How Gradualist Are Chinese Reforms? Evidence from Rural Income Determinants[*]

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Abstract

Gradualist reform (GR) is a strategy that implements partial and incremental reforms at the beginning but gradually deepens the reforms over time. Using income determinants in rural China as the measure of the GR hypothesis, this paper provides a direct test of the widely accepted claim that China has followed a GR strategy. In the sense that reform deepens, production factors should become more important income determinants over time. Our difference-in-difference analysis, based on a large panel dataset from fixed-site rural surveys conducted between 1986 and 2002, shows that the efficiency of return to production factors deteriorated over time instead. Households that had more production resources, such as land and labor, or that devoted more labor and time to entrepreneurial activities experienced better income growth in the 1980s, but households with better political status did so in the 1990s. Further difference-in-difference analyses show that these income patterns are related to an inefficient credit allocation due to government interference in the 1990s comparing to market mechanisms in the 1980s. Overall, the empirical evidence on the income determinants and the explanation through finance do not support the GR hypothesis on China's reform path.

1. Introduction

One of the most widely accepted interpretations of Chinese reforms is that China has followed a gradualist reform (GR) strategy. A GR strategy is characterized by two prominent features. One is incrementalism; that is, reforms first start in partial and incremental steps but over time they accelerate both in pace and in scope. The other is sequentialism; that is, reforms are launched in a sequential order such that early reforms reduce the costs of later reforms. China's impressive GDP growth has led to a near consensus among economists that the GR strategy is superior to its closest intellectual and policy rival, the shock therapy adopted by post-socialist Eastern Europe and Russia. Wei (1997), for example, listed the following benefits of GR strategy: political feasibility, lower social costs, economizing policy makers' cognitive capabilities, and optimizing the timing and sequential order of reforms.

Our paper does not revisit these normative discussions on GR strategy. Instead, it asks a basic factual question: "Does a GR interpretation of Chinese reforms accurately characterize the pace and nature of Chinese economic reforms since 1978?" To make our exploration tractable, we focused on income growth patterns in rural China; specifically, whether income growth was consistent with a GR hypotheses. As the GR strategy suggests the development of more market-based mechanisms and the lessening of government control as reform deepens, it hypothesizes that income growth should be related more to production inputs (market-driven) than political relation (state control) over time.

Our data is based a large panel of fixed site rural surveys between 1986 and 2002, with gaps in year 1992-1994, covering 67,031 households. We include labor, land, entrepreneurial activities, credit access and political relationships in the income determinants to account for the fact that Chinese rural residents' income derives mainly from four areas: labor income, land income, business income, and government transfer payments. We apply a difference-in-difference approach to explain various measures of income and income growth in rural households by the above-mentioned factors and a change in their deterministic effects over two periods: the 1980s and the 1990s.

Four sets of empirical evidence emerge from the analyses. First, income growth is higher in the 1980s than in the 1990s. Second, production factors have a significant deterministic effect on income growth in the 1980s but much less in the 1990s. Third, households' political status has no effect on income growth in the 1980s but a significant one in the 1990s. Finally, production factors losing deterministic effect on income is most evident for bank loans – our measure of capital credits as a production factor. Further analysis attributes the fourth income pattern to an inefficiency in credit allocation in the 1990s that favors on political status rather than economic performance. This evidence contradicts the GR hypothesis and suggests a reversal and deterioration of market mechanisms in playing the role of allocating resources and supporting income growth.

Applying the GR strategy to the financial area, we would expect an advancement of financial development and market oriented capital allocation over time. Using the same

panel of fixed-site rural surveys, Qian and Huang (2016) detail how credit allocation became less market oriented in rural China from the 1980s to the 1990s. In the 1980s, credit allocation in rural areas largely followed market mechanisms supporting households to transit out of agriculture, while in the 1990s credits went to households endowed with favored political status. This paper shows that the deterioration in bank credit allocation efficiency is indeed related to the deterioration of market-based income determination from the 1980s to the 1990s. Although both papers examine the evolution of the market mechanism in the rural economy of China during the 1980s and the 1990s, this paper distinctly differs from Qian and Huang (2016) and is much more closely tied to the debates in the finance and growth literature. Whereas Qian and Huang (2016) focuses on deterioration of credit access credit access and, moreover, the causes of the financial reversal, this paper focuses on how income growth rewards production inputs and hence completes the circle by showing that the deterioration of credit allocation affects the real economy growth, specifically income growth and its determinants.

In the development economic area, there is already an accumulated body of case evidence that GR strategy may not be an accurate characterization of Chinese reforms. Land reform is one of many examples. Chinese rural reforms started in 1978 with the granting of long-term contracting rights over state-owned land to farmers. A logical progression of contracting reforms is the privatization of land titles; a step the Chinese government has explicitly ruled out. A better example of GR strategy is Vietnam. Vietnam started out in 1986 with the exactly the same contracting reforms as China did

in 1978, but, unlike China, Vietnam also privatized land revenue rights in 1993. Institutional changes that aim to promote market mechanism are the key measures for the progress of economic reform (Lenger 2008) and China, unlike Vietnam, has fallen short of implementing the predicted changes in land ownership.

Fiscal reform is another example. A well-known reform experiment involved delegating fiscal authority to local governments through a contractual arrangement between the central government and local governments. This initially modest step was heralded by economists as leading to broad institutional reforms—known as "federalism, Chinese style"—that supposedly would lead to a hardening of budget constraints and an evolution toward more fiscal accountability and transparency at the local level. There is one problem with this interpretation: the Chinese government moved to recentralize the fiscal system and reversed the reforms by eliminating the contracting arrangements in 1994, one year before the paper that coined the concept of "federalism, Chinese style" was published (Montinola, Qian and Weingast 1995).

Previous research that challenges the GR interpretation of Chinese reforms is primarily qualitative in nature and based on case analytics (Huang 2008). Our paper offers a more systematic analysis and draws from a large-scale panel dataset based on fixed rural site surveys conducted annually between 1986 and 2002 (with a gap in 1992 and 1994). Much of the research by economists, including research that led to the formulation of the GR strategy, is based on data available since the 1990s. To the best of our knowledge, this paper is among the first few to formulate an interpretation of

China's reform strategy on the basis of long time-series data dating back to the 1980s rather than an assumption.

We acknowledge at the outset that our findings are limited to income determinant patterns in rural China and, as such, our findings should not be mechanically extrapolated to other areas of Chinese economy (such as external trade and investment policies and privatization). That said, it should be noted that rural reforms played an important role in economists' formulation of the GR strategy account of China. Naughton (1996) argued that the sequential order of first implementing rural reforms in the 1980s and following up with urban reforms in the 1990s is one of the defining features of Chinese reforms. However, since the main merit of reform is marketization, if evidence of intra-sectoral gradualism is absent, evidence of inter-sectoral gradualism is doubtful to exist and hence careful examination is required.

In addition to the central role of rural reform in China's economic development, another reason we focus on rural China is its economic importance. Even today, China's rural population is sizable. By residence, rural population accounts for around 50% of the Chinese population, and by their legal registration status (the so-called *hukou* system) the rural share of population can be even higher. The a2015 survey of migrant workers by the National Bureau of Statistics of China revealed that there are 277 million rural migrants who work in cities but retained their rural legal status.[1] During the

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[1] http://www.stats.gov.cn/tjsj/zxfb/201604/t20160428_1349713.html

period of our survey data, that is, the 1980s and the 1990s, rural China was even more important than it is today.

Rural China is a significant—although seldom acknowledged—factor behind many of the policy discussions on Chinese economy, although these topics are beyond the scope of our paper. This paper documents a reversal in the market-driven income determination mechanism and a significant slowdown of rural household income in the 1990s. Because the rural share of China's population is large, this slowdown had an immediate impact on its macro-economy. The slowdown of rural household income coincided with China's falling consumption share of GDP and rising external balances; the two root causes behind global rebalancing and China's exchange rate management.

In addition to its relevance to financial reform and emerging market development, our paper is of particular interest to European countries and academics. According to Europe Union (EU) statistics[2] (www.ec.europa.eu), China is the main location in Asia for EU's outward investment, top 10 investors for EU's inward foreign direct investments, and its second largest international trading partner. China's economic reform and political or institutional system risk are therefore of great importance for EU economic stability and growth.

As Cumming, Guariglia, Hou and Lee (2016) note, "China is attracting a surge of interest from academics around the world". This surge includes European academics: the *European Journal of Finance* has published dozens of studies on Chinese capital

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[2] http://ec.europa.eu/eurostat/statistics-explained/index.php/Foreign_direct_investment_statistics

market in recent years which aim to understand China's economic and financial development. Many of these studies closely relate to our theme of examining the economic and financial implications of a market-driven system versus a state-controlled system. For example, Guariglia and Mateut (2013, 2016) and Hsiang-Chun Michael Lin and Hong Bo (2012) closely examined how unfinished market reform, pervasive state ownership and political affiliation affects firms' financing investment decisions. Huyghebaert and Wang (2016) expanded the analysis to a broader set of institutional developments, which capture legal and financial institution reform for marketization. Cumming, Guariglia, Hou and Lee (2014, 2016) noted that "characterizing Chinese firms cannot be well understood without considering the unique institutional environment" and that further work could examine the "history, evolution of financial intermediation, and detailed entrepreneurial finance in China". Our paper, by analyzing the historical data of financing rural entrepreneurs and income growth exactly fills this gap.

The remainder of the paper is organized as follows. Section 2 provides a brief literature review of the GR strategy, finance and growth, and an explanation of empirical predictions and our empirical strategy. Section 3 describes the dataset and section 4 presents the empirical results. Section 5 concludes the paper.

2. Theory and methodology

2.1   Literature review

Our paper relates to two strands of academic literature: transition economics, and finance and growth. Except for a few studies that primarily rely on qualitative data (e.g., bank and policy documents),[3] economists and social scientists have long accepted the view that Chinese reforms have been gradualist and that the rapid growth of the Chinese economy is a result of GR strategy. The proponents of the GR strategy argue that market economy develops best not by revolution but by evolution. Such a strategy is justified on both economic and political grounds (e.g., Wei 1997; Roland 2000). Gradual or incremental reforms are believed to create political and economic complementarities. Politically, economic reforms can engender opposition from vested interest groups and from potential losers from reforms, which often derails first-best reforms. For example, while mass privatization can be justified on efficiency grounds, the political feasibility of this approach is often poor. For this reason, second-best reforms, such as those based on a GR logic, are viewed as superior. A GR strategy, by staging reforms and by making deeper reforms conditional on initial successes, minimizes the political and social costs of transition and incubates political support for further reform (Rodrik 2007).

There is also an economic logic for a GR strategy. Reforms are best implemented endogenously rather than imposed exogenously. Endogenous reforms allow learning by doing and learning from experience and are less onerous on the cognitive

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[3] This comment applies also to Huang's studies (2008, 2012), which are based on document not statistical analysis. Qian and Huang (2016) provide statistical evidence on rural financial development, which does not fully support the GR view.

capabilities of policy makers. Endogenous reforms are also more self-reinforcing. For example, entry liberalization (as opposed to privatization), *motivates* state-owned enterprises (SOEs) to undertake reforms, because the entry of non-state firms reduces SOE profitability and *forces* the SOEs to reform. Naughton (1996) notes the "interconnectedness" of the institutional features of centrally planned economies which makes it possible for reforms to happen by "contagion." "Unhooking a single key connection can cause the entire fabric to unravel" (Naughton 1996, p. 311). One of the most famous examples illustrating gradualism's economic logic is dual-track price reform: farmers can sell a portion of their produce at market price once their plan obligations are fulfilled. This alternative to full price liberalization is claimed to be effective because it is both simple and Pareto-optimal (Lau, Qian, and Roland 2000; Rodrik 2007).

However, many of the studies, except a few historical narrative and factual accounts, explain Chinese economic success *conditional upon* China having adopted a gradualist strategy. In other words, China's pursuit of a GR strategy is often assumed and asserted as an established fact. Few have actually explicitly and empirically examined the transition experience against data. Our paper takes no position on the normative aspects of the GR strategy. Instead we focus on a set of questions—to what extent does China's reform reflect the predictions of a GR strategy about reform sequences and trajectories? Did market mechanisms actually deepen over time as predicted by GR logic? Is it true that market mechanisms expand over time endogenously? Specifically

for our empirical tests, did income become increasingly determined by production resources rather than the relationship with the state?

Because access to bank credit is one of the most important income determinants, our paper is also closely related to a large body of literature on finance and economic growth and on the political economy of financial reversals. An extensive line of research shows that access to finance is critical for long-run economic growth (King and Levine 1993, Levine 1997) and policy reversals that reduce financial access can impede growth (Rajan and Zingales 1998). As our paper shows, the deterioration of market mechanisms in determining income can be explained by the reversal of market allocation of bank credits. Our paper further emphasizes the detrimental effect of rural financial reversal as documented in Qian and Huang (2016). It should be noted that the financial reversal in rural China documented here is not unique to China, even though the contributory causes may be China-specific. Rajan and Zingales (2003) have identified a monumental development in the world's financial history following World War II; namely, that many countries reversed their pre-war financial liberalization policies. This line of research was further developed by Morck, Wolfenzon, and Yeung (2005). Interestingly, this line of research argues that the reversal was rooted in the previous financial liberalization: those who had benefited from initial financial liberalization subsequently sought to block further liberalization to protect their interests. . Our paper, while being

agnostic on the causes of the reversal,[4] provides another example of the reversal and evidence of its real economic consequences.

2.2 Empirical strategy

The GR strategy perspective has a number of predictions amenable to empirical examination. Our focus is to understand how rural areas transit from a planned agriculture economy into a market-oriented economy by examining income determinant patterns—in particular, how production factors determine income growth—so as to shed light on the gradualism framework of Chinese reform. We do so by employing a difference-in-difference approach to examine the cross-sectional implications of income growth determinants.

Suppose that, in each period, household income is determined by the time-varying production allocation:

$$E\left[Y_{it} \mid X_{it}, t\right] = \alpha_i + \lambda_t + X_{it}'\beta_t, \tag{1}$$

where Y_{it} is the household i's income growth in period t; α_i is the household fixed effect; λ_t is the time varying effect; X_{it} is the household i's devotion of production resources in

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[4] There might be many economic reasons for the reversal. We however also believe that the rural economic reversal in China could have resulted from exogenous political shocks (Qian and Huang 2016), although empirically proving this assumption lies outside the immediate scope of this paper. Without doubt, the turning point was the 1989 Tiananmen crackdown that brought a group of economic policy-makers into the national government, who differed fundamentally from those in power during the earlier decade. In the 1980s, the key economic policy-makers, Zhao Ziyang and Wan Li, rose to national prominence by using deregulation and reform – including the rural land contracting system – to turn around two of China's largest rural economies, Sichuan and Anhui, respectively. In the 1990s, however, China was ruled by two consummate technocrats, Jiang Zemin and Zhu Rongji, who built their political careers exclusively in the state sector. Huang and Qian's (2010) show that Shanghai had the smallest private entrepreneurship among China's major cities. The archival research on bank documents shows that the reversal started in 1993 when Zhu Rongji became governor of China's central bank.

period t; and β_t measures the production resources' contribution to income growth.

Under the null hypothesis of gradualism, β_t should increase over time. That is,

$$E[Y_{it+1}|X_{it+1}, t] = \alpha_i + \lambda_{t+1} + X_{it+1}'\beta_{t+1} = \alpha_i + (\lambda_t + \Delta\lambda_{t+1}) + X_{it+1}'(\beta_{t+1} + \Delta\beta_{t+1}), \quad (2)$$

where $\Delta\beta_{t+1}$ should be positive for market-oriented production resources and negative

for non–market-oriented production resources, if China's reform experiences follow a

GR formulation. Similarly, for resource allocation such as private credit and

determinants of credit allocation X_{it}, the null hypothesis based on the GR transition

hypothesis suggests $\Delta\beta_{t+1}$ to be positive for those household characteristics associated

with improving credit worthiness and negative for those household characteristics

associated with deteriorating credit worthiness. The GR strategy, however, does not

suggest any clear null prediction for $\Delta\lambda_{t+1}$

In summary, the primary regression equation in the empirical analysis is the

following.

$$Y_{it} = \alpha_i + \lambda_t + X_{it}'\beta_t + \varepsilon_{it} \quad (3)$$

and

$$Y_{it} = \alpha_i + \lambda_t + \lambda_o D + X_{it}'\beta_o + X_{it}'\beta_s D + \varepsilon_{it} \quad (4)$$

where D equals one if t is in the latter half of the sample period (1995–2002). β_t

estimated from equation (3) for the two periods of the sample respectively and β_s

estimated from equation (4), a difference-in-difference measurement through

cross-sectional implication, reveal how market mechanisms are at work in the two

periods and have evolved over time.

3 Data

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3.1 The sample

Our empirical investigation is primarily based on the most detailed dataset available for Chinese rural households: a fixed-site rural household survey (hereafter, FSRHS) conducted by China's Ministry of Agriculture from 1986 to 2002 nationwide.[5] The dataset is the same one used in Qian and Huang (2016). Nevertheless, for this paper to be self-illustrative, we describe here again in details how we verify and organize the dataset, although the procedure of data verification and organization is exactly the same as well. The FSRHS was not administered in 1992 and 1994 and it was discontinued after 2002 (or the data after 2002 is not made available). Our sample consists of two waves—annually from 1986 to 1991 and from 1995 to 2002, with a gap between 1991 and 1995. (Although the survey was administered in 1993, for analytical tractability we will report findings only for the 1986–1991 and 1995–2002 waves of the FSRHS.). In each year that it was administered, the survey sampled about 300 to 400 villages, stratified by socioeconomic development level and geography, and most of these villages were resampled in subsequent years. Because about 20 to 120 households were selected randomly from each village, only about one-third of the households sampled each year were resampled in the next year.[6]

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[5] In contrast, the China's Household Income Project (CHIP)'s household surveys were administered only in 1988, 1995 and 2002, and thus have significant gaps in their time series. Han, Wailes and Cramer (1995), Rozelle (1995), and Fang, Wailes and Gramer (1998) described and discussed in detail how this fixed-site rural household survey (FSRHS) data was collected, as well as the advantages and problems of using this data, including the data's limited availability. Qian and Huang (2016) use this dataset to examine financial development in rural China.

[6] Although the survey clearly identifies resampled households, we further ensure resampling accuracy and consistency in the household identification codes over time by employing over a dozen demographic and land information variables and matching the year beginning and year end information. For analysis that involves variable changes over time at the household level, we limit the analysis to a subsample in which resampling is clearly established and the observations appear over at least four years in both

The survey questionnaires, at 35 plus pages, collect detailed accounts of financial transactions, income, expenditure flows, household assets, and employment information, age, gender, and education for household members. The questionnaires in the two waves and in 1993, although not identical, are similar, allowing most items to be constructed consistently. For this study, the most relevant information is household income, various economic inputs and other non-income factors that potentially influence income, such as labor, land, access to bank credits, and political status.

The dataset used in this paper comprises household-level FSRHS data for six provinces—Liaoning, Shandong, Hubei, Guangdong, Yunnan, and Gansu—as they are the only ones whose data is released by the government. We have conducted checks to evaluate whether this FSRHS subset is representative of the country as a whole. First, there is no ex ante reason to expect that the reform took an opposite direction in these six provinces compared with the rest of the country. Second, a comparison of the average statistics across the country shows these six provinces to be above the national average in a number of economic indicators, including household income.[7] Thus, all else being equal, our findings are conservative, because these six provinces are likely to be those where the deterioration of market mechanisms was less significant than the rest of the country.

survey periods. This subsample includes 2,693 independent households and 35,125 household* year observations from the two surveys. The results reported in this paper use the full sample; we conduct robustness tests using the even panel subsample. The results are robust and the tables are available upon request.

[7] The households in these six provinces reported a higher level of income than the national sample; for example, an average of 2,791 yuan from our dataset compared with 2,442 yuan for the whole country in 1986, and 12,223 yuan compared with 10,255 yuan for 1999. Thus, the six-province FSRHS covers richer households than the national FSRHS—and this is even more so in the 1990s than in the 1980s.

We control for potential data errors by performing a range of reconciliation checks using the 100 plus reconciliation equations listed in the FSRHS questionnaire appendix that specify relations among variables. We drop observations that failed to satisfy these reconciliation equations: 3.4% for the 1986–1991 wave and 8.8% for the 1995–2002 wave. The final sample includes 34,571 observations of household* year for the 1986–1991 wave and 32,460 observations for the 1995–2002 wave.

3.2 Variable definitions

The variables used in the analysis are listed in the appendix. Income growth is measured for both the entire household and the portion of the income attributable to entrepreneurial activities. *Income growth-household* measures the growth rate of household net income (household total revenue minus consumption expenses and production costs); and *income growth – non-farm* measures the growth rate of the household's net income from non-farm activities (revenue minus costs of non-farm production). We adopt the measure of income from non-farm activities in addition to household income for two reasons. First, it measures income from entrepreneurial transitions out of agriculture. Second, it provides a robust test of the production effect, because non-farm income is calculated independently of consumption whereas total net household income is partially driven by consumption. We also compute *household income per unit of labor*, the household net income divided by the number in of household members employed in the labor force, and estimate *net income from non-farm* per unit as *net income from non-farm*/total # *of days spent on non-farm* by all the members employed in the labor force. To provide a comparative overview for these two periods,

we also compute the annual average of income growth in each of the two waves. We adjust all these loan, income, and profit measures for inflation using a deflator based on the rural CPI in each province for each year, with the index values in 1985 (the constant) set to 100 for all provinces.

We use loan access by the surveyed households, together with *labor force* and *# of days spent on non-farm activities* as the production factor, to establish the link between income growth determinants and resources allocation. The loan information includes two dummy variables—*formal loan access* and *informal loan access*—which equal one (zero otherwise) if the household secures any loans from banks and rural credit cooperatives (RCCs) or any other channels such as mutual credit cooperatives or individual providers of credit, respectively. *Amount of formal (informal) loan* is the amount of loans obtained from banks and RCCs (and other channels) in the surveyed year. *Deflated loan amount* is the *loan amount* deflated by the *rural consumer price index (CPI)* for each corresponding province, with year 1985 as the constant.

As household income and credit access are both associated with the economic strength and resource endowment of the household, the explanatory variables used in this study overlap with some of those in Qian and Huang (2016), including demographic, economic, financial, and political factors. Because we are not able to directly observe loan interest rates, we estimate *interest payment rate* as the total interest payment divided by the total loan balance for the year. We include *cultivated land* (the size of the land worked by the household at the beginning of the year) and *labor force* (the total number of household members in the work force) as controls, because the

microfinance literature identifies them as important determinants of household income and credit access (Chen and Chivakul 2008, Crook and Hochguertel 2005, and Duca and Rosenthal 1993). Our intuition is that a household's land and labor resources affect their production inputs and qualification for access to loans. We measure *collateral* as the number of durable goods a household owns, with the number of cars and motorcycles rescaled by 100 and 10, respectively, to be comparable with such goods as TV sets and washing machines. On the demand side, we measure *fixed assets investment*—the household's investment that year in fixed assets for production purposes—as demand. For alternative financing sources, we include *net household income,* measured by total household income minus all household expenses; *other financial assets,* including the amount of cash, deposits, treasury and private investment, and claims on individual lending; and *remittance*, the amount the household received as gifts from non-local relatives.

We also use fixed effects on *year*, *province*, *agriculture*, *subsidized family,* and *agricultural specialty* to control for time and geographic differences, as well as possible sectoral lending priorities or bank obligations. We denote agriculture as the household's "core production" if survey respondents selected planting, forestry, husbandry, or fishing (with the remaining choices being industry, construction, transportation, and service) and if the family has an *agricultural specialty* in any large-scale area of agriculture. We base e*ducation* level on that of the leading family member in the labor force. *Subsidized family* indicates that the household is subsidized by the government because of special hardship. Finally, we test for the existence of political preference

using *political status*, a dummy variable equal to one (zero otherwise) if a family member is a Communist Party member, military veteran, employee of a state-owned firm, or local government official.

3.3 Descriptive statistics

As we use the same dataset as Qian and Huang (2016), Table 1 describing the sample coverage is therefore the same. The 1986–1991 survey data for the six provinces covers 66 villages and 34,571 household * year; the data for the 1995–2002 wave includes 79 villages and 32,460 household* year. Table 1 shows that the sample distribution of households over the years is quite even: 200 to 2,000 households are sampled for each village. Because villages in Yunan and Gansu tend to be smaller, so is the number of sampled households in the survey. For every province, the average number of households in each village is stable over time, except for Liaoning in the first two years; 1986 and 1987.

[Insert Table 1 about here]

Table 2 summarizes our primary demographic, income and production inputs. The average number of members in each household remains between four and five, although the numbers are relatively smaller during the 1995–2002 period, most probably because of the implementation of the one-child policy. In addition, and possibly as a result of financial reversal, the growth rate of household income slows down dramatically during the 1995–2002 period compared with the 1986–1991 period. Moreover, although both the total and per capita net household incomes more than triples over this time on average, a year-by-year check of the numbers shows that

almost all of the growth is achieved before 1995. The net household income and per

capita income, respectively, grow at 11.8% and 12.2% annually during the 1986–1991

period but double between 1992 and 1995. During the 1995–2002 period, however, they

fall to 3.8% and 5.1%, respectively. The gap between the minimum and maximum

household incomes also widens during the second survey period. In fact, the time series

trend of income, although not reported in Table 2,[8] reveals that income growth is much

steadier in the 1986–1991 period than in the 1995–2002 period.

[Insert Table 2 about here]

4   Empirical results

4.1 Income growth pattern

Figure 1 shows annual average (mean of the sample) household income using

deflated income measures to exclude inflation effect, presenting a clear picture of

income growth over time. We first compute the year-to-year growth rate of these

income measures for each household, then compute the sample average for each year.

As Figure 1 shows, all four measures of income growth—*net household income*, *per labor*

net income (net household income/number of household labor force), *net income from*

non-farm activities, and *per unit* (labor*day) *income from non-farm activities*—, are higher in

the 1980s than in the 1990s. The differences are especially striking for income from non-

farm activities, in terms of both net total income and per labor-day unit income.

To show the economic and statistical magnitude of the differences between these

two periods, in Table 3 we compare household income growth rates in the 1986–1991

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[8] These statistics are available from the authors upon request.

period with those in the 1995–2002 period. Here we include both nominal and deflated measures and compare the pooled average in both mean and median. Panel A shows the means of the income growth rate for the full sample and subsample, as well as t-test results for subsample mean differences. Panel B lists the median income growth rates for the full sample and subsample, together with Wilcoxon test results for subsample median differences. As Table 3 shows, 14 out of the 16 measures of income growth rate are lower in the second survey period, with t-values (differences in subsample means) or Wilcoxon statistics (differences in subsample medians) mostly significant at the 1% level.

[Insert table 3 here]

As discussed in the methodology section, gradualism does not predict a clear direction for Y_{it} itself or coefficient $\Delta\lambda_{t+1};$ the decrease in income per se therefore does not shed light on whether the GR hypothesis holds. Moreover, many economic reasons may have contributed to these income growth patterns. We will perform a number of tests on $\Delta\beta_{t+1}$ in order to identify the effect of market mechanisms, or lack of them, from the time series of development stage.

Without excluding other potential causes, we focus on establishing the link between income growth and the return to production factors and inefficiency in allocating resources. To start with, we conduct simple univariate cross-sectional tests. In Table 4, we compare household income growth by regime and across groups based on households' demographics, resource endowments, entrepreneurship inputs, and government relationships. We conduct the difference test between high and low groups

in each time period, 1986-1991 and 1995-2005; the difference test between the two time periods for each group, high or low; and the difference-in-difference test. Table 4 shows four clear patterns. First, groups with high values in economic determinants always have a higher income growth rate than the groups with low values in economic determinants. Second, for all groups, income growth rate is higher in the 1980s than in the 1990s. Third, for the economic determinants—*land, labor* and *days on non-farm activities*—high-value groups outperform the low value groups more in the 1980s than in the 1990s. Finally, for the non-economic determinants—political status and agriculture specialty—the low-value groups underperform the high value groups much less in the 1990s than in the 1980s. Overall, the univariate comparison and DD tests in Table 4 suggest that the economic determinants contributed much more to income growth in the 1980s and that their contribution declined over time. In contrast, government relationship contributed little to income growth in the 1980s but their contribution increased over time.

[Insert Table 4 about here]

4.2 Returns to production factors

To better understand how income growth patterns are shaped, we analyze the determinants of income growth in the two periods using equation (1) and test the difference-in-difference using equation (2). In Table 5, the observations include those in the 1986–1991 survey. The dependent variables are the growth rate of *net household income* and *household income from non-farm activities*, measured in both nominal and deflated terms at the household, per labor and day unit levels. The independent

variables include access to finance (*bank/RCC loan* and *informal loan access*),

entrepreneurship (*portion of year spent on non-farm activities*), household inputs (*land,*

household labor forces), household characteristics (*education*, *subsidized family*, *agricultural*

specialty), and the non-economic factor, *political status*. The regressions also control for

year and region fixed effects, and standard errors are clustered by household.

Consistent with the univariate tests reported in Table 4, *bank/RCC loans* during 1986-

1991 are significantly positively associated *with household income growth* and per labor or

unit income growth. All else equal, during this period, *access to bank/RCC credit* is

associated with higher household income (deflated) by 5.84% (3.87%), significant at the

1% level. Entrepreneurial effort also pays off: a household that expends one entire

year's labor on non-farm activities has a 2.2% to 12.22% higher income growth rate than

a household that expends no labor on non-farm activities. This relation is positively

significant for seven out of eight growth measures. *Fixed investment* is also important in

improving household income: for each (log) RMB of investment, the income growth

rate increases from 1.49%~5.23%, significant at the 1% level for all eight growth

measures. On the other hand, *political status* is negatively associated with income

growth. This suggests that, during the 1980s, political activities diverted energy from

production activities. Taken together, these findings suggest that households in the

1980s were able to transit out of agriculture through entrepreneurship, owning

resources, and access to finance. Furthermore, political status was not an economic

asset. It in fact led to an income decrease.

[Insert table 5 about here]

Table 6 reports the results of a similar income analysis for the second survey period, which yields very different outcomes from the ones for the first survey period. First, *bank/RCC loans* in the 1995–2002 wave no longer support *household income growth* as they did in the 1986–1991 wave. Second, entrepreneurial efforts no longer pay off and are sometimes even significantly negative; for example, when the *per unit net income from non-farm activities* are the dependent variable. Even *fixed investment* is no longer effective in improving income growth. The only persistently positive and significant factor now is *agricultural specialty*. These results suggest that households wanting to transit out of agriculture in the 1990s were no longer supported.

[Insert table 6 here]

In Table 7, we test whether the difference between the two survey periods is significant. To capture the structural shift, the specification incorporates a dummy (second regime) that equals 1 if the year falls between 1995 and 2002, and its interaction terms with all the stand-alone explanatory variables. Even after controlling for the structural shift, we find a significant drop in income growth in the 1990s ranging from -5.34% to -94.91%, which is significant for three out of the eight measures. The role of entrepreneurship (indicated by non-farm activities) in supporting income growth is significantly different between the second and first survey periods, being large and negative at between -1.18% and -2.71% in the second period. On the other hand, farming produces a significantly positive difference.

[Insert table 7 about here]

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In the cross-sectional analysis, *bank loan access* is only significant for *household income* in the first period, resulting in a significant change in the coefficient on *bank or RCC credit access* from one period to the other. The latter result is consistent with our conjecture that the reduction of bank credits contribute to the reduction in the *household income growth* rate in the second period.

4.3 Explanations for income pattern

In this subsection, we explore the possible reasons behind the deterioration of the relation between household income growth and resource endowments and production inputs. Because we do not directly observe market or state-controlled prices of the resources and inputs faced by these households, we have to rely on the variables that are covered in the survey data, such as credit access and interest payment to explore the role and effects of changes in financial allocation.

Using a difference-in-difference estimation with specifications similar to equation (4) in this paper, Qian and Huang (2016) examine formal credits extended by the banks and RCCs and informal credits obtained through other channels (e.g., family, relatives, and mutual assistance associations) in the 1980s and the 1990s. The credits are measured in terms of access, loan amount, and deflated loan amount. The explanatory variables are microfinancing factors (*land, household labor forces*); entrepreneurial activities (portion of year spent on non-farm activities); loan demands (*fixed assets investments, household income*); pricing factors (*interest, collateral*); alternative sources (*informal loans, financial assets, remittance*); household characteristics (*education, subsidized family, agricultural specialty*); and finally, *political status*. The regression also controls for year and region

fixed effects, and standard errors are clustered at the household level. A dummy variable for the second survey period and its interactive terms with all the stand-alone variables are included too.

Qian and Huang (2016) find that not only is there a large decrease in loan access and loan amounts during the second period, but the importance of production resources, such as land, labor and entrepreneurship (measured by the portion of a year devoted to non-farm activities), decreases significantly (at the 1% level) in explaining the variances of credit access . In contrast, the importance of political status and collateral increases, also at a 1% significant level.

We also run credit access determinants analysis for the two periods separately. The tables are not reported here but available upon request. They are consistent with the findings generated from the pooled regressions. The single-period regressions show that, during the 1986–1991 period, the allocation of bank/RCC credits is positively associated with household entrepreneurial activities and always significant at the 1% level. In particular, the *bank/RCC credits* go to households endowed with production resources, such as *cultivated land* and *labor force*. Consistent with a hypothesis emphasizing the role of market forces, formal credits are also higher for households that have larger demand (*fixed investments*) and pay higher *interest rates*. During this period, collateral is not mandatory in the allocation decision, and consistent with the pecking order theory of capital structure, formal credits are lower in households with more alternative financing resources, such as *informal credits, financial assets, and remittances received*. Households with better *political status* are not privileged in receiving loans.

Overall, the bank/RCC loan allocation decisions in this period are consistent with market economy principles; that is, to support household transition out of agriculture uninfluenced by political factors.

There may be many demand and supply side reasons for this income growth pattern. For example, changing features of economic development may have affected investment opportunities. Labor migration rose in the 1990s which could have affected the quality of labor supply in rural China. Education and ability may explain the observed effect of political status. Our analysis does not attempt to pin down or exclude any of these explanations.

We note that, although the deterioration of rural income determinants by market mechanism is consistent with a substantial worsening of income equality in the 1990s, China maintained a strong GDP growth. We do not rule out the possibility that reforms in other areas, such as foreign investment and trade, might have played an offsetting effect against the rural income deterioration. The goal of this paper is not to provide an overall assessment of Chinese reforms but to identify a hitherto little-noted important development in rural China and use this development to re-evaluate the claim on the GR strategy. The overall empirical evidence on income determination shows no improvement in market mechanisms but rather deterioration over time, which contradicts the GR hypothesis that reform deepens and market mechanisms improve over time.

5 Conclusions

That reforms should be gradual and incremental is an influential idea in transitional economics. China is often held up as an exemplary country that has implemented a GR model successfully. In this paper, we set out to test this conjecture. Specifically, we examine whether rural income is increasingly determined by market factors such as production inputs and resource endowments over time, as a GR strategy predicts. Empirical evidence revealed through a rich and detailed household dataset from 1986 to 2002 provides little support for the GR hypothesis in relation to rural China. While economic factors were the main determinants of income growth in the 1980s, political and endowment factors (such as collateral) became dominant in the 1990s.

We explicitly note three caveats in interpreting our findings. First, other than looking briefly at credit allocation, we do not offer a rigorous explanation of why income determination becomes less market-oriented in the 1990s than in the 1980s. We limit our analyses to this dimension because credit is a key driver for income and Qian and Huang (2016) have adjudicated among a host of explanations of why financial reversals occurred and financing is a key driver for growth. This study provides evidence of how inefficiency in credit allocation have impacted income growth.

Second, our findings should not be interpreted as a critique of the logic of the GR model itself. Our empirical tests shed light on whether or not China implemented a GR strategy in its rural economy, not whether or not those features of the GR model, such as cognitive economy and political feasibility, are flawed.

Third, our findings are limited to rural China and should not be extrapolated to the country as a whole. That said, it should be noted that, at the time of our data, the rural

economy was still a substantial component of the Chinese economy and both the relative and absolute size of the rural population was substantial. Other facts such as the coincidental timing of the reform reversals and declining household consumption, are prima facie evidence of the real economic importance of the dynamics documented in this paper.

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Appendix: Definition of variables

Variable name	Definition
Income growth variables	
Income growth, household	The growth rate of net income in the household (household total revenue minus expenses and costs).
Income growth, non-farm	The growth rate of household's net income from non-farm activities (revenue from non-farm production minus non-farm production costs).
Per labor income	Household net income/# of laborers in the household.
Per unit non-farm income	Net income from non-farm/labor *days spent on non-farm production.
Production factor variables	
Days on non-farm activities	Total number of days the family members spent on non-farm activities.
Labor force	Total number of household members who are in the labor force.
Cultivated land	The size of the land worked by the household at the beginning of the year.
Formal loan access	A dummy variable that equals one if the household obtains loans from banks and rural credit cooperatives (RCCs), zero otherwise.
Amount of formal loan	The amount of the loans obtained from banks and RCCs.
Informal loan access	A dummy variable that equals one if the household obtains loans from channels other than banks and RCCs, such as mutual cooperatives or individuals; zero otherwise.
Amount of informal loan	The amount of the loans obtained from channels other than banks and RCCs.
Control variables	
Interest payment rate	Total interest payment divided by total loans.
Other financial assets	The sum of cash, deposits, treasury and private investment, and claims on individual lending.
Fixed assets investment	Investment during the year of fixed assets for production purposes.
Durable goods	The sum of the numbers of durable goods owned by a household, with the number of cars and motorcycles rescaled by 100 and 10, respectively.
Net income	Net household income for the year.
Net income per capita	Net household income over total number of household members.
Profit from non-farm activities	The household's marginal profit rate from non-farm activities (profit over income).
Agriculture	A dummy variable that equals one if agriculture is the main business of the household.
Remittance	The household's gift income from non-local relatives.
Subsidized family	A dummy variable that equals one if the household is subsidized by the government for special hardship.
Education	The education level of the leading family member who is in the labor force.
Political status	A dummy variable that equals one if any of the family members is a Communist Party member, military veteran, employee of a state-owned firm, or a local official; zero otherwise.
Inflation index	The rural consumption price index for the year in each province, with the index values in 1985 set to 100 for all provinces.

Table 1: Distribution of the sample by region and year

This table describes the sample coverage of the fixed-site rural household survey (FSRHS) from six provinces in China. Panels A and B show the distribution of villages and households by year for each province and for the full sample from the 1986-91 and 1995-2002 surveys, respectively. As we use the same dataset as in Qian and Huang (2016), the table describing the sample coverage is the same.

Panel A: Surveys conducted between 1986 and 1991

Province	# of villages	Number of households						
		Total	1986	1987	1988	1989	1990	1991
Liaoning	12	9,103	2,427	2,097	1,145	1,152	1,146	1,136
Shandong	14	5,683	969	966	967	978	972	831
Hubei	16	9,723	1,579	1,653	1,675	1,712	1,484	1,620
Guangdong	10	5,747	1,047	1,056	909	902	908	925
Yunnan	5	3,001	478	490	512	496	510	515
Ganshu	9	1,314	282	282	127	162	159	302
Total	**66**	**34,571**	**6,782**	**6,544**	**5,335**	**5,402**	**5,179**	**5,329**

Panel B: Surveys conducted between 1995 and 2002

Province	# of villages	Number of households							
		Total	1995	1996	1997	1999	1999	2000	2001	2002
Liaoning	13	8,653	747	1,155	1,123	1,158	1,162	1,115	1,098	1,095
Shandong	16	4,280	609	615	572	476	493	505	505	505
Hubei	16	6,605	865	862	828	793	822	824	798	813
Guangdong	14	7,003	753	877	819	955	934	935	879	851
Yunnan	5	3,769	487	478	457	426	467	492	494	468
Ganshu	15	2,150	274	248	237	231	244	247	265	404
Total	**79**	**32,460**	**3,735**	**4,235**	**4,036**	**4,039**	**4,122**	**4,118**	**4,039**	**4,136**

Table 2: Summary statistics

This table summarizes household income, labor participation in non-farm activities, resource endowment, demographic, and government relationship for the surveyed household. The statistics in Panels A and B are based on the pool of observations (household*year) from the first (1986-1991) and second (1995-2002) survey periods, respectively.

Variable	Observations	Mean	Standard deviation	Min.	Max.
Panel A: Surveys conducted between 1986 and 1991					
Net household income (yuan)	34,571	3943.3	4,840.95	1	181,000
Annualized average growth rate		11.8%			
Net household income per labor (yuan)	34,566	852.31	1,099.32	0.25	106,800
Annualized average growth rate		12.2%			
Number of household members	34,562	4.73	1.88	1	19
Labor in the household	34,571	2.39	1.53	1.00	54
Household non-farm activities days	34,571	107.66	318.15	0	11,700
Percentage of non-farm activities days	34,571	0.16	0.25	0	1
Land owned by the household	18,661	6.26	2.23	0.00	1305
Fixed assets investment	18,661	2.62	8.64	0.00	16,2701
Education	34,571	2.32	0.85	0	6
Political status	34,571	0.22	0.41	0	1
Subsidized family	34,571	0.00	0.07	0	1
Agriculture specialty	34,571	0.88	0.33	0	1
Panel B: Surveys conducted between 1995 and 2002					
Net household income (yuan)	32,458	12,463.17	18,647.64	-394,400	1,032,490
Annualized average growth rate		3.8%			
Net household income per capita (yuan)	32,411	2,969.193	41,80.192	-98,600	258,122.5
Annualized average growth rate		5.1%			
Number of household members	32,422	4.31	1.66	1	18
Labor in the household	32,183	2.40	1.49	1.00	47
Household non-farm activities days	32,458	127.05	367.60	0	30,600
Percentage of non-farm activities days	32,032	0.17	0.27	0	1
Land owned by the household	32,458	4.87	2.44	0.00	151
Fixed assets investment	32,458	1.67	6.53	0.00	999,999
Education	32,458	2.56	0.78	0	8
Political status	32,460	0.21	0.40	0	1
Subsidized family	32,458	1.98	0.21	0	1
Agriculture specialty	32,460	0.82	0.38	0	1

Table 3: Univariate comparison of 1986–1991 and 1995–2002 income growth rates

In this table, we compare household income growth rate in 1986–1991 with that in 1995–2002, using four income measures: net household income, per labor net income (net household income/number of household labor force), net income from non-farm activities, and per unit (labor*day) income from non-farm activities. These four income indicators are measured in both nominal and deflated terms, producing a total of eight measures.

After first computing the year-to-year growth rate of these income measures for each household, we then compare the pooled average (mean and median) during the two survey periods. Panel A reports the mean income growth rates for the full sample and subsample, as well as *t*-tests of the mean difference between the subsamples. Panel B lists the median income growth rates for the full sample and subsample, as well as Wilcoxon statistics for the median difference between subsamples.

Yearly growth rate (%)	Nominal income				Deflated income			
	Household		Non-farming activities		Household income		Non-farming activities	
	Net	Per labor	Net	Per labor *day	Net	Per labor	Net	Per labor *day
Mean test								
Full sample	23.02	22.77	71.99	32.25	13.76	13.64	58.52	22.86
1986-1991	28.10	27.57	99.78	42.43	14.58	14.16	78.93	27.74
1995-2002	18.01	18.02	43.73	21.89	12.97	13.13	37.76	17.88
Difference	-10.08	-9.55	-56.05	-20.54	-1.61	-1.03	-41.17	-9.86
t-statistics	[-16.59]	[-16.18]	[-12.70]	[-8.77]	[-3.04]	[-1.99]	[-10.33]	[-4.60]
Median tests								
Full sample	6.73	6.46	0.00	0.00	1.21	0.87	-4.19	-4.40
1986-1991	12.14	11.59	4.40	3.38	1.13	0.63	-5.81	-6.61
1995-2002	2.44	2.34	-0.97	-1.07	1.25	1.06	-3.46	-3.10
Difference	-9.70	-9.24	-5.37	-4.45	0.11	0.44	2.34	3.52
z-score	[-22.14]	[-20.53]	[-10.27]	[-7.94]	[0.45]	[0.44]	[-4.14]	[-0.76]

Table 4: Household income growth rate by production inputs and resource endowments

In this table, we compare the income growth rate across household groups by their entrepreneurial activities, resource endowment, production inputs, demographic and government relationship. The income growth rate uses the deflated net household income annual growth rate. *Land* ownership is classified as low if the household own less than the sample average minus standard deviation, and is classified as high if the household own more the sample average plus one standard deviation. The same applies for *labor* force, and *days on non-farm*. *Fixed assets investment* is classified as low if the household made no fixed assets investment in the year, otherwise it is classified as high. Education is classified as low if the scale is below or equal to 2, and high if the scale is 4 or above.

We conduct the difference test between high versus low groups in each of the time periods 1986–1991 and 1995-2005, the difference test between the two time periods for each high or low group, and the difference-in-difference test. The number presented is the mean (or DD of mean). The numbers in the brackets are t-values. ** denote significance at the 1% level.

Factors	1986–1991	1995–2002	t-stats of difference /DD
Low land ownership	22.20	12.58	[5.30]
High land ownership	27.86	14.98	[5.58]
t-stats of difference	[-2.02]	[-1.72]	DD=-3.26**
Low labor force	10.45	6.08	[1.67]
High land force	26.91	15.61	[7.16]
t-stats of difference	[-5.92]	[-6.03]	DD=-6.93**
Low non-farm input	15.56	11.90	[3.98]
High non-farm input	30.85	16.36	[8.64]
t-stats of difference	[-8.55]	[-4.99]	DD=-10.83**
Low fixed assets investment	19.80	12.11	[10.23]
High fixed assets investment	26.96	24.11	[1.27]
t-stats of difference	[-4.31]	[-8.56]	DD=4.84**
Low education	22.84	11.46	[12.00]
High education	18.80	12.84	[2.76]
t-stats of difference	[1.65]	[-1.15]	DD=5.42**
Political connection—No	21.76	12.85	[11.07]
Political connection—Yes	19.14	13.38	[4.01]
t-stats of difference	[1.65]	[-0.58]	DD=3.15**
Subsidiary—No	21.18	22.57	[-0.30]
Subsidiary—Yes	21.40	12.88	[0.45]
t-stats of difference	[-0.01]	[2.45]	DD=-9.11**
Agriculture specialty—No	26.95	13.11	[7.22]
Agriculture specialty—Yes	20.37	12.93	[9.83]
t-stats of difference	[3.29]	[0.18]	DD=6.40**

Table 5: Income growth in 1986–1991

This table reports the results for the determinants of household and labor income growth rate in 1986–1991. The dependent variables are the growth rate of net household income and household income from non-farm activities, measured in both nominal and deflated terms and at both the household and per labor and day unit levels. The independent variables include access to finance (bank/RCC loan and informal loan access), entrepreneurship (portion of year spent on non-farm activities), household inputs (land, household labor forces), household characteristics (education level, subsidized family, agricultural specialty), and the non-economic factor of political status. The year and region fixed effects are controlled for. Estimation of standard errors are clustered at the household level and presented in the brackets below the coefficient. ** and * denotes significance at the 5% and 1% level respectively.

	Nominal income				Deflated income			
Year	Household		Non-farming activities		Household income		Non-farming activities	
	Net	Per labor	Net	Per labor *day	Net	Per labor	Net	Per labor *day
Bank RCC	4.50**	3.10*	1.62	-0.70	3.49*	2.06	0.62	4.50**
loan access	[1.58]	[1.50]	[12.38]	[6.38]	[1.37]	[1.29]	[11.05]	[1.58]
Portion of year	3.42**	2.67**	12.22**	-6.44**	2.55**	2.20**	10.87**	3.42**
on non-farm	[1.07]	[0.80]	[3.86]	[1.22]	[0.86]	[0.68]	[3.43]	[1.07]
Log (informal	0.02	0.16	-0.88	0.66	0.05	0.14	-0.71	0.02
loan)	[0.19]	[0.18]	[1.38]	[0.71]	[0.16]	[0.16]	[1.23]	[0.19]
Log (cultivated	-0.61	1.34	15.81**	-1.00	-0.3	1.46*	16.56**	-0.61
land)	[0.79]	[0.74]	[5.97]	[3.20]	[0.68]	[0.65]	[5.48]	[0.79]
Log labor	9.05**	-22.74**	1.05	2.33	7.82**	-19.93**	2.87	9.05**
	[1.20]	[1.18]	[9.50]	[4.56]	[1.04]	[1.04]	[8.48]	[1.20]
Log (fixed assets	1.57**	1.63**	4.92**	3.26**	1.37**	1.36**	4.77**	1.57**
investment)	[0.23]	[0.22]	[1.65]	[0.80]	[0.20]	[0.19]	[1.51]	[0.23]
Political status	-0.91	0.40	-18.83*	-1.45	-0.57	0.59	-15.06	-0.91
	[1.00]	[0.99]	[8.50]	[4.95]	[0.88]	[0.87]	[7.71]	[1.00]
Education	-0.03	-0.41	-7.31	2.28	-0.23	-0.44	-7.95*	-0.03
	[0.54]	[0.52]	[4.18]	[2.19]	[0.47]	[0.46]	[3.76]	[0.54]
Agricultural	-3.64	-5.39**	-10.73	-12.15*	-3.69*	-5.36**	-12.55	-3.64
specialty	[1.94]	[1.78]	[11.11]	[4.98]	[1.67]	[1.56]	[10.24]	[1.94]
Constant	39.38**	42.49**	117.26**	59.23**	15.25**	31.82**	64.85**	28.98**
	[2.71]	[2.47]	[19.90]	[10.33]	[2.35]	[2.29]	[16.43]	[9.11]
Observations	26766	26706	10279	10282	26727	26664	10284	10295
R-squared	0.03	0.04	0.01	0.01	0.03	0.04	0.01	0.01

Table 6: Income growth in 1995–2002

This table reports the results for the determinants of household and labor income growth rate in 1995–2002. The dependent variables are the growth rate of net household income and household income from non-farm activities, measured in both nominal and deflated terms and at both the household and per labor and day unit levels. The independent variables include access to finance (bank/RCC loan and informal loan access), entrepreneurship (portion of year spent on non-farm activities), household inputs (land, household labor forces), household characteristics (education level, subsidized family, agricultural specialty), and the non-economic factor of political status. The year and region fixed effects are controlled for. Estimation of standard errors are clustered at the household level and presented in the brackets below the coefficient. ** and * denotes significance at the 5% and 1% level respectively.

	Nominal income				Deflated income			
	Household		Non-farming activities		Household income		Non-farming activities	
Year				Per labor				Per labor
	Net	Per labor	Net	*day	Net	Per labor	Net	*day
Bank RCC	1.06	0.21	2.12	13.62	2.26	-0.20	1.62	15.1
loan access	[2.89]	[2.84]	[17.55]	[10.97]	[2.64]	[2.47]	[16.39]	[10.08]
Portion of year	0.90	1.06*	4.11	-3.88**	0.78	1.20*	3.64	-3.72**
on non-farm	[0.54]	[0.47]	[2.16]	[1.23]	[0.43]	[0.47]	[2.01]	[1.15]
Log (informal	0.35	0.33	1.39	0.46	0.23	0.10	1.52	0.25
loan)	[0.21]	[0.21]	[1.12]	[0.61]	[0.18]	[0.18]	[1.09]	[0.58]
Log (cultivated	0.28	1.74**	9.30*	3.99	-0.20	1.17*	7.82*	2.20
land)	[0.63]	[0.61]	[4.16]	[2.39]	[0.55]	[0.54]	[3.75]	[2.13]
Log labor	5.16**	-15.56**	-1.95	0.03	5.81**	-14.95**	-0.41	-1.41
	[1.11]	[1.13]	[7.16]	[4.08]	[0.97]	[1.01]	[6.63]	[3.73]
Log (fixed assets	2.04**	1.84**	2.59	1.03	2.05**	1.68**	2.39	1.15
investment)	[0.28]	[0.27]	[1.47]	[0.87]	[0.26]	[0.23]	[1.40]	[0.79]
Political status	0.40	2.50*	-9.84	-1.21	0.25	2.69**	-9.73	-0.14
	[1.02]	[1.01]	[6.91]	[4.76]	[0.88]	[0.90]	[6.33]	[4.52]
Education	2.00**	2.09**	-6.08	-0.84	1.91**	1.75**	-6.15	-0.31
	[0.54]	[0.54]	[3.31]	[2.07]	[0.47]	[0.48]	[3.15]	[1.91]
Agricultural	1.23	-0.62	22.34**	-1.96	0.41	-0.75	15.39*	-1.09
specialty	[1.29]	[1.26]	[6.66]	[4.08]	[1.12]	[1.11]	[6.08]	[3.72]
Constant	12.21**	17.09**	23.94	19.89*	9.62**	23.12**	15.28	12.89
	[2.54]	[2.41]	[14.44]	[8.97]	[2.24]	[2.24]	[13.30]	[8.07]
Observations	27,070	26,956	10,110	10,107	27,108	26,998	10,105	10,094
R-squared	0.02	0.02	0.01	0.01	0.01	0.02	0.01	0.01

Table 7: Comparison of income growth determinants between 1986–1991 and 1995–2002

       This table compares the determinants of household and labor income growth rate in 1986–1991 with those in 1995–2002. The dependent variables are the growth rate of net household income and household income from non-farm activities, measured in both nominal and deflated terms and at both the household and per labor and day unit levels.

       The independent variables include access to finance (bank/RCC loan and informal loan access), entrepreneurship (portion of year spent on non-farm activities), household inputs (land, household labor forces), household characteristics (education level, subsidized family, agricultural specialty), and the non-economic factor of political status.

       The specification also captures the structural shift between 1986–1991 and 1995–2002 by including a dummy (second regime) that equals one if the year falls between 1995 and 2002, together with this dummy's interactive terms with all the stand-alone explanatory variables mentioned above.
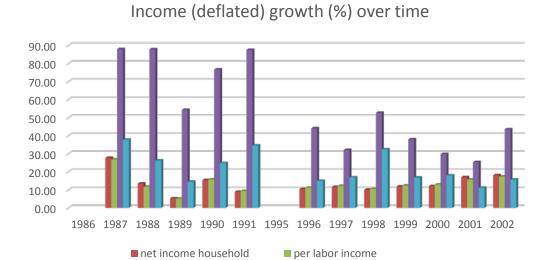
       The year and region fixed effects are controlled for. Estimation of standard errors are clustered at the household level and presented in the brackets below the coefficient. ** and * denotes significance at the 5% and 1% level respectively.

Year	Nominal income				Deflated income			
	Household		Non-farming activities		Household income		Non-farming activities	
	Net	Per labor	Net	Per labor *day	Net	Per labor	Net	Per labor *day
Stand-alone variables are controlled for								
second regime			-94.91**		-5.34	-8.19**	-52.38*	-18.23
			[22.93]		[2.98]	[2.98]	[20.86]	[10.70]
Interaction of second regime with								
Bank RCC	-3.27	-2.43	17.92	18.34	-0.03	-0.90	16.75	20.75
loan access	[3.24]	[3.17]	[21.57]	[12.74]	[2.93]	[2.74]	[19.90]	[11.62]
Portion of year	-2.71*	-1.82*	-8.03	2.36	-1.88*	-1.14	-7.05	1.53
on non-farm	[1.18]	[0.92]	[4.42]	[1.76]	[0.95]	[0.82]	[3.98]	[1.63]
Log (informal	0.47	0.29	2.09	-0.09	0.29	0.05	2.03	-0.13
loan)	[0.28]	[0.28]	[1.77]	[0.94]	[0.24]	[0.24]	[1.64]	[0.86]
Log (cultivated	0.58	0.53	1.89	7.72*	-0.04	0.04	0.3	4.44
land)	[0.94]	[0.90]	[6.80]	[3.71]	[0.81]	[0.79]	[6.21]	[3.41]
Log labor	-4.08**	6.56**	1.08	-2.32	-1.50	4.88**	-1.24	-0.7
	[1.58]	[1.57]	[11.39]	[5.85]	[1.38]	[1.40]	[10.29]	[5.40]
Log (fixed assets	0.52	0.22	-2.52	-2.21	0.73*	0.33	-2.60	-1.7
investment)	[0.36]	[0.34]	[2.22]	[1.18]	[0.32]	[0.30]	[2.06]	[1.07]
Political status	1.62	2.33	10.97	1.18	1.18	2.36	7.21	3.07
	[1.42]	[1.41]	[10.93]	[6.86]	[1.24]	[1.25]	[9.96]	[6.33]
Education	1.84*	2.42**	-1.38	-3.79	1.80**	1.95**	-0.08	-2.55
	[0.74]	[0.73]	[5.28]	[2.93]	[0.65]	[0.65]	[4.88]	[2.67]
Agricultural	6.18**	5.43*	33.50**	12.69*	5.33**	5.09**	29.36**	12.18*
specialty	[2.27]	[2.12]	[12.39]	[6.15]	[1.96]	[1.87]	[11.37]	[5.55]
Constant	19.86**	24.16**	118.14**	8.73	16.14**	31.49**	75.97**	29.37**
	[2.47]	[2.38]	[18.96]	[8.27]	[2.19]	[2.21]	[16.78]	[8.66]
Observations	53,836	53,662	20,389	20,389	53,835	53,662	20,389	20,389
R-squared	0.03	0.04	0.02	0.01	0.02	0.03	0.01	0.01

* and ** denote a 5% and 1% significance level, respectively.

Figure 1: Income growth (annual, %) pattern over the years

Income (deflated) growth (%) over time