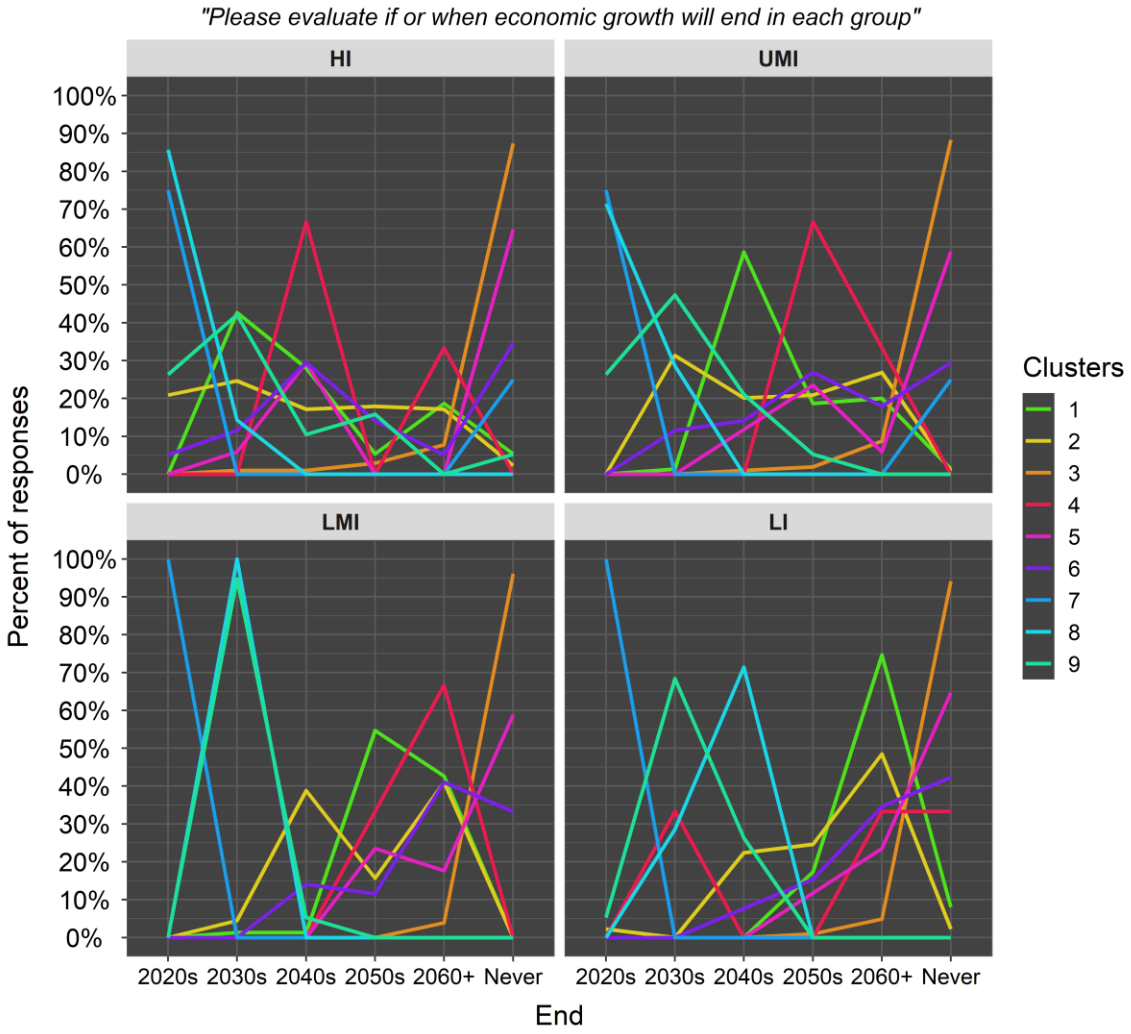


Figure C9. End of economic growth by cluster.

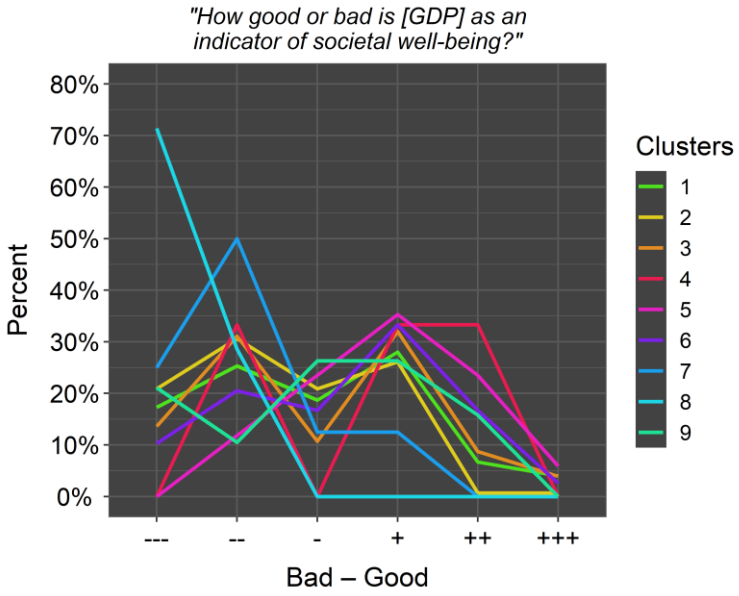


Figure C10. GDP attitudes by cluster.

Appendix D – Global expert survey questions and metadata

SURVEY QUESTIONS

[For this appendix, notes about the survey structure are provided in brackets and underlined]

Expert survey: Achieving sustainability in different country income groups

Thank you for participating. The purpose of this survey is to find out what future pathways scholars think different country income groups should follow for local and global sustainability to be achieved, and what scholars view to be the future of Gross Domestic Product (GDP) in each group.

Your participation is needed to make the study useful, so the survey has been optimised to be as quick and smooth as possible to save your time. The survey takes around 15 minutes to fill. Only close-ended questions are included. The survey is both desktop and mobile friendly.

The survey will close July 29, 2021 (at noon, UTC+0).

A huge thank you in advance to all who choose to respond!

Teemu Koskimäki, PhD candidate.
Ida Kubiszewski, Associate Professor.
Robert Costanza, Professor.Crawford

School of Public Policy, Australian National University.

Anonymity and data protection

The survey is anonymous and you will NOT be identifiable within any published outputs. You can find the full participant information sheet through this link [Google Drive]. If you wish to withdraw from the survey, simply exit the survey without submitting the answers. Incomplete responses will be deleted. Ethics approval

The ethical aspects of this research have been approved by the ANU Human Research Ethics Committee (Protocol 2021/134).

If you have any concerns or complaints about how this research has been conducted, please contact: Ethics Manager

The ANU Human Research Ethics Committee

The Australian National University

Telephone: +61 2 6125 3427

Email: Human.Ethics.Officer@anu.edu.au

What is your age?

17 years old or younger, 18-29, 30-39, 40-49, 50-59, 60 years old or older

[Conditionally appearing section:]

You have selected your age to be 17 or less. If this is correct, you are not eligible to complete this survey.

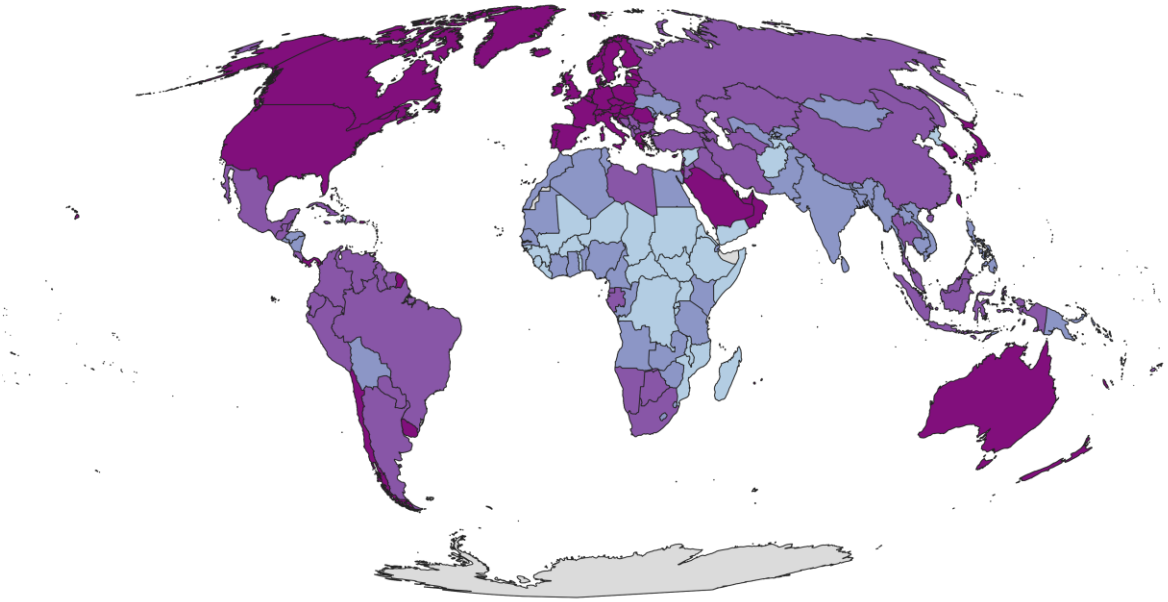
If this is your correct age, please exit the survey by closing it.

If the age is incorrect, please choose the correct age bracket before continuing.

Definitions for key terms, as used in this survey

Country income groups: In this survey, countries are grouped by Gross National Income following the World Bank categories, as defined in the figure below. Gross National Income takes into account country's GDP (domestic output) and net income earned abroad.

You do NOT need to memorise the groups.



Gross Domestic Product (GDP): GDP measures the monetary value of all finished goods and services produced within a country during one year. It indicates changes in the total amount of production and consumption.

Societal wellbeing: Wellbeing is the state of being happy, healthy, and prosperous. This includes the availability of nutrition, employment, and essential man-made and ecological resources and services. We use "societal" to refer to the overall wellbeing of a group of people.

Environmental impacts: The sum of all harmful effects on the environment, whether local or global, that result from human activities in a given country income group. This includes all direct and indirect impacts to ecosystems, biodiversity, and climate.

Section 1: Future pathways to sustainability.

In this section, you are asked to evaluate what future pathways different groups should follow for local and global sustainability to be achieved.

Note: You can see the map of country income groups at the end of this page.

In general, what future pathway should each group follow in this decade (2021–2029)?

	(A) ...focus on increasing GDP to increase societal wellbeing even while environmental impacts increase.	**(B)** ...focus on increasing GDP to increase societal wellbeing while also reducing environmental impacts.	**(C)** ...focus on increasing societal wellbeing directly while also reducing environmental impacts, regardless of what happens to GDP.	**(D)** ...focus on decreasing GDP to reduce environmental impacts, while also directly increasing societal wellbeing.
High-income countries should…	○	○	○	○
Upper-middle-income countries should…	○	○	○	○
Lower-middle-income countries should…	○	○	○	○
Low-income countries should…	○	○	○	○

In general, what future pathway should each group follow during the next decade (2030–2039)?

[Same answer format as above]

[Country income group figure was repeated at the bottom of this page]

Section 2: Gross Domestic Product (GDP)

At the end of this section, you will be asked to estimate desirable future GDP rates for each group.

To help with this task, you will first be asked to roughly estimate future population change rates and past GDP change rates, and to compare your responses to information which will be provided once you have given your own estimates.

The map of country income groups is provided at the end of each page.

Definition of GDP: GDP measures the monetary value of all finished goods and services produced within a country during one year. It indicates changes in the total amount of production and consumption.

Future population rates

What will be the annual rate of change in population size for each group between 2025-2030 (on average)? Please give a rough estimate.

Note: To register a response you need to drag or click the slider, even if you choose zero.

[Answers were given on a slider from -10.0 to +10.0, for each country income group]

[Conditionally appearing section once all four answers had been given:]

After comparing your above responses to the table below, move to the next question. Please do not change your responses.

Average annual rate of population change in the future based on UN medium estimates:

Population change % (annual average)

Group	***2020-2025***	**2025-2030**	***2030-2035***
High	*0.3%*	0.2%	*0.2%*
Upper-mid.	*0.5%*	0.3%	*0.2%*
Lower-mid.	*1.2%*	1.1%	*1.0%*
Low	*2.6%*	2.4%	*2.2%*

[Country income group figure was repeated at the bottom of this page]

Past GDP rates

What was the annual GDP rate of each group between 2011-2019 (on average)? Please give a rough estimate.

[Answers were given on a slider from -10.0 to +10.0, for each country income group]

[Conditionally appearing section once all four answers had been given:]

After comparing your above responses to the table below, move to the next question. Please do not change your responses.

Average historical and present GDP rates based on IMF data from 04/2021. Values for 2020 and 2021 are estimates.

GDP change % (annual average)

Group	2011-2019	2020	2021
High	2.4%	*-7.3%*	*4.4%*
Upper-mid.	2.7%	*-7.2%*	*5.8%*
Lower-mid.	4.3%	*-3.5%*	*3.4%*
Low	3.6%	*-1.0%*	*3.5%*

[Country income group figure was repeated at the bottom of this page]

Future of GDP

Map of groups and the tables with future population and past GDP rates are provided at the end of this page.

What average GDP rate should each group have in the year 2025?

[Answers were given on a slider from -10.0 to +10.0, for each country income group]

What average GDP rate should each group have in the year 2030?

[Answers were given on a slider from -10.0 to +10.0, for each country income group]

[The above tables of past GDP rates and future population rates were repeated at the bottom of the page]

[Country income group figure was repeated at the bottom of this page]

Would your responses in the previous section have been different if the COVID-19 pandemic had NOT happened? And if yes, how?

[Options:]

- No difference, I would have supported the same GDP rates overall.
- I would have supported higher GDP rates overall.
- I would have supported lower GDP rates overall.

Section 3: The future of economic growth.

In this section, you are asked to consider what the future of Gross Domestic Product (GDP) will be in each group.

Please evaluate if or when economic growth will end in each group.

End of economic growth means some year after which the average long-term GDP rate will be 0 % or lower.

	2020s	2030s	2040s	2050s	Sometime beyond 2060	Never
High-income	○	○	○	○	○	○
Upper-middle-income	○	○	○	○	○	○
Lower-middle-income	○	○	○	○	○	○
Low-income	○	○	○	○	○	○

[Country income group figure was repeated at the bottom of this page]

[Conditionally appearing section:]

You responded that economic growth would end in at least one group.

Please specify whether that end will be intentional or not, meaning whether you think it will be the desired and controlled result of purposeful policies.

Select the option that you think best describes the way economic growth will end in the relevant group(s).

The end will be...

[Options, evaluated separately for each country income group:]

- Intentional
- Unintentional

GDP measures the monetary value of production, but how good or bad is it as an indicator of societal wellbeing?

[Options:]

- Extremely good
- Very good
- Slightly good
- Slightly bad
- Very bad
- Extremely bad

[Definition of societal wellbeing was repeated at the end of this page]

Section 4: Familiarity and experience with the UN Sustainable Development Goals (SDGs).

Please rate your familiarity with the SDGs

- Extremely familiar
- Very familiar
- Moderately familiar
- Slightly familiar
- Not familiar at all

How many publications have you (co)authored that addressed the SDGs?

0, 1-5, 6-15, 16-30, 31 or more

Have you taught a university course that covered the SDGs?

Yes, No

Have you attended a university course that covered the SDGs?

Yes, No

Section 5: Familiarity and experience with "green growth" and "post-growth".

Definitions:

In this survey, "green growth" refers to the hypothesis that economic growth can be made environmentally and socially sustainable. We consider "sustainable economic growth" as a green growth approach.

In this survey, "post-growth" refers to the hypothesis that economic growth, or the focus on economic growth, needs to end in order for societies to achieve environmental and social sustainability. We consider both "degrowth" and "agrowth" as post-growth approaches.

Please rate your familiarity with…

...green growth theory

...post-growth theory

[Options for both:]

- Extremely familiar
- Very familiar
- Moderately familiar

- Slightly familiar
- Not familiar at all

How many publications have you (co)authored that addressed…

...green growth

...post-growth

[Options for both:]

0, 1-5, 6-15, 16-30, 31 or more

Have you taught a university course that covered…

...green growth theory

...post-growth theory

[Options for both:]

Yes, No

Have you attended a university course that covered…

...green growth theory

...post-growth theory

[Options for both:]

Yes, No

---

ection 6: Academic and personal information

What is your gender?

Male, Female, Other, Prefer not to say

What is your highest level of educational attainment?

Please state the highest degree/position you have completed/achieved. If your exact degree/position is not listed, please choose the closest option.

No degree, Bachelor's degree, Master's degree, Doctor's degree, Associate professor / Docent, Professor, Prefer not to say

What is your country of residence?

[Dropdown list with 218 options]

What is your main field of expertise?

Choose the closest relevant from the dropdown list below. Listed in alphabetical order

[Dropdown list with 52 options]

Optional: Do you have additional fields of expertise? If not, leave blank.

Additional field 1: [Dropdown list with 52 options]

Additional field 2: [Dropdown list with 52 options]

Additional field 3: [Dropdown list with 52 options]

Please indicate the main geographical focus of your scholarly work, by selecting one or more from the groups below.

- o High-income
- o Upper-middle-income
- o Lower-middle-income
- o Low-income
- o Global
- o Prefer not to say

[Country income group figure was repeated at the bottom of this page]

How did you receive the survey invite?

- o Directly from the authors of the survey.
- o Invite was shared to me by a peer.
- o Invite was shared through my academic institution.

Optional: Feedback

Please use the field below if you have any comments about this survey that you would like us to consider.

[Unlimited character field]

I thank you for your time spent taking this survey. Your response has been recorded.

Please share this survey!

Based on previous global expert surveys, a "snowball" approach can help increase the sample size by as much as 18 %! Please help us increase the reach of this survey by copying the following survey link

and sharing it with your colleagues:You might be interested in this survey, have a look: [link to survey]

Once published, a summary of the findings of this survey will be made available here: https://teemukoskimaki.com/research/summaries Thank you!

[End of survey questions]

VARIABLES IN THE FINAL SURVEY DATA

Table D1. Metadata for all variables in the final survey data. "Derived" data type refers to variables calculated or recategorized based on the other variables, while "Required" indicates that the question could not be skipped in the survey.

Variable	Description	Type
ID	Row number (1–n)	Derived
StartDate	Date the survey response was started.	Derived
EndDate	Date the survey response was finished.	Derived
Reminded	0 = Submitted a response before reminder was sent. 1 = Received a reminder.	Derived
Duration.m	How many minutes the survey response took.	Derived
Finished	Whether the survey response was completed or not.	Derived
ResponseId	Identifying number for the response.	Derived
Invite	How the participant received the survey invite.	Required
Gender	Participant gender.	Required
Age	Participant age group.	Required
Country	Specific country of residence of the participant.	Not required
Residence	Country income group of residence of the participant, aggregated based on the 'Country' variable.	Derived
Level	Highest degree or academic position achieved.	Required
Fam.SDG	Familiarity with the Sustainable Development Goals (SDG).	Required
Pub.SDG	Number of (co)authored publications that addressed the SDGs.	Required
SDG.course.T	Whether or not the participant has taught a university course that covered the SDGs.	Required
SDG.course.A	Whether or not the participant has attended a university course that covered the SDGs.	Required
Fam.GG	Familiarity with Green Growth theory.	Required
Pub.GG	Number of (co)authored publications that addressed Green Growth.	Required
GG.course.T	Whether or not the participant has taught a university course that covered Green Growth theory.	Required
GG.course.A	Whether or not the participant has attended a university course that covered Green Growth theory.	Required
Fam.PG	Familiarity with Post-Growth theory.	Required

Table continues on the next page.

Table D1. *(Cont.)*

Pub.PG	Number of (co)authored publications that addressed Post-Growth.	Required
PG.course.T	Whether or not the participant has taught a university course that covered Post-Growth theory.	Required
PG.course.A	Whether or not the participant has attended a university course that covered Post-Growth theory.	Required
Field.main	Specific main field of expertise, selected from a list.	Required
Field.Add.1	Specific additional field of expertise, selected from a list.	Not required
Field.Add.2	″	Not required
Field.Add.3	″	Not required
Field.main.agg	Main field of expertise, aggregated based on predefined criteria.	Derived
Field.Add.1.agg	Additional field of expertise, aggregated based on predefined criteria.	Derived
Field.Add.2.agg	″	Derived
Field.Add.3.agg	″	Derived
Focus.orig	The main geographical focus of the scholarly work of the participant, multiple choice.	Required
Focus.LI	The main focus of scholarly work was Low-Income (LI) countries	Derived
Focus.LMI	″ Lower-Middle-Income (LMI) countries	Derived
Focus.UMI	″ Upper-Middle-Income (UMI) countries	Derived
Focus.HI	″ High-Income (HI) countries	Derived
Focus.G	″ Global	Derived
Focus.Not	Participant preferred not to disclose the main focus of their scholarly work.	Derived
HI.P.2020	The preferred future pathway that HI countries should follow during the next decade (2021–2029).	Required
UMI.P.2020	″ UMI (2021–2029)	Required
LMI.P.2020	″ LMI (2021–2029)	Required
LI.P.2020	″ LI (2021–2029)	Required
HI.P.2030	″ HI (2030–2039)	Required
UMI.P.2030	″ UMI (2030–2039)	Required
LMI.P.2030	″ LMI (2030–2039)	Required
LI.P.2030	″ LI (2030–2039)	Required
Pop.HI	Rough estimate of future population rates for HI countries. Asked before UN medium estimates were shown for comparison.	Required

Table continues on the next page.

Table D1. *(Cont.)*

Pop.UMI	” UMI	Required
Pop.LMI	” LMI	Required
Pop.LI	” LI	Required
Past.GDP.HI	Rough estimate of past GDP rates for HI countries. Asked before data on historical rates was shown for comparison.	Required
Past.GDP.UMI	” UMI	Required
Past.GDP.LMI	” LMI	Required
Past.GDP.LI	” LI	Required
HI.GDP.2025	The preferred GDP rate (year-on-year percent change) for HI countries for the year 2025.	Required
UMI.GDP.2025	” UMI for 2025	Required
LMI.GDP.2025	” LMI for 2025	Required
LI.GDP.2025	” LI for 2025	Required
HI.GDP.2030	” HI for 2030	Required
UMI.GDP.2030	” UMI for 2030	Required
LMI.GDP.2030	” LMI for 2030	Required
LI.GDP.2030	” LI for 2030	Required
C19.influence	If the GDP rate responses would have been the same, higher, or lower, if the COVID-19 pandemic had NOT happened.	Required
HI.end	If or when economic growth will end in HI countries. End of economic growth means some year after which the average long-term GDP rate will be 0 % or lower.	Required
UMI.end	” UMI	Required
LMI.end	” LMI	Required
LI.end	” LI	Required

Table continues on the next page.

Table D1. *(Cont.)*

HI.end.type	The option the participant thought best describes the way economic growth will end in HI countries, specifically, whether the end will be intentional or not, meaning whether it will be the desired and controlled result of purposeful policies.	Required
UMI.end.type	″ UMI	Required
LMI.end.type	″ LMI	Required
LI.end.type	″ LI	Required
GDP.attitudes	Describes how good or bad participants thought the GDP indicator is as a measure of societal wellbeing. Range from -3 to +3.	Required
NeverCat	Categorical variable indicating whether the participant chose that growth would never end in any group (chose Never for all), in some groups, or in no group (growth would end in each group). Options: All, Some, None.	Derived
Pub.type	Whether the participant had published in GG, PG, both, or neither: GG.only, PG.only, Both.GG.PG, Neither.	Derived
EE.field	1 for participants who had EE as main or additional field	Derived
CE.field	1 for participants who had CE as main or additional field	Derived
Econ.field	Whether the participant had expertise in CE, EE, both, or neither: CE.only, EE.only, Both.CE.EE, Neither	Derived
MinCat	Categorical variable for the duration it took participants to complete the survey: <6, 6-10, 10-20, 20-30, 30-60, >60 min.	Derived
Cluster.k9	Hierarchical clustering result following a FAMD.	Derived
Focus	Categorised main scholarly focus. Fo.hi = Main focus of scholarly work is on the higher country income groups (either only or mainly on HI or UMI). Fo.lo = Main focus of scholarly work is on the lower country income groups (either only or mainly on LMI or LI). Fo.hi.lo = Main focus of scholarly work is on both the higher and the lower country income groups (any combination except all, which was considered to be a global focus). Fo.g = Main focus of scholarly work is only global (excluding those who chose 1-3 specific groups along with global) Fo.not = Those who preferred not to disclose their focus.	Derived

Appendix E – Supplementary information about the expert workshop

Workshop timeline, summary, and questions

[For this appendix, notes about the survey structure are provided in brackets and underlined]

[The questions have been translated from Finnish to English. The questions have original emphasis.]

Week 1:

- Section 1, round 1 – The role of growth in Finland's future.
    - Workshop structure and timetable
    - Section info
    - Commenting in eDelphi
    - Permission to collect data
    - [Survey page 1/8] Definitions for key terms

[Same definitions as used in the global survey excluding country income groups, see Appendix D.]

    - [2/8] Future pathways

[Same question as used in the global survey, but evaluated only for Finland, for three decades: 2021–2030, 2031–2040, and 2041–2050]

    - [3/8] Future GDP

[Question included a figure]

The figure above shows the annual change in the volume of GDP in percentages, as well as the GDP level in euros in Finland historically (real GDP, 2015 prices).

Estimate below for *every five years* what you think would be a *desirable* annual percentage change for Finland's future GDP.

Answer by clicking on the graph below for the years 2025–2050, or by dragging the points on the graph. Choose the percentage change in GDP volume that you think should be desirable for that year.

You can use the interactive scenario tool ◳ [teemukoskimaki.com] to help you answer. The tool visualizes how the percentages you choose would affect the level of GDP in euros.

[Definition of GDP was repeated here]

Note: If you don't know what to answer, you can also give a rough estimate or guess. The answers can be corrected later based on the discussions. The assumption of the question is that Finland will continue to calculate the GDP indicator.

    - [4/8] Future of growth in Finland

When do you think economic growth should end in Finland, if ever?

End of economic growth refers to a year after which the average long-term GDP rate will be 0 % or lower.

Use the slider to roughly estimate the year when you think economic growth should end in Finland.

If you feel that economic growth will never end, choose the past year 2020. If you feel that economic growth should end in 2100 or later, choose 2100.

- [5/8] Future of growth in Finland

How likely and desirable is it that economic growth will be intentionally brought to an end in Finland?

"Intentional" refers to change that is the desired and controlled result of purposeful policies.

The "end" of economic growth refers to a year after which the average long-term GDP rate will be 0 % or lower.

[Evaluated on 2 separate 7-point scales for Probability and Desirability]

[The scale was formatted like this: --- -- - +/- + ++ +++]

- [6/8] Finland's level of growth dependence

How dependent is Finland currently on economic growth?

One of the defining factors of dependence ["riippuvuus" in Finnish] is a lack of control. In terms of societal dependency, this means that stopping or regulating a certain activity is structurally challenging for society and its actors (individuals, companies, communities, etc.).

Growth dependence *measures how challenging it would be for society to meet the needs of citizens and maintain social well-being without economic growth.*

Evaluate the level of growth dependence of present-day Finland below and justify your choice in the comments.

[Evaluated on a 6-point scale ranging from Non-existent to Very high]

- [7/8] Level of support for a post-growth economy in Finland

What percentage of Finns who belong to the following groups are currently supportive of the post-growth economy?

Rounded to the nearest tenth.

[Scale: 0 % – 100 %]

- [8/8] Changing the system

How easy or difficult would it be to change the current system in Finland so that societal wellbeing could be maintained without economic growth?

[Definition of social well-being repeated here]

[Evaluated on a 5-point scale ranging from Not at all difficult to Extremely difficult]

- Background information form

[Evaluated variables: Gender; Age; Academic level (same as used in the global survey); Group (whether the participant belonged to some of the listed Finnish groups that study degrowth and sustainability topics); Areas of expertise (same as used in the global survey); Stakeholder group and area of expertise (evaluated on a 5x8 matrix with the following stakeholder groups: Decision maker, Researcher or Expert, Media or Reporter, Entrepreneur, Investor or Financier, and the following areas of expertise: Environment, Society, Law, Economy, Money, Technology, Domestic policy, Foreign policy.

Week 2:

[This week was focused on reviewing, discussing, and re-evaluating the previous week's responses. The questions were reordered by relevance, based on first round comments.]

- Section 1, round 2 – The role of growth in Finland's future.
    - Info: Reordering of questions to focus and aid the discussion.
    - [Survey page 1/8] Definitions for key terms
    - [new] Defining a post-growth economy

How much do you disagree/agree with the definition below?

In a post-growth economic system, society no longer focuses on the pursuit of economic growth, as society's ability to maintain wellbeing is decoupled from economic growth. Instead of economic growth, society's goal is to improve wellbeing and the state of the environment, as well as to secure overall sustainability.

You can suggest changes to the definition in the comments section.

[I did not present results for this question in the thesis because it ended up not being all that relevant, but the results were as follows: 7 panellists responded. 3 totally agreed, 3 somewhat agreed, and 1 neither agreed nor disagreed with the definition.]

    - [6/8] Finland's level of growth dependence
    - [8/8] Changing the system
    - [2/8] Future pathways
    - [7/8] Level of support for a post-growth economy in Finland
    - [5/8] Future of growth in Finland
    - [4/8] Future of growth in Finland
    - [3/8] Future GDP

Week 3:

- Section 2 – Envisioning a post-growth Finland.
    - Controlled feedback of section 1 results
    - A term for describing the future

What term should the desired [post-growth] **future be called? Select one or more of the options below.**

    - Section info
    - Agenda2030 areas of change

The Agenda2030 roadmap will play a central role in the implementation of Finland's Agenda2030 for sustainable development. In the coming years, the work of the Finnish Sustainable Development Commission will be structured around these areas of change.

The roadmap identifies 6 areas of change:

1. A sustainable food system

2. A sustainable energy system

3. Use of forests, waters, and land to enhance biodiversity and carbon neutrality

4. Sophistication, skills, and sustainable living

5. Welfare, health, and social inclusion

6. Economy and work that foster wellbeing, with sustainable consumption.

Reflect on and comment briefly, how the transition to a post-growth Finland would appear in these areas of change.

- Vision of a moderation economy

Based on the definition below, how much do you disagree/agree with the vision of the moderate economy?

[See Box 3 for the text]

[Evaluated on a 5-point scale ranging from Completely disagree to Completely agree]

- Vision of ecological reconstruction

I have written below a narrative summary of ecological reconstruction based on the BIOS group's plan of ecological reconstruction and their transition policy dashboard. Most of the summary text is directly copied, but the order of the sentences and wording have been changed.

The roughly page-long text below focuses only on those parts of these sources that describe the future. The sources correspond to dozens of pages of text, in which, in addition to envisioning the future, the reasons and means of change are reviewed. The original texts were not written in a narrative form. You can also take advantage of the original sources if you wish.

After reading the vision text, evaluate how much you disagree/agree with it, and describe in the comments section what you think about this narrative vision for Finland. If you wish, you can also suggest changes to the vision text (additions, deletions, refinements).

[See Box 4 for the text]

[Evaluated on a 5-point scale ranging from Completely disagree to Completely agree]

- Familiarity with topics the above three (Figure E1)

How familiar were the topics addressed in this section to you beforehand?

[Evaluated on the following 5-point scale: Never Heard of It, Heard of It, Know a Little, Know a Fair Amount, Know It Well.]

[See Figure E1]

Week 4:

- Section 3 – Envisioning a post-growth Finland.
  - Definitions for key terms

Improvement suggestions were given to the key concept definitions. Below are the updated definitions, taking into account the comments made in the first section.

You can comment on these if you want, but you can also go directly to the next question.

- Controlled feedback of section 2 results
- Section info
- Evaluating practical measures

Estimate how effective the actions listed below would be in terms of transitioning to a moderation economy in Finland.

The actions have been selected from the comments of the previous sections.

[Evaluated on a 6-point scale ranging from Non-existent to Very high, + I cannot say.]

- Influencing Finnish consumption habits

By what means should efforts be made to influence the consumption habits of Finns?

According to the BIOS group: *"Ecological transition requires a drastic reduction of total use and intervention in "externalized" environmental effects. For example, in Finland this means reducing material consumption by about 70–80 % at the national level. The goal is that alongside quantitative reduction (which includes, alongside reducing consumption, various measures to increase reuse, repair and recycling), an equally significant qualitative change occurs away from the most environmentally damaging forms of production and consumption."*

It is therefore necessary to look even more closely at the consumption habits of Finns.

Briefly comment below one or more concrete actions (maximum 5) that should be taken to influence the consumption habits (quantity and quality) of Finns.

- The level and causes of Finland's growth dependence

[This question began with a summary of the discussion about growth dependence from round 1]

After reading the summary, reassess the level of growth dependence in present-day Finland below.

Let us know in the comments if, in your opinion, the discussion is missing essential points that should be taken into account when assessing Finland's dependence on growth.

- The challenges of changing the system

What is the most difficult part of the change in Finland?

In the first section, no consensus was reached on how difficult it would be to change the system in Finland. About 27 % answered somewhat difficult, 40 % moderately, 27 % really, and 7 % extremely difficult.

In the comments, several reasons were raised for what makes the change difficult. The purpose of this question is to clarify the answers by dividing the question into two parts:

1. How difficult would it be to achieve the support of the majority for the idea that Finland should strive for the envisioned moderation economy?

2. How difficult would it be to implement the system change required by the moderate economy in practice after the vision of the moderate economy already had the support of the majority?

Rate the difficulty of the options below.

[Both questions were evaluated on a scale from 0–10]

- Increasing the acceptability of the envisioned future

Evaluate how the acceptability of the moderate economy vision could be increased in Finland...

A) among citizens,

B) among members of parliament / decision-makers,

C) among researchers/experts,

D) among entrepreneurs / investors?

Briefly comment on one or more concrete actions (maximum 5) for each group, that you think could best increase the acceptability.

Bonus question: It has also been mentioned in the comments of the previous sections that the interests of the elites (the rich and privileged class) should also be taken into account in the change. You can also evaluate how the acceptability of the moderate economy vision could be increased among E) elites.

- Feedback of the eDelphi part of the workshop

Please give feedback on how I implemented the eDelphi section of the survey.

Answer the questions and then, if you wish, give open feedback via the comment section below. Answers and comments are not visible to other panelists.

What do you think about the following statements?

[See Figure 8 for the statements and results]

Week 5:

- Additional week for responding and discussing section 3.

End seminar via Zoom

- Controlled feedback for all sections.

Supplementary workshop result figure

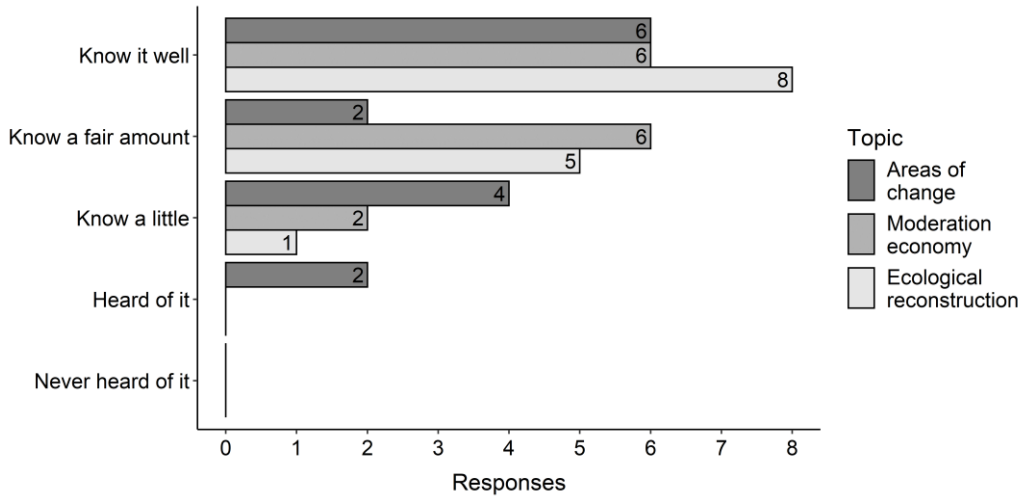


Figure E1. Panellists' answers to the question, "How familiar were you with the topics in this section before attending this workshop?" Based on this self-evaluation, the panellists were most familiar with ecological reconstruction (mean 3.50, SD 0.65; with "Never heard of it" being 0 and "Know it well" being 4), second most with moderation economy (mean 3.29, SD 0.73) and least familiar with the areas of change of the Agenda2030 roadmap (mean 2.86, SD 1.17).