

The cash incentive

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The cash incentive The economic response of semi-subsistent craftworkers in Papua New Guinea

Norman E. Philp

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Abstract

This study examines the income-earning potential, the cash expenditure behaviour and the work effort response of a sample of handloom wool weavers who operated in both the remote villages and urban towns of pre-independent Papua New Guinea. Its concern is thus with the response of these workers to the cash incentive.

Although weaving represented the main cash-earning activity of the weaver households, they continued to rely on the non-monetary traditional economy for a substantial part of their livelihood. In the Highlands of New Guinea non-monetary garden production contributed one-third of total household income during the study period.

The weaving workforce was selected because of the homogeneity of work effort, because the quantity of work performed and the earning rates of individual workers could be calculated with some precision and because there was a high degree of freedom in the actual work-leisure choice of each participant. It was found that less than 40 per cent of the potential work time available to the average weaver was actually used in effective cash-earning work and, as such, average weekly earnings during the study period were less than 40 per cent of their potential.

Foreword

This book is based on work done by Dr Philp in Papua New Guinea in 1974, but with the elapse of time Dr Philp's research has become neither out of date nor irrelevant. On the contrary, with the rapid spread of monetization, not only in Papua New Guinea but in most parts of the world, its importance has increased. Indeed, his study may well be the last of its kind. The opportunity for examining the response of 'affluent' subsistence producers to new cash incentives may not occur again in so measurable a form.

The study is of people from villages living in a condition of subsistence affluence in Papua New Guinea, who have undertaken weaving on handlooms as a means of earning a supplementary cash income. In each case it has been possible for Dr Philp to observe the performance of the weaver, recording the time taken for each operation, and thus the effort spent in producing a given quantity of cloth and the monetary reward so earned. During his lengthy period of fieldwork he gathered a wealth of information about the economic circumstances of the weavers and their families, their access to market goods, the level of their subsistence income, the distance from home to workplace, and the time spent at the workplace in social and other non-weaving activities.

The study thus contains valuable socio-economic data about members of self-subsistent households in the early stages of intrusion into the monetized economy. This will serve as a benchmark against which future researchers of labour response and economic behaviour in Papua New Guinea may compare their results with the situation immediately prior to independence.

In many respects the data are unique, and unlikely to be refined or reproduced in later studies of this kind. In addition Dr Philp has applied a sophisticated form of economic analysis to his data and has produced some fascinating results concerning the supply response of effort to the price of labour in a simple subsistence-oriented society. The data collection methods are also of interest.

This book should be of value to scholars, researchers and specialists in several disciplines. It should find a place in many libraries, not only in Australia and Papua New Guinea, but also in other parts of the world where the labour response of subsistence producers to monetary incentive is of significance for economic development policy.

E.K. Fisk

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Chapter 1

Introduction

Throughout Papua New Guinea and indeed throughout much of Melanesia, even into the mid-1970s, a very substantial proportion of the population has been able to remain relatively independent of the monetary economy for the basic essentials of livelihood. Although population growth rates in excess of 2 per cent per annum and the incessant encroachment of the monetary economy have brought about some perceptible changes in circumstances over the 1960s and 1970s, reports of genuine malnutrition amongst New Guinea's subsistence farmers are only quite recent. Apart from the occasional frost damage to Highland gardens and a temporary food shortage that sometimes accompanies the dry season, it has been usual for most New Guineans to attain adequate levels of food consumption and to do so with the application of relatively small inputs of human labour effort. In fact, the subsistence economy has even provided a surplus of production to cover various entertainment and emergency needs plus a standard of housing, clothing and cultural pursuit that has long been considered adequate by traditional standards. All this has been possible because of the relationship between abundant land and sea resources and relatively low population densities and the fact that adequacy has been perceived in terms of traditional standards. Fisk (1966, 1975, 1982) described this situation as one of 'subsistence affluence', in contrast to that which prevails throughout much of Africa, Asia and Latin America where high population densities relative to the available resources have seen the struggle for existence on much less favourable terms.

Because monetary exchange is the prerequisite for specialization in production, the division of labour and capital formation, economic planners throughout the Third World have been anxious to encourage the transition to complete monetization. Their hope is that there will be substantial increases in productivity and self-sustaining economic growth. In their efforts to encourage the transition towards greater monetization, the economic planners and administrators in Papua New Guinea and in similar Melanesian countries have often met with much slower responses to economic incentives than were apparent in South Korea, Taiwan, Singapore and other rapidly developing parts of Asia. Even recently, the low productivity of New Guinean labour has been

partly attributed to a general lack of industriousness and a low motivation to work hard (see Mannur 1983). Higher crop prices and higher wage rates do not always induce the anticipated supply responses and observers at various levels have from time to time remarked on an apparent indifference to monetary rewards amongst many New Guineans.

Throughout the 1960s and 1970s a small group of economists attempted to understand the rationale behind these supposedly slow and somewhat 'irrational' responses. They attempted to show that economic rationality rather than simply a lack of motivation can explain the behaviour of these subsistently affluent Melanesian villagers. Furthermore, they did so by using models based on acceptable modifications of the common concepts and analytical techniques of neo-classical economic theory. Foremost amongst the explanations were the models of E.K. Fisk (1962, 1964, 1975) which sought an explanation of the forces which drew producers from the primitive subsistence sector into the monetary exchange economy. Fisk also provided an explanation of why these forces work or fail to work as expected in economic and cultural situations that differ from those of the West and which also differ from those of India, upon which so much of our development theory has been based. There have been several empirical studies of economic motivation and responsiveness to economic incentive and opportunity pertaining to the Melanesian region and inspired by the work of Fisk (e.g. Lockwood 1968; Waddell and Krinks 1968; Moulik 1973; Shand and Straatmans 1974; Conroy 1976).

The current study makes an attempt to define 'labour response' quite specifically, to explain labour supply response in a model which has some consistency with the accepted theory, carefully to collect data which are as consistent as possible with the variables expressed in the theory, and then estimate the coefficients of the model so that 'response' can be expressed as an elasticity measurement. The prime advantage of this formal approach is that it enables one to identify and then logically and consistently to relate the many important factors that one can hypothesize to affect the labour response being investigated. It also enables one to hold constant the 'other factors' that influence labour response whilst the most important relationship can be isolated and then measured.

Defining 'response', 'incentive' and 'opportunity'

In this study 'response' refers to the number of units of labour supplied by an individual worker to his or her main cash-earning activity during a period of time in which there were no binding physical, institutional or cultural constraints on the performance of that activity. The labour supply units refer to hours of effective work time performed during that period. The particular workforce group selected for study were paid on a

piece-rate basis for the work they performed. During the defined choice period, time spent socializing with other workers, resting, eating or wandering around the workshop vicinity, etc. did not earn the worker any income and was thus defined as non-work or 'leisure'.

The basic monetary 'incentive' referred to in the study is the calculated average hourly earning rate for effective work performed. This varied from individual to individual depending on his skills and, more particularly, on the different piece rates offered by the various establishments for which the piecework was performed.

The economic 'opportunity' provided was thus the total cash income that the individual worker could earn from his cash-earning activity if he chose to work effectively in all of the hours potentially available to him during the designated work (or choice) period.

The central concern of this more formal aspect of the study is thus the extent to which an increase in this incentive is successful in inducing a response in the form of a greater application of individual work effort. Alternatively stated, it seeks an explanation of why some individuals are more prepared than others to 'exploit' the cash-earning opportunity that is available to them.

The workforce sample was deliberately chosen from a cross-section of people participating in one specific monetary earning activity and performing a fairly homogeneous set of tasks. Under such conditions the measured units of work effort can be considered to be qualitatively similar and sufficiently homogeneous to permit comparisons between the sampled observations.

Because this study analyses the work effort of a number of individuals, it is thought that the individual rather than the household is the appropriate decision-making unit. This approach contrasts with some previous studies which analyse the labour supply response relevant to family farms. However, it does not preclude the notion that in making an economic decision the worker will consider the welfare of his dependents and his familial and wider social obligations.

The workforce sample

The study sample consisted of some fifty-seven handloom wool weavers who, during the late 1960s and early to mid-1970s produced decorative woollen rugs and blankets in a number of small establishments (weaving cells) throughout the Eastern Central Highlands of New Guinea and in and around Port Moresby (Papua). This particular workforce group was selected because all weavers were paid on a

piece-rate basis and all had a highly flexible work environment which permitted them considerable choice in the number of hours they might wish to work during any given week. There was thus a much closer correspondence between work effort and income received than might be observed in agricultural activity or in regular wage employment. Furthermore, the nature of the activity permitted close observation and measurement of the main variables of a work-leisure choice model.

The weaving activity provided the main cash income source for each of the participants and, for many, weaving represented their first and only cash-earning work experience. In some of the more remote areas the weavers were often the main or only regular cash earners in their village.

The sample covered approximately 80 per cent of the weavers known to have been operating in Papua New Guinea in 1974. The only weavers excluded from the study were those attached to very small establishments in such remote areas that the substantial costs of data collection could not be justified. The geographical distribution of the sample of weavers is shown in Tables 1.1 and 1.2. Further details on the weaving industry and the location of the cells will be given in the following chapter.

Table 1.1 Distribution of weavers in the Highlands

Location	Number of weavers	Organizational form
Goroka		
(a) Makia	15	Government sponsored factory (Department of Business Development)
(b) Villages near Goroka	2	Independent
Kundiawa	8	Admin. operated (Department of Business Development)
Marawaka	5	Mission operated (Lutheran)
	8	Admin. operated (Patrol Officer)
Yonki	3	Mission operated (Swiss)
Bioka Village	2	Independent
Tarabo	5	Mission operated (Lutheran)
Total	48	

Table 1.2 Distribution of weavers in Port Moresby

Location	Number of weavers	Organizational form
Hohola (Small Industries Research and Development Centre)	3	Administration (Department of Business Development)
Hohola	3	Independent (but with DBD assistance)
Sabama	1	Independent
Badili Vocational Centre	2	Independent (but with some assistance from Principal of Vocational Centre)
Total	9	

Pure and applied theories of labour supply response

It has been usual to treat the theory relating to the labour supply response of the individual (or the individual's supply of effort) as an application or extension of consumer demand theory. 'Leisure' or 'non-work' is the commodity demanded and this is subject to a trade-off with the goods and services which work income enables one to procure. The price of leisure is the income forgone when leisure is taken. It is, in effect, the hourly wage or earning rate. Both leisure and the more conventionally defined goods yield satisfaction or utility and the analysis of the individual's supply of effort has conveniently lent itself to and benefited from developments in utility theory. Indifference curve analysis has enabled us to comprehend the change in the demand for leisure brought about by a change in the wage or earning rate and we have been able to appreciate the income and the substitution effects that operate. The theory does not, however, tell us whether an increase in the wage rate induces less leisure and hence more work or more leisure and less work. The answer, as far as the theory is concerned, depends upon whether it is the income or the substitution effect which predominates. Nothing can be said *a priori*. It is essentially an empirical question.

The use of utility theory in the form of indifference curves is again apparent in the applied theories relating to household labour response in subsistent and semi-subsistent farms. Unfortunately, there have been few if any developments in this theory since 1970. The earlier mentioned works of Fisk (1962, 1964, 1975) are amongst the better known. Whilst the supply of effort by the individual is not of central concern in Fisk's models, he was able to offer an explanation for the oft-reported stop-go response

to new development projects in terms of quite rational responses to identifiable market forces. He pointed out how the relatively high subsistence sector productivity throughout much of Melanesia was likely to influence attitudes to monetary work. Monetary goods, most of which are imported, are relatively expensive. The productivity of indigenous labour engaged in monetary pursuits tends on the other hand to be rather low because of lack of training and inexperience. The effort cost to procure cash goods where they exist is thus quite high, whilst the effort cost to obtain adequate non-monetary substitutes from the traditional sector is usually low. Under such circumstances and with an adequate and acceptable livelihood often assured without the commitment of effort to monetary pursuits at all, it is hardly surprising that many New Guineans take a somewhat different view of monetary work to that of their African, Asian or even Western counterparts.

The subjective equilibrium of peasant households was also analysed by Nakajima (1969) and by Mellor (1963). Mellor's model in particular presented a conceptual framework for analysing labour use and labour productivity on the assumption that a limited aspiration for consumer goods and services existed beyond some biologically and culturally determined subsistence (or minimally acceptable) level. Later, Stent and Webb (1975) took Fisk's concept of 'subsistence affluence' and developed the implications for producer/consumer behaviour when a point of demand satiation (or 'Bliss' point) is introduced within the familiar indifference curve models of constrained equilibrium.

Of interest in a number of the above cited works is the concept of a minimum 'subsistence' level of consumption. This has a cultural element over and above that amount which is biologically necessary to sustain life. As people become acquainted with a more comprehensive range of goods and services (i.e. through the 'demonstration effect') and as their contact with the monetary economy increases, the quantity (and variety) of goods which they come to accept as the basic or minimum amount becomes progressively larger. This concept will, in fact, be one of the features to be tested in the model of labour response developed in a later part of this study.

Although these models adhere to the notions of utility theory they have a number of limitations when applied to empirical work. One cannot derive empirically testable and theoretically consistent demand or supply equations from graphically illustrated indifference curves. Further and more precise theoretical restrictions are necessary. It is not possible to apply these models to a particular data set and assess their theoretical validity, nor is it possible to estimate the necessary coefficients and compute the fundamental elasticities that the notion of 'labour supply response' engenders. Most of the analytical models and empirical studies undertaken to date in these semi-subsistent and transitional economies by economic anthropologists have not

encompassed the many developments in applied consumption analysis that have appeared in other economic literature over the past thirty years (in particular see Brown and Deaton 1972; Lluch, Powell and Williams 1977). Whilst the very nature and limitations of the data collected in economic anthropological studies are not always conducive to the sophisticated analyses that can be undertaken on the more extensive national data sets, some initial attempts could prove to be worthwhile.

The collection of data

Because there were neither time series nor cross-sectional data suitable for a study of labour supply response at either the national or regional level, a major part of this study was devoted to the collection, presentation and interpretation of meaningful data. This was often a laborious, time-consuming and tedious task. However, because of the intensive and prolonged contact it gave with the sampled workforce members and their households, one was able to recognize and later incorporate into the analytical framework factors that one sensed to be of explanatory importance. As such, one could retain many of the advantages of the inductive methodology more usually associated with economic anthropology.

With the workforce sample selected, a fieldwork strategy was devised which enabled each weaver and weaver household to be visited and investigated for two fortnightly periods during the year 1974. All fieldwork and data collection were carried out by the researcher and a full-time, experienced Gorokan assistant/interpreter. As it was necessary to obtain some indication of the garden food production (and total subsistence incomes) of each weaver household, it was desirable to survey each of the weaving centres in the Highlands area once in the 'wet' season and once again in the 'dry' in order to capture some of the seasonal variation in food production.

Repeat surveying had other advantages. Many of the New Guineans in this study had only very limited contact with non-traditional lifestyles and concepts and, in the absence of some distinctly remembered time bench-mark, it was very difficult to establish accurately an understanding of a past span of time. Because many of the survey questions related to expenditures made and cash income received over previous months, the first survey period provided an appropriate bench-mark to be utilized during the second follow-up survey. It also enabled the researcher to cross-check some of the more important pieces of information.

Data were collected using three particular techniques:¹
(i) observation and measurement; (ii) daily scheduling of the

¹For a detailed discussion of these techniques see Philp (1976).

weaver and his household; and (iii) formally administered questionnaires. Basically, the two important variables, *the effective work time* committed by the weaver to his weaving work and *the average hourly earning rate* of each weaver were obtained from extensive observation and measurement. In producing a woven article (floor rug or decorative blanket) a weaver performed a number of fairly well defined and separate processes. The amount of time each weaver took to perform certain sampled units of each of these processes when working at his normal and sustainable work pace was measured and recorded. Numerous repeat observations and measurements were made and the results averaged. Then, from measuring and analysing each article that a particular weaver produced, it was possible to estimate the effective work time which he committed to each article. Finally, from the record of his actual production over a week, one could quite easily estimate the number of hours of effective work time committed during that period. Payment rates per article varied considerably among the different weaving cells. However, after ascertaining these piecework rates, it became a rather simple matter to divide the estimated effective production time taken by each weaver to produce the articles completed in any given week or period (expressed in hours) into the piece-rate value of that production to obtain the average hourly earning rate of the worker. For several of the workforce who were independent of an organized weaving cell, allowances had to be made for time spent in hawking their finished articles and in buying the raw materials. In addition information was recorded on the time it took each weaver to walk from his/her place of residence to the weaving workshop.

Other data were collected by visiting each weaver household from a particular centre on a daily basis (or, in some cases where individual dwellings were widely dispersed, on a two-day basis) during each of the two periods when each centre was surveyed. This was necessary because of the widespread illiteracy amongst the sampled group and their inability to record household budgetary information themselves. Data collected on this basis were: (i) the other (non-weaving) small and irregular cash receipts of the weaver and his or her household (e.g. cash gifts, sales of coffee beans, etc.); (ii) the time spent by the weaver in non-weaving activity, e.g. gardening, fence and house building, coffee garden work, etc.; (iii) the non-monetary food production and income of the household (all daily collected garden produce was counted and weighed); (iv) the time spent by the weaver's spouse and family in subsistence type work activity; and finally and most importantly, (v) the daily cash expenditures of the weaver household.

At the beginning of each of the two survey visits, each weaver was questioned, amongst other things, on matters relating to the size of his household, the number and duration of visits from kin, his past employment and educational history, regular non-weaving cash sources, recent large traditional cash commitments (bride payments or compensation commitments, etc.) or receipts,

major cash expenditures on goods and services over the past month (or since the last survey period), etc.

Finally, in addition to data relating to weaver households, information was collected in each of the different geographical regions which enabled regional food and non-food item price indices to be constructed. Also surveyed were the range and relative availability of a number of consumer goods and services within each of the regions. These data were later used in an attempt to construct an 'availability index'.

The next chapter deals with aspects of the geographical environment in which the various subgroups of weavers lived and worked and which, in turn, could have some effect on their economic behaviour. It also describes the structure of the weaving industry and the relevant demographic characteristics of the weavers and their associated households.

Chapters 3 and 4 deal, respectively, with the monetary and non-monetary incomes of the weaver households. In addition to the cash receipts from weaving, most weaver households had other cash sources and/or were recipients of cash amounts that had become an integral part of customary exchanges. Most were able to meet a substantial proportion of their basic food needs from subsistence garden production or from the almost obligatory charity of fellow clansmen.

Chapter 5 accounts for the monetary outlays of the sampled workforce members. Not only is it concerned with the expenditure pattern on current goods and services but it also details the very considerable cash outlays and commitments that New Guinean cash earners make and are probably expected to make in traditional or customary exchanges. Chapter 6 examines the activity patterns of the weavers, not only in respect to their main cash-earning activity but in other pursuits, and it also gives a somewhat less precise account of the activities of some other household members.

A comprehensive data set containing values for each one of the many variables discussed throughout Chapters 2-6 and pertaining to each of the fifty-seven sampled weaver households will be made available to interested researchers by the author, upon request. This document is referred to in the following chapters as the Data Appendix.

Finally, Chapter 7 explains how a formal econometric model of labour effort response was developed to incorporate the many explanatory variables that have been hypothesized and described throughout Chapters 2-6. The model enables the effect of wage-rate variation on effective work effort to be isolated and then measured. The results, the merits, the limitations and the policy implications that flow from this modelling approach can then be evaluated.

Chapter 2

The areas, the industry, the weavers and their dependent households

The study of the weaving workforce was conducted in six geographical areas: Goroka (EHD), Kundiawa (Chimbu), Marawaka (EHD), Yonki (EHD), Tarabo (EHD) and Port Moresby (CD, Papua). Five areas are in the New Guinea Highlands. Certain features of the localities in which the weavers lived and worked appeared to have some influence on the labour supply response of the local weavers. Furthermore, the weavers themselves came from households of various sizes and had different degrees of potential for acquiring other monetary and non-monetary incomes.

The first part of this chapter deals with some features of the geographical areas in which this study was conducted. The second relates to relevant characteristics of the handloom wool weaving industry in Papua New Guinea and the final part is concerned with characteristics of the weavers themselves and their households.

The geographical areas

The Highlands of New Guinea

The Eastern Highlands Administrative District in which four of the six study centres were located embraces an area of 14,447 sq. km and at the time of the 1971 census its population was approximately 239,640.¹ No fewer than 94.1 per cent of these people lived in the thousands of rural hamlets scattered throughout the area. The remaining 5.9 per cent lived in one of the two urban centres of the Eastern Highlands District, Goroka and Kainantu.

Goroka township is the administrative and main educational centre of the District. In 1971, Goroka had an indigenous population of 10,500 and there were 1500 Europeans. Goroka's

¹This amounts to approximately 9.6 per cent of Papua New Guinea's entire population.

growth has been quite recent. Howlett (1973:164) reports that Goroka's population was a mere fifteen persons in 1950. The township is situated in the fertile Asaro Valley at an altitude of approximately 1550 metres. It is linked with the other Highland centres of Kainantu to the east and Kundiawa, Mt Hagen and Mendi to the west and links with New Guinea's second largest city, Lae, via the Highlands Highway. This major roadway, which extends from Lae to Mendi, although largely unsealed at the time of the study, was trafficable over its entire length for all of the year.

Kainantu is a smaller township and had approximately 1950 indigenous residents and only 150 Europeans in 1974. Over recent years another small township has developed at Yonki, some 25 kilometres east of Kainantu, following commencement of the Upper Ramu Hydroelectric Scheme. There are probably 100 or so expatriates, predominantly Korean, associated with the scheme's construction. During 1974 there were five weavers operating in the general area of Yonki. Three were attached to the Yauna Swiss Mission and another two, operating as independents, lived in Bioka village, approximately 20 kilometres from the others.

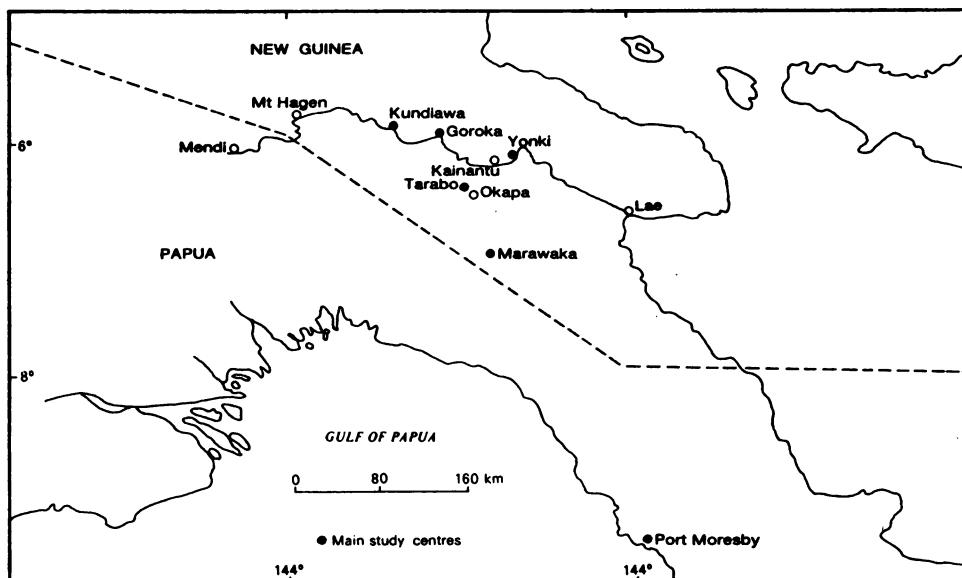
Both Goroka and Kainantu act as service centres for their large peripheral populations. It is estimated that about 80,000 people live within a 20-mile (32-km) radius of Goroka township.

Fifteen weavers and their families lived in Makia village approximately 14 kilometres from Goroka township and in the Bena Bena area. This new village was most interesting as it consisted entirely of the weavers employed at the Highland Weavers Pty Ltd factory which was only five minutes walk away. The village was traditional in style and built on land once owned by an expatriate but it had been acquired by the government-sponsored company. The weavers, the majority of whom were young married men, came from many parts of the Highlands districts and most had worked previously in village-based cells which had either closed down or reduced their scale of operation. Only one weaver came from the Bena Bena area although several had taken Bena wives.

The Tarabo weaving cell, to which another five of the sampled weavers were attached, was approximately 20 kilometres northwest of Okapa. Okapa is the subdistrict headquarters and is on an upgraded road link approximately 75 kilometres southwest of Kainantu. It was, in 1974, the third largest township in the District and had several stores, a post office, service station and hospital. The road linking Tarabo and Okapa was of very low quality and for much of the wet season was only trafficable in a four-wheel-drive vehicle.

Marawaka station, the headquarters for the Marawaka (Wonenara) Subdistrict, was the most isolated of all the areas in which this study was conducted and was, as well, the most recently contacted. Although reached by light aircraft three

times weekly (weather permitting), it was three days' walk from the nearest road-head and four to five days' walk from Kainantu, the nearest urban centre. Marawaka station is in an area settled by the Barua people, one of the famous Anga (Kukukuku) groups which inhabit not only this southeastern part of the Eastern Highlands but also the adjoining parts of the Morobe and Gulf Districts. During the early 1970s, the Anga were approximately 70,000 strong but only 8000² of them were in the Marawaka Sub-district, thus making it the least densely populated subdistrict in the Eastern Highlands.



Map 1 Location of study centres

To the west of the Eastern Highlands lies the Chimbu District, the most densely populated of all New Guinea's administrative districts. At the 1971 census the population of the total Chimbu administrative district was approximately 160,000. Even if this population had been evenly spread over Chimbu's 8400 sq. km of generally rugged terrain, the average population

²Including, along with the dominant Barua, another Anga group known as the Simbari (see Gaduseck *et al.* 1972:5).

density would be approximately 18 per sq. km. However, because of the relatively sparse population in an isolated area to the south of the district (i.e. around Karimui), the effective density of the remaining rural areas is much higher, averaging 40 persons per sq. km. The main urban centre and the administrative headquarters of the Chimbu District is Kundiawa. In 1971 Kundiawa had a population of 2380.

Port Moresby

Port Moresby, in the Central District of Papua, is the country's administrative capital and the largest town in Papua New Guinea. Its population, which had been only 2800 in 1935, had increased to 42,000 in 1966 (Oram 1967:3) and to 76,500 at the time of the 1971 census. The expatriate population in the city was approximately 17,000 in 1971.

Besides its administrative function and its being the air and sea gateway to Papua New Guinea, Moresby is a significant educational centre with a university, teachers' college, bankers' college, administrative college and a school for medical training. At the time of writing it had also developed a substantial light industrial sector especially in relation to the manufacture of building materials and the processing of drink and food.

Nine of the fifty-seven weavers lived and worked in Port Moresby. Only two of the nine came from the Central District originally and not one came from any of Moresby's inner Motu villages. Six came from the Gulf District of Papua and one came from a village near Daru in the remote Western District. Typical of a large proportion of Moresby's population, the weavers were migrants drawn by the city's 'bright lights' and the search for an opportunity to earn a money income.

Because Port Moresby is quite isolated from most other parts of the country, the migrants from the Gulf and Western Districts usually travel to Moresby by boat, often after a substantial walk to the coast from villages further inland. The New Guinean Highlander comes to Moresby by aeroplane. Most migrants settle in squatter areas within the town or, as is so often the case, they settle in the houses of their *wantoks* (people from the same linguistic group) who have come to the city beforehand and have since, perhaps, obtained jobs.

Contact history

European contact with the Highlands dates only from 1930 when two prospectors, Michael Leahy and Michael Dwyer, penetrated the central cordillera to discover one of the last major isolated groups of mankind (see Finney 1973:19). The Asaro Valley was

discovered during a second short expedition these two men made later in that year. An airstrip was built in the area in 1932 and in 1933 the Bena Bena patrol post was established by Jim Taylor. The year 1933 also marks the initial contact between the Chimbu and the European for, later in that year, Dan and Mick Leahy and Jim Taylor climbed over the Asaro Range to discover the populous Siane and Chimbu people in their very mountainous environment (Finney 1973:21). Missionaries followed almost immediately. The Lutherans and Seventh Day Adventists established mission stations in the Asaro Valley within a few years of initial contact and the Lutherans and Catholics began their work in the Chimbu in 1934. It was not until 1954, however, that both the air and road links between Kundiawa and Goroka became effectively established and regular contact occurred between the two settlements.

The 1950s saw the opening up of the coffee industry in the Eastern Highlands and Chimbu Districts and European settlers took up land for coffee plantations. Further land alienation was stopped by the late 1950s and by this time indigenous plantings were being encouraged. The decade of the fifties and the associated development of the coffee industry in the Eastern Highlands-Chimbu area began the economic transition which has been in progress ever since.

The other areas studied in the Highlands had a somewhat similar history. Yonki may have been contacted before 1930 by Lutheran missionaries from the coast. However, in 1931 a Lutheran mission station was established on the eastern edge of the nearby Gadsup area and in 1933 Lutheran headquarters were established near the present town of Kainantu. The Upper Ramu patrol post, later called Kainantu, was established in 1932.

Kainantu and Goroka were linked by a jeep road in 1944 but the final and most important link of all, from Kainantu to the coast, was not achieved until 1953 because of the great difficulty in crossing the Kassam Pass down to the Markham Valley. The modern upgraded Highlands Highway and regular road access to the coast is an innovation of the early 1960s.

Contact with the two other areas of this study, Tarabo (Okapa) and Marawaka, was even more recent. It was only in the late forties and early 1950s that contact was properly established in the parts of the Okapa area relevant to this study. The Lutheran mission station, on which the Tarabo weaving cell was located, was established in 1949 and it was the first permanent Western presence in the area. Rudimentary road links between Tarabo, the present subdistrict headquarters at Okapa and Kainantu were completed in the mid-1950s and also about this time the airstrip at Tarabo mission became operational.

Marawaka had the most recent contact history of all the areas studied. The first official European contact with this

Eastern Highland group was made by a government patrol, led by James Sinclair, in 1951. However, permanent government contact with the Barua people in the villages surrounding what is now Marawaka station was only established in 1968, following the shift of the administrative headquarters from Wonenara patrol post (established 1960), some eight hours' walk away to the north and over the rugged Kratke Ranges. After 1964 three missions were operating in various parts of the subdistrict.

The traditional economy

The New Guinean Highlander is very much a subsistence farmer and, as this study will later show, even those households with relatively high monetary incomes continue to rely on their own garden production for a large proportion of their basic food requirements.

The main subsistence crop of the Highlands is undoubtedly the sweet potato (Pidgin: *kaukau*) although the other supplementary root crops, taro and cassava, are quite important in some areas. Pumpkin, beans, bananas, yam, maize, *pit pit*, sugar cane, peanuts and even cabbages were widely grown throughout the study areas but a miscellaneous array of green leafy vegetables (cress, pumpkin tips, aibica, etc.) collectively known by the Pidgin term, *kumu*, appeared to constitute the most important regular supplement to *kaukau*.

There is a fairly distinct 'dry' season between May and September throughout almost all of the Eastern Highlands area. Whilst June, July and August are 'dry' months in all sections, May is less definitely so in both Okapa (Tarabo) and Marawaka.

The effect of the dry season on food supply occurs with a lag but by the time of the second round of surveys in late June, July and August, many respondents and villagers had mentioned that they had entered the *taim belong hangri*, the period of the year in which food shortages tended to be felt. Despite noting a substantial falling off in the quality and size of the tubers during the dry season and perhaps a drop in the proportion of the daily harvest being fed to the household pigs, there was little visible evidence of households having insufficient daily garden production to meet their requirements for human food. Such deprivation, where it was observed, did not appear due to a shortage of suitable land. Causes could be traced to such factors as family illness or some other disruption to the household's labour force at the time of preparation and planting, to severe damage to gardens by pigs, to an underestimation of the household's food requirements, or to a severe drain on supplies as a result of an unexpected ceremonial feast to which the household contributed heavily.

Although there were quite definite exceptions, Fisk's generalization concerning the relatively high productivity of the subsistence sector or the overall 'primitive affluence' of New Guinean tribal society appeared to be quite valid in the Highlands in 1974. Only those who had left their home villages (temporarily or otherwise) to seek wage employment in some distant centre, relinquished the fruits and security of this very substantial non-monetary income source.

Despite the abundance of pigs in Highland villages, the intake of animal protein appeared small indeed. Pigs contributed very little to the household's regular diet. They were, however, a most respectable household asset and an essential item in almost all major traditional festivities. Pigs were killed for feasts at birth, initiation, puberty and death ceremonies and were exchanged live, as well as being killed and eaten, at marriages and when inter-clan compensatory payments were being made. Every 5-10 years in some, although not all, Highland areas a prolonged 'pig feast' takes place and hundreds of pigs are slaughtered and consumed during the festivities.

Such infrequent consumption of pork, and the relatively small amounts actually available to many of the individuals at the time, suggested that one should not treat the household pig stock as a consumer food item. It was most uncommon to find a household killing and eating one of its pigs merely in response to a shortage of other food. In terms of the care and respect which pigs receive and the demands which they make on the daily *kaukau* harvest from the household garden, it seemed more legitimate to treat pigs as a household consumption unit, especially with respect to the consumption of garden produce.

Although the traditional economy remained intact in the coastal and hinterland villages near Port Moresby, the nine weavers sampled in this area drew very little on the traditional garden economy for their livelihood. One weaver made fairly frequent weekend visits to his nearby home village but most of the others were migrants from distant districts in Papua. They had usually attached themselves to an urban household of a brother or clansman who earned a good and regular wage income. One household had a small backyard garden, another made several catches of fish and a third received some sago and coconuts from the home village during the survey period. It was not worthwhile or possible to try and capture the magnitude of this non-monetary income and discern the weaver's actual share of it in the same way as had been done for the weavers in the Highlands.

The commercial economy

Employment opportunities. The limited size of the Highland urban centres, Goroka, Kainantu and Kundiawa, in relation to the

vast rural populations which surrounded them, meant that the scope for urban employment throughout the Highlands was very limited. Whilst there were certainly some Highlanders employed as clerks, drivers and labourers in Goroka's sizeable administrative sector and there were also many employed as shop assistants, labourers and factory workers in the growing secondary and tertiary component of the Highland towns, job availability appeared to fall far short of the number seeking employment.

Wage labour was for most Highlanders almost synonymous with the indentured labour for work on the coastal plantations through the Highlands Labour Scheme. Brown (1972:27) estimated that in the 1950s and early 1960s up to 60 per cent of the men of some Chimbu groups were recruited for this work and that for the whole district the average figure was approximately 20 per cent. Even during the early 1970s it was not uncommon to find up to 40 per cent of the young adult males in some subdistricts away with the Scheme. This was certainly so in the Marawaka Subdistrict.

Those who agreed to work with the Highlands Labour Scheme were employed on the rubber, copra, cocoa and oil palm plantations of the coastal districts. Up until 1971, payment was made both in cash and in kind (food, accommodation, clothing, tobacco, etc.) and part of the cash component was withheld and given to the worker as a lump sum at the completion of his contract. The total cash payment up until this time was approximately \$52 per year. In 1972 this minimum rural wage was made an 'all cash' wage and increased to \$5.90 per week. Approximately \$3.70 per week could be deducted by the employer to cover the previous 'in kind' payments if the worker so chose to take them.

For most of the weavers operating in the Highlands area during the two years prior to the study, the most likely alternative source of cash income to weaving would have been the \$5.90 per week mentioned above. Local Highlanders able to find employment on the expatriate-owned coffee plantations in the Highlands area were also paid \$5.90 per week but, for a limited few, the higher wages obtaining in the town (i.e. \$13.80 per week) might have been an alternative to weaving income. A new minimum *urban* wage of \$20 per week, applicable in Moresby and Goroka and with proportional adjustment in other urban centres, was to become effective at the end of 1974.

A much more widespread source of monetary income for the vast majority of rural villagers in the Eastern Highlands and Chimbu Districts was from the growing of Arabica coffee. Indigenously owned coffee gardens were generally quite small, averaging approximately one-quarter of an acre or less. The picking of the coffee cherries was predominantly the task of the household's womenfolk. Men usually pulped the cherries and performed or supervised the drying of the coffee beans. Parchment (sun dried coffee beans) was sold to one of the many coffee buyers who vied with one another

on almost every road and track throughout the coffee districts during the coffee season. Payment rates varied with world coffee prices and fluctuations were noticeable from week to week.

The coffee industry in the New Guinean Highlands had its beginnings in the mid-1950s. In the years since its growth has been quite remarkable and only a few of the most isolated areas in the Eastern Highlands and Chimbu Districts, for example Marawaka and Karimui, have failed to feel its economic effects.

Both cattle raising and passionfruit growing were introduced as alternative income sources but their impact was small. The sale of garden produce at the local markets offered the only effective cash earning alternative to coffee growing for most Highlanders, although a few specific exceptions were noticed. In Yonki, for example, small amounts of gold were sometimes panned from the local creeks and some employment was available for construction labourers on the nearby Upper Ramu Hydroelectric Scheme.

In Marawaka where, because of its extreme isolation, there was no coffee growing or any other form of commercial cropping, the only alternative source of cash income to the Highlands Labour Scheme for the majority of local Anga people was work on government road making and airstrip maintenance projects, for which they were paid 20 cents per day. With the estimated annual cash income per adult male being less than \$5 in the subdistrict,³ it is evident that the weavers represented a relatively affluent subgroup within their society.

Indigenous non-agricultural entrepreneurial activity in any of the Highland areas was largely confined to the operation of public motor vehicles (PMV) and small village trade-stores. Whilst both occupations gained their operators prestige and experience, only a very small percentage returned any substantial net profit to the investor-operator.

Port Moresby offered the largest pool of job opportunities in Papua New Guinea but there were many job seekers and the rate of unemployment was high. Moresby attracted a large number of single young men from all over the country but quite a few looked upon their stay as a transitory one and sought to earn only enough cash to cover subsistence and perhaps meet some traditional commitment in their home village areas (e.g. a bride payment). Others remained only because they were unable to earn the fares necessary for their return home. Whilst \$13.80 per week was the minimum urban wage applicable for most of 1974, it would be incorrect to assume that this was, in effect, available as a real

³An estimate made by T. Buising, ADC, Marawaka, in an unpublished area study (1973).

alternative cash income source to any significant proportion of them. As is so often the case in Moresby, the effective alternative is not the minimum urban wage but rather no wage at all.

The development of markets and the availability of goods.

As the weavers of the sample were drawn from many diverse areas, the extent to which local markets for consumer goods and services had developed varied quite considerably. Whilst the weavers near Goroka and in Port Moresby had access to an extensive range of goods and services, the only Western-style consumer items locally available to the Marawakans were those contained within the four tin walls of the subdistrict's only trade-store.

A list of what the author and his New Guinean assistants considered to be the 100 most popular goods and services available to and purchased by indigenous people in and around Goroka township was constructed. Details of this list and the 'availability index' constructed from it can be found in Philp (1976). A summary of the data, that is the number of listed items available in each of the centres surveyed, is presented in Table 2.1. Some of the centres listed in the table represent the nearest large urban market to some particular weaver household; others represent the closest market (often a local trade-store) or an intermediate market point.

Table 2.1 The availability of 100 selected goods and services, 1974

	Go.	Mak.	Ku.	Mar.	Ya.	Yo.	Ta.	Ok.	Ka.	PM
Per cent of all (100) listed items available	100	54	100	73	67	81	55	80	100	100
Go. -	Goroka township.									
Mak. -	Single trade-store near weaver village, Makia, via Goroka.									
Ku. -	Kuniawa township, Chimbu District.									
Ma. -	Marawaka, single mission trade-store.									
Ya. -	Single mission store, Yauna Swiss Mission, Yonki area.									
Yo. -	Yonki township.									
Ta. -	Tarabo, single trade-store near mission station.									
Ok. -	Okapa township.									
Ka. -	Kainantu township.									
PM -	Port Moresby city.									

One is quite unable, from the list alone, to assess the relative accessibility of goods and services in relation to each of the weaver households. For instance, whilst the Makia weavers had only 54 per cent of the items available in the trade-store closest to their homes and workplace, they were on a main road link to Goroka and could have access to 100 per cent of the listed

items by making a 20¢ and 20-minute PMV ride. It was not uncommon for these weavers to shop in Goroka on several afternoons per week. However, although the people at Marawaka were well catered for by the subdistrict's only trade-store (i.e. a fairly high 73 per cent of the listed goods and services were available to them), if they sought the full array of listed items, they had to face either an arduous 4-5 day walk, or an expensive aeroplane trip (\$26 return), to Kainantu or Goroka.

The effect on demand (and work) behaviour of the access and exposure to goods and services is indeed a difficult concept to capture in valid and quantifiable terms. A basic assumption used in forming an index of accessibility was that every household in New Guinea had some access to all goods and services. The households differed only in respect to the degree of this accessibility. The ease with which a person could acquire a particular good or service, or the impact of it on one's tastes and demand patterns, seemed to be related to the relative proximity of each type of item to the person or household concerned. The index was thus constructed from data on the availability of goods and services at various centres together with measurements of each household's proximity to these same items (see Philp 1976).⁴

As region of residence affected the value of the index attributed to a household, one can gain some general indication of the distribution of the index by listing the mean index figure for

Table 2.2 Index of accessibility (mean value)

Group	Group mean index
Makia factory (15 weavers)	3.85
Goroka independents (2)	1.70
Chimbu (8)	0.74
Marawaka (13)	0.12
Yauna Mission (3) — Yonki	1.07
Bioka independents (2) — Yonki	0.47
Tarabo (5)	0.24
Port Moresby (9)	5.00
Total (57)	2.20

Source: Data Appendix.

⁴A Data Appendix containing values for each of the variables cited in this and following chapters, over each of the 57 households, is available from the author upon request.

each group, as shown in Table 2.2. The calculated index figure reflects the relative availability of goods in different centres, and the alternatives the weavers had for gaining access to them. The basic deficiency of the index is that it does not place a weight on each of the 100 listed goods and services in accordance with their relative importance in the demand patterns of households which have complete and easy access to all of them. Unfortunately, insufficient data were available to permit the calculation of these appropriate weights.

In addition to the marketing of an array of (largely) imported 'Western' consumer goods and services in trade-stores and expatriate dominated enterprises, a more indigenous form of marketing locally-grown produce, traditional and quasi-traditional artifacts, decorative and utility items had developed as an expression of the increasing monetization of the New Guinean economy. The local produce market had become a regular institution in nearly all towns and hamlets of Papua New Guinea.

In some places the market (Pidgin: *bung*) was merely a small informal gathering of men and women selling bundles of surplus garden produce beside a road or track. In Goroka, however, the market was a formally organized, twice weekly occurrence with several hundred sellers and probably several thousand buyers regularly participating. Shelters and tables were built for produce display, sellers paid an entrance fee to the grounds and officials kept a check on market cleanliness and order. The market at Kundiawa was similar to this and also operated twice weekly. It appeared to attract buyers and sellers from up to a 20-km radius of the township.

At these markets sweet potato, taro, yam, *kumu*, *pit pit*, sugar cane, pumpkin and a whole array of European-type vegetables (cabbage, peas, tomato, potato, peanuts, carrots, lettuce, etc.) were offered for sale. Much of the produce was displayed in front of the seller in bundles, each priced at 10 cents. The variations in the size of the bundles reflected the fluctuations in demand and supply conditions during the different seasons of the year.

In addition to the larger markets in the town centres, it was common to find any number of small, informal markets near the town outskirts and in or near the larger villages. These markets were usually held on days which did not coincide with the main market days in the town centres.

Small local markets in and around Yonki and at Tarabo were held regularly and were well established. However, at Marawaka the market for locally grown foodstuffs was neither regular, well-organized nor well patronized by the local Anga inhabitants. Instead, and because of the number of indigenous, but non-Anga, households attached to the administration and mission staffs

(policemen, clerks, carpenters, teachers, pastors and interpreters), a considerable informal, door-to-door trade in garden produce was evident. Although some items had an 'official' price,⁵ it was noticed that the local sellers became increasingly reluctant to offer their produce during the dry season and, in effect, were able to command a price well above that set by the administration.

Not only was there considerable seasonal fluctuation in prices within a given area but within any given season prices varied quite markedly from one area to another. Table 2.3 lists the average price of *kaukau* (sweet potato) obtaining in the five relevant Highland markets during each of the two survey visits.

Table 2.3 Prices of sweet potato (*kaukau*) in five local produce markets of the New Guinean Highlands (cents per lb)

	Goroka	Kundiawa	Marawaka	Yonki	Tarabo
Round 1 (<i>'wet season'</i>)	2.6	4.4	1.5	3.3	2.2
Round 2 (<i>'dry season'</i>)	4.0	5.5	2.5	4.8	3.3
Average (weighted)	3.2	4.9	1.9	3.9	2.8

The 'wet' season price (i.e. that which obtained during the first contact with each centre in the period from February until the end of May 1974) varied from approximately 1.5¢ per lb in Marawaka to 4.4¢ per lb in Kundiawa. Price differentials of this magnitude were able to persist between the various areas for several reasons. The marketing of garden produce in Papua New Guinea was invariably carried out by the producer himself or by his kin. No wholesalers operated in these markets. Because of the difficult and hence limited access between the various markets and the small volume traded by any given individual, the per unit transport and marketing costs were very high. This factor, together with the general lack of information amongst most New Guineans concerning the extent of such price differences meant that there was no substantial trading between the different areas contacted in this study. Each market was effectively closed from another and the price in any one was thus a consequence of local demand and supply conditions.

One sometimes observes behaviour in the New Guinean market place which defies the economist's usual explanations. On several

⁵The purchase price of sweet potato was set by the administration at approximately 1¢ per lb when buying for government patrols and other government requirements.

occasions it was noted that, even on the one market day, a person acted both as a seller and a buyer of a similar product. The market place in New Guinea performs a function over and above the economic exchange of locally produced goods. It is a place of social gathering in which bonds of social solidarity are cemented through the acts of exchange. A reciprocal purchase from the member of another subclan or clan, whether needed or not, seems to be a similar, but commercial, expression of the more usual reciprocal exchange of valuables ingrained in traditional New Guinean society. The mores of Western commercialism have modified, but certainly have not yet replaced, traditional patterns and values. The local produce markets of the New Guinea Highlands are an interesting example of the intermingling of the two value systems.

The indigenous market at Koki (Port Moresby) was one of the most widely known markets in Papua New Guinea. Although characteristics of the traditional sector were still quite evident in this market, its long establishment and the less personal relationships which existed between the local Papuan village sellers and the predominantly migrant, urban-dwelling buyers had tended to make Koki more commercial in its operation than any of the other markets contacted during the study.

The handloom weaving industry

The handloom weaving industry of Papua New Guinea was fairly insignificant if one viewed it on a national scale. At most, it had only involved approximately 130 weavers and it is doubtful if more than 85-90 had worked (even infrequently) during the two years 1973-74. Total value of output for 1970 was estimated at approximately \$20,000.⁶ However, with the establishment of Highland Weavers Pty Ltd near Goroka and the introduction of weaving to the Central District in 1971, the writer estimates that the gross sales receipts from New Guinea's weaving products would have approached \$120,000 per annum⁷ in 1974 (at 1974 prices).

The handloom weaving scheme was actually a government project intended to introduce the non-traditional skill of handweaving to New Guinean Highlanders. It was started at Kundiawa in the Chimbu District in 1965 with the expressed purpose of providing an alternative income source to cash cropping, road building or coastal plantation labouring for some of the less educated youths

⁶All estimates and information in this section were obtained from the official records, Department of Business Development, Port Moresby.

⁷Based on my observations of production from Highland Weavers Pty Ltd, and the assumption that this company produces 50-60 per cent of the country's total annual output.

in the Highland villages. The project was thought to have particular merit in isolated areas where, because of the lack of roads, they could not participate in the main Highland industry, coffee growing. Even in 1974 in isolated areas such as Marawaka, weaving provided the only alternative source of cash income to infrequent work on administration projects and patrols.

During 1965 and 1966 young men were sent in from various areas to be trained in weaving at the Kundiawa centre and on completion of training they were returned to their villages with the necessary equipment (purchased either by their local government council or patrol post, a mission, or with savings made from the sale of articles produced whilst training) to commence their business operation. Sometimes these weavers trained others from their village area.

By 1969 there were (reputedly) some twelve weaving cells in the Highlands and in 1971 the weaving company, Highland Weavers Pty Ltd (Makia) was formed with the Department of Business Development being (indirectly) the largest shareholder.

During 1970 weaving was introduced into Papua, training being provided at the Small Industries Centre at Hohola, Port Moresby. During the period 1971-73 some of the trainees established independent weaving cells in the coastal village of Tubusereia and in villages in the Rigo subdistrict. Others remained in and around the city. By late 1974 none of the Papuan village units was in operation and only nine of a total of twenty-three trained Papuan weavers persisted with their trade.

Weaving cell organization and supervision

In 1974 there were only four independent operators in the Highlands area. The remaining forty-four weavers sampled in this study were attached to weaving cells organized by the administration or a church mission. Those organized by the administration took several forms, ranging from one fairly large factory, established and managed under the auspices of the Department of Business Development at Makia, to an informal patrol post or local government council project. The latter type was rarely supervised but a government officer was responsible for ordering the raw material supplies (either directly from an Australian supplier or through the Makia factory), paying the weavers for their labour on a piece-rate basis, and arranging for the sale of the finished product (either to the Makia factory or through private outlets). Mission-controlled cells operated in much the same way with the missionary performing the managerial role.

Six of the nine Papuan weavers could be regarded, essentially, as independent operators. The other three were attached to a government workshop in Hohola, where an officer of the Department

of Business Development performed a function similar to the missionary or administration official in the Highlands.

Because the weavers were not all fully independent operators a question arises about the effects on individual production and effort resulting from the particular way a cell was organized, for example, were there some limits placed on the individual weavers' work-leisure choices? Whilst frequent and prolonged absence would probably have led to the cell overseer withdrawing access to looms and materials from the offending weaver, no such limitations were noticeable during the relatively short period of this study. In all of the mission units and most of the administration-operated weaving cells there was no evidence of any effective limit being imposed on the minimum labour effort being required by the weavers.

There was, however, one notable exception. The fifteen weavers attached to the Makia factory, Highland Weavers Pty Ltd, at the time of the study, were more formally organized than others in the outer village cells. The company had an expatriate adviser-overseer from the Department of Business Development, a Papuan manager and a Papuan technical officer-supervisor. Although there was considerable variation in average weekly input amongst the fifteen weavers and little compulsion regarding the intensity with which the weavers were required to work, there was some restriction on the hours these weavers were expected to be in attendance. Weaving began at 8.00 a.m. each morning and ended at 4.00 p.m., Mondays to Fridays. Frequent absence without reason during these hours would have brought reprimand and could have led to dismissal. Such restrictions did not apply to any of the other weavers studied and for this reason the analysis of individual labour effort response had to include some allowance for the effects of this 'supervision factor'.

The effective labour-leisure decision period

There were definite limits to the maximum number of hours that could be worked by the weavers in the sample. Weaving workshops under the auspices of administration officers and missions invariably followed the Western or expatriate concept of a work week. The cells were seldom opened before 8.00 a.m. and were generally closed by 4.00 p.m. daily and almost without exception the workshops were not open to the weavers on weekends.

When the monetary economy, and its associated employment opportunities, work patterns and styles have been so heavily drawn from a single outside country, namely Australia, it is to be expected that those New Guineans who have accepted the cash employment opportunities offered by the intruding economic system should also imitate the work behaviour patterns and conventions of their expatriate counterparts. There was a noticeable and

very strong tendency for the weavers to adopt the conventional work hours of the other monetary sector workers in their vicinity, for example administration officers, mission schoolteachers, government clerks, etc. Even the independent operators who had access to their looms during all daylight hours appeared consciously to limit the length of their work day and work week to that which was customary for the Europeans and for their indigenous brothers engaged in full-time wage employment.

Therefore, whilst wishing to resist making an assumption which involves the application of a purely Western convention to a non-Western social system, in the case of the particular workforce group that was studied, it was a fact that the effective cash work-leisure choice extended over a maximum of only 40 hours per week. Such an assumption is certainly more in keeping with observed conditions, institutional and social constraints than the usual alternative which assumes that the work-leisure choice is effective over the whole 168 hours of any week.

Payment procedures

Weavers attached to mission or administration cells received payment when they presented a finished product to the cell manager. There were two payment practices observed in the surveyed cells. In the Makia and Chimbu units, payment was made once every fortnight when the weavers presented all the articles they had completed during that time to the manager. At Yauna, Tarabo and Marawaka there was no such regular and organized procedure and weavers presented their finished articles for payment when they had completed all the weaving from one full warp on the loom⁸ or when they had built up a certain finished stock. This procedure was also followed at Port Moresby, and weavers presented their finished articles for payment at the Hohola centre.

The weavers and their dependent households

Age, sex and marital status

The average age of the weavers included in the study was 25 years and ages ranged from about 15 to 46 years.⁹ The youngest

⁸A weaver usually wound a warp sufficiently long to enable him to make a number of articles, e.g. producers of large floor rugs (96 inches long) often made 5-8 rugs on a single warp.

⁹Very few New Guineans knew their exact ages. Therefore this particular statistic is based largely on the estimates made by myself and my assistant with the aid of information from friends and family familiar with the particular individuals.

weavers were those working in Papua (average age 17.7 years) and most of those had been weaving for three years or less. The weavers at Kundiawa had the highest average age (32.5 years), although the oldest weaver in the whole sample worked in the administration unit at Marawaka. Summary statistics on age are presented in Table 2.4.



Plate 1 The weavers' products: (A) A floor rug constructed from a combed and twisted raw fleece weft (rolag) on a cotton warp. (B) A woven tablecloth using woollen yarn. (C) A poncho fabricated from cloths similar to B.

There were only three women weavers included in the sample. The relatively small number of female weavers is perhaps explained by Wilson and Garnaut (1968:17) who report that the project officer associated with the early development of the project avoided encouraging women participants for fear that the technique of weaving might acquire a low status.

All three women weavers included in this study worked at Marawaka. Two were wives of indigenous mission pastors and the other was an Anga woman whose husband worked (infrequently) around the government station. All were quite consistent workers and despite the traditional role of women in daily gardening activities these women generally kept the two types of work separate, usually tending their gardens at weekends, in the early mornings, or after the cell closed down in the afternoons.

Of the fifty-seven weavers, seventeen were unmarried men and one of these married near the end of the survey period. The

three weavers at Yauna mission and three of the five weavers at Tarabo were single men but the largest proportion of non-marrieds was in Port Moresby. No fewer than eight of the nine weavers studied in Port Moresby were single men and were quite typical of the regular influx of young unmarried men to Moresby who come in search of work before returning to their home areas to take a bride. The marital status of each weaver is indicated in the Data Appendix.

Table 2.4 Age, education and monetary work experience of weavers, by area subgroup and total sample

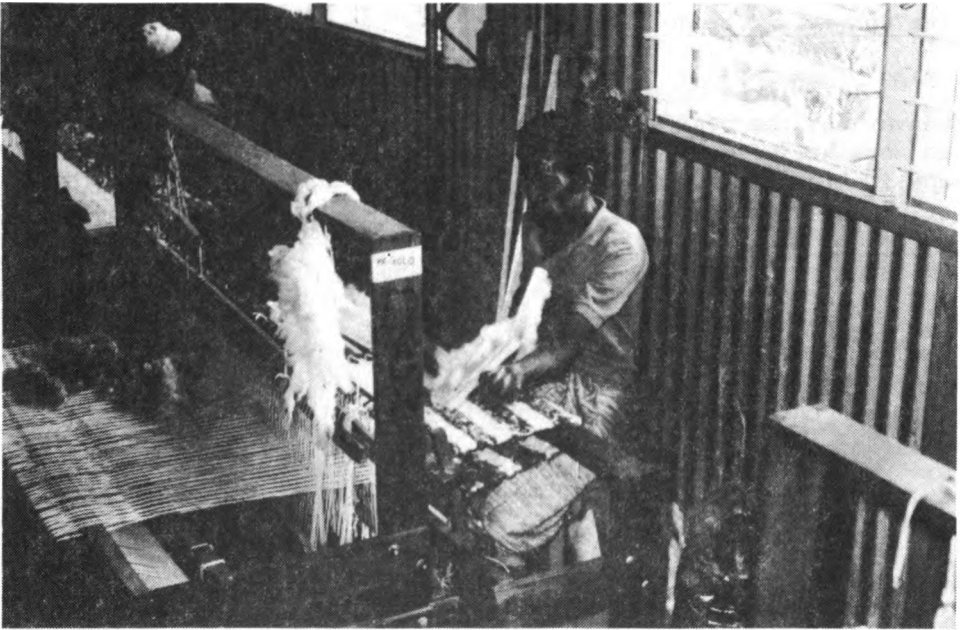
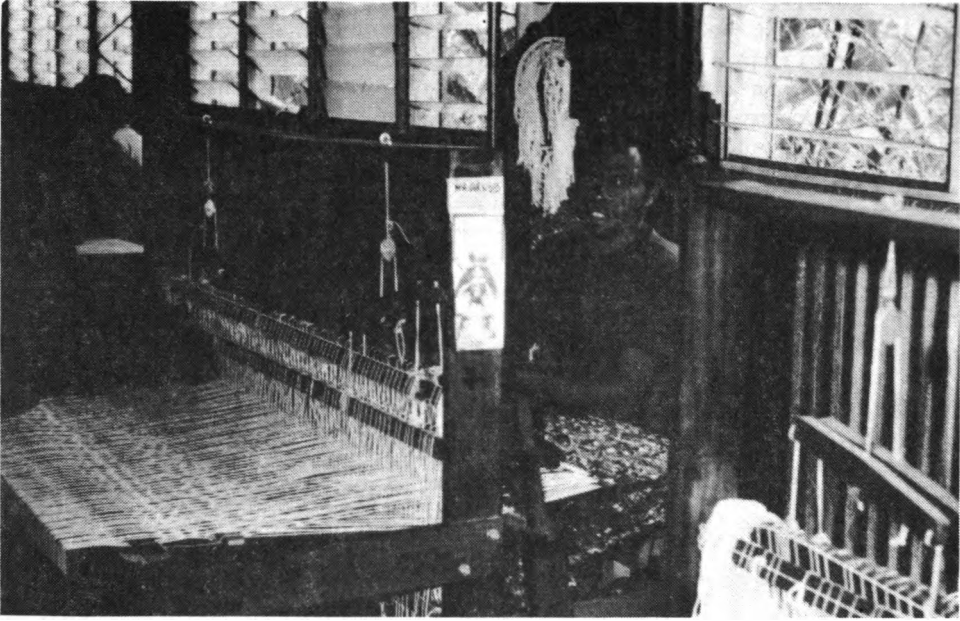
Area subgroup	Av. age of weaver (yrs)	Av. years schooling completed	Av. years former monetary work	Av. years spent weaving
Goroka (17)	24.5	2.0	3.9	4.6
Chimbu (8)	32.4	1.0	2.2	6.6
Marawaka (13)	26.0	0.5	1.1	2.4
Yonki (5)	22.8	3.2	0.8	3.2
Tarabo (5)	22.8	-	0.9	3.5
Port Moresby (9)	17.8	6.0	0.2	2.6
Total sample (57)	25.6	2.1	1.9	3.9

Source: Data Appendix.

Education, previous monetary work
and weaving experience

Forty-seven per cent of the weavers surveyed had no formal education at all and not one weaver had ever attended high school. This, of course, was partly the result of the scheme's original intention to offer weaving as an economic opportunity for uneducated village youths. The Papuan (Moresby) weavers were quite noticeably the most educated group. All had had at least three years of primary schooling and seven of them had a full primary school education (6-7 years). Five of the nine Moresby weavers had a reasonably good command of English whilst only one of the forty-eight Highlanders could speak English fluently.

Fifty-four per cent of all weavers had some experience with employment in the monetary economy other than through weaving. Of those, the average number of years employed in other pursuits prior to their taking up weaving was 3.6 years. One-half of the group which had had other work experience gained this through contract (indentured) labour and the Highlands Labour Scheme. Others had been sawmill labourers, general labourers, gardeners,



Plates 2 and 3 Weavers producing woollen floor rugs on handlooms at the Highland Weavers workshop, Makia village, Eastern Highlands District, Papua New Guinea.

house-boys, and coffee plantation workers. One actually claimed to have had 16 years of experience in other cash work, including 9 years as a jail warder. The younger Papuan group were much less experienced in other occupations. Only three of the youths had tried other employment and one of these had worked as a carpenter for almost a year.

Only six of the fifty-seven weavers were newcomers to the weaving trade and had worked as weavers for less than a year. The average length of time spent in the trade, taken over the whole sample, was 3.8 years. The Chimbu weavers (mean 6.6 years) and the Gorokan weavers (4.6 years) were the most experienced of all groups, a clear reflection of the early concentration of training in these two areas. However, because of the recent introduction of weaving to Papua and the high early failure rate resulting from the unduly ambitious attempt to establish all weavers as single independent businessmen, the average experience of the nine weavers sampled in the Moresby area was only 2.6 years. Only two belonged to the initial contingent of trainees and one of these had only recently been re-established following an early failure to operate successfully as an independent businessman.

The weaver's dependent household

In a large number of cases (68 per cent of the sample) the weaver was the head of the household in which he resided. Contrary to some beliefs concerning the universality of the extended family and its complex familial relationship in primitive societies such as New Guinea, there appeared amongst the sample, at least, a strong pattern of fairly small nuclear families.¹⁰ It was not unusual, however, to find an elderly parent and/or a wife's brother or sister fairly permanently attached to the household, nor unusual for a particular household to accommodate any number of transient and semi-permanent kin and clansmen for often fairly long periods.

In respect to the economic problem with which the study is concerned, it was necessary to discern those people associated with the weaver and his direct family and for whom the weaver had a firm obligation or commitment to ensure their welfare, that is, whether they depended, in full or in part, upon him and his gardens for their livelihood and cash needs. This unit has been referred to as a weaver-household or the weaver's dependent household.

Three young single men in the Highlands area posed a classificatory problem. Each had left the home of his parents and attached himself to another household in another village. The

¹⁰Moulik (1973:32, 61) makes the same point in relation to his observations in Milne Bay and the Eastern Highlands.



Plate 3 Independent weavers operating from a *haus blanket* constructed from traditional materials, Bioka village, near Yonki, Eastern Highlands District, Papua New Guinea.



Plate 4 A weaver in traditional Kukukuku costume posing with his two wives next to his dwelling at Jemuruk village, Marawaka subdistrict, Eastern Highlands District, Papua New Guinea.

weaver's relationship with the family that 'adopted' him was not clear, although it appeared that the relationship was only a temporary one. The weaver was given a place to stay and a share of the family's garden food if he required it. In return he might assist it in meeting some of its traditional and other cash commitments. Whilst the young 'lodger' was probably obliged to make some gifts of store food and cash to the household, it did not appear to be a regular commitment or a dependent relationship and in very many respects the young weaver was free to act, spend and work as would a completely uncommitted individual. An attempt was made to ascertain the value of the garden food goods received by the weaver from the family and the value of the cash and cash goods transferred to it. As the commitment of either party did not extend beyond this, the larger household could hardly be classified as the weaver's dependent household.

A similar situation arose with eight of the nine weavers in Port Moresby. All except one had attached themselves to the household of a relatively affluent *wantok* (clansman or friend from the same village area). In Moresby, however, the weaver was generally not the main, or even an important cash earner in the relationship. Rather, he was often seen as the relatively impoverished or dependent party. Because of his traditional ties with the true household head he could expect to receive accommodation and regular meals (most of which had to be purchased by the head and other cash-earning household members). The weaver's reciprocation of this regular gift was relatively small and also infrequent. On selling some woven articles he was perhaps expected either to buy some of the food for the next few days or else pay the head a particular sum of money (usually regardless of the size of his sales — and less than \$5). Apart from this degree of immediate reciprocation (which was slightly more than obligatory when the weaver's financial position was temporarily good, but not particularly demanding if his cash holdings were currently low) the weaver was able to remain largely independent of his *wantok*'s household in respect to other economic matters. In the short run the young weaver was able to avail himself of the head's generosity in respect to the basic components of livelihood for quite undemanding reciprocal commitments. Full reciprocation, however, was a matter for the indeterminate long run.

Such an apparently one-sided arrangement could persist only because of the strong traditional social ties that exist amongst clansmen. The relationship appeared to be the expression, in an alien and commercial environment, of the traditional obligation that one *wantok* feels to another to extend food and protection when the latter's current circumstance prevents his own adequate provisioning. In doing so, however, a debt had been created and the current recipient had an equally strong obligation that could be called upon in the long run. It is in this way, one suspects, that the urban benefactor views his current income transfers to the weaver concerned.

Again, as was the case with the three young Highlanders, it seemed unreasonable to include all those with whom the weaver lived as part of the weaver's own household. The ambiguity of the 'household' concept was overcome by considering only the weaver's true dependents and, for purposes of the economic analysis of the weaver's work behaviour, the relationship of the single man to the household in which he was currently resident was viewed as constituting an informal transfer of cash and kind. In return for regular gifts of food (which were valued) and for accommodation (which was not) the young man was forced to forgo some (flexible) proportion of his irregular earnings as an expression of short-run reciprocation. When, as was the case in Port Moresby, the short-run receipts from the adopted household far exceeded in value the reciprocal transfers made by the weaver, the difference in the two amounts was simply viewed as a net transfer of non-weaving income to the individual weaver concerned.

The size and structure of a weaver's dependent household was captured by measuring the number of adult equivalent consumption units. Children of various ages were given a weighting in accordance with the proportion of one adult's share of the good acquired by the household that they were thought to consume.

The coefficients used herein were taken from Lockwood (1968: 102). They were left unchanged for the current study because they were both simple to use and appeared to reflect quite adequately the proportions of the regular daily food items, e.g. *kaukau*, *kumu*, beans, maize, rice, tinned fish, that appeared to be consumed by children and adults in the New Guinean villages visited (Table 2.5).

Table 2.5 Consumption unit coefficients

Age	Male and female
0-1	-
1-4	0.5
5-9	0.7
10-14	0.8
15-50	1.0
50+	0.8

Source: Lockwood (1968:102).

Because the number of dependents attached to the weaver were recorded on two separate occasions (i.e. during each of the two survey visits) and it was found that the numbers had sometimes changed in the intervening period; and because an attempt was made to include a measure for the regular semi-permanent

dependents of the weaver, the calculations of the number of household consumption units given herein were somewhat complicated. The measure eventually taken was the average weekly number of regular adult equivalent consumption units in the four weeks prior to and including each of the two study periods.¹¹

A summary of the number of regular dependents of each weaver, calculated by this method, is presented in Table 2.6. The average size of the weaver's dependent household (including the weaver), when taken over the entire sample, was 3.14 Adult Equivalent Consumption Units (AECUs). There were, however, a predominance of young weavers without dependents in the Port Moresby area (mean 1.2 AECUs). The mean of 2.9 for the subsample of Gorokan weaver households was a reflection of the fact that many of these weavers were young married men with young and relatively small families. Most had migrated from their traditional home villages and were in the process of starting afresh in their new Makia village. Being fairly distant from their home areas and also sufficiently distant from Goroka township, they did not attract quite the number of permanent or semi-permanent dependents (kin or other *wantoks*) they might otherwise have had.

The average size of the Chimbu families (5.0 adult AECUs) was much higher than for any other group and this, no doubt, was a reflection of the higher average age of the weavers in this district. Several had grown families and also, being resident in their home villages, they were often directly responsible for the welfare of elderly parents and associated kin.

The average family size at Marawaka (3.9 CUs) was above average and partly explainable by the fairly young age at which

¹¹Example: Suppose the initial list of dependents comprised the weaver, his wife, his wife's 12-year-old sister and his 2-year-old son. In addition, his wife's adult brother came to stay with him every weekend. In between the two survey periods the wife's sister had returned to her home village. The average weekly number of regular adult CUs can be calculated thus:

<u>Survey period 1</u>	<u>Survey period 2</u>
4 x 1.0 = 4.0	4 x 1.0 = 4.0
4 x 1.0 = 4.0	4 x 1.0 = 4.0
4 x 0.8 = 3.2	4 x 0.8 = 3.2
4 x 0.5 = 2.0	4 x 0.29 = 1.16
4 x 0.29* = 1.16 (* $\frac{2}{7}$ of 1.0)	4 x 0.29 = 1.16
<u>14.36</u>	<u>13.52</u>
Total = <u>27.88</u>	

Average weekly regular adult CUs = $27.88 \div 8 = 3.48$. The measure can be (and was) extended to incorporate situations when I considered some person to be partly dependent on the weaver.

marriage and child rearing began in this more primitive society. The Yonki group, with a mean number of household CUs of 3.3 was closest to the overall sample norm. As three of the five weavers at Tarabo were single men, the average household size in that area (2.4 AECUs) was below the sample norm.

Table 2.6 Number of consumption units within weaver-household, by area subgroup and total sample

Area subgroup	Human AECUs per household	Human AECUs plus adult pig CUs per household
Goroka (17)	2.9	4.3
Chimbu (8)	5.0	7.7
Marawaka (13)	4.0	7.1
Yonki (5)	3.3	6.5
Tarabo (5)	2.1	3.5
Highlands (48)	3.5	5.8
Port Moresby (9)	1.2	1.2
Total sample (57)	3.1	5.0

Source: Data Appendix.

Additional household consumption units

A large part of all household consumption in a New Guinean Highland society involved the consumption of *kaukau*; and it was not only for the human members of the household that this garden produce was grown and harvested. The household's stock of pigs, perhaps the most prestigious element of the household's wealth (monetary or traditional), must be regarded as much more than a supplementary and occasional source of food. As Rappaport observes in relation to the Maring people of the Bismarck mountains, 'it is hardly facetious to say that the pig through its early socialisation becomes a member of a Maring family' (Rappaport 1968:59). Rappaport's observation was certainly generally applicable to all the Highland families contacted.

When gardens were planted and harvests made, the number of pigs that had to be provided for was certainly taken into account and it was largely because of the felt need to provide sufficient and regular supplies of *kaukau* for the pigs that a woman harvested her gardens so frequently. The volume of *kaukau* available to the human members of the household was thus somewhat less in total volume and value than the *kaukau* that was weighed as part of the women's daily harvest. One should, therefore, allow for the

household's pig stock in any measure which relates to the size of adequacy of a household's non-monetary income and its food requirements.

Rappaport contends that 'each adult pig receives a daily ration that equals an adult man's ration in weight, although it differs from the human ration in composition' (1971:127). An 'adult pig' was defined as one which weighed approximately 70 kilograms. Although information was collected on the number of pigs belonging to each weaver and corrected for pigs which were not currently kept with the weaver, no attempt was made actually to weigh them. However, considerable time was spent with the weavers and other village men discussing the current value of their pig stock. This certainly was a much discussed topic amongst village men and with the help, and often strong vocal interjection and correction, of clansmen and neighbours, it was possible to obtain, for each weaver, an estimate of the current value of each pig he possessed. As value was approximately related to size and as the approximate value of an 'average' adult pig could be estimated in each area it was possible to obtain a rough indication of the household's pig stock in average adult pig equivalents.

Using the assumption that an adult human and an adult pig consume approximately the same weight¹² of *kaukau* per day, it was possible to ascertain the proportion of the total weekly garden production which was considered by the weaver actually to be available for the consumption of the human members of his dependent household.

Thus,

$$Y_{SH} = \frac{Y_S N}{Q}$$

where

Y_S = the amount (by weight or by value) of weekly garden produce acquired by the weaver's dependent household;

Y_{SH} = the amount of Y_S considered to be freely available for human consumption by the household;

N = number of human AECUs;

Q = N plus number of adult pigs dependent on the output Y_S (see Data Appendix).

¹²Details of weight, rather than quality, were the only data the researcher found it possible to obtain when assessing the household's regular harvest of garden produce.

As might be expected, those families living in their traditional home village areas usually had the largest gardens, and hence the largest subsistence food incomes, and the same families usually had the most pigs per family.

Table 2.6 indicates that the Papuan weavers had no pigs at all and that the average number of adult pigs per weaver family, taken over the full sample, was approximately 2.0. Those weaver families at Marawaka and Yonki, each with an average of 3.2 adult pigs per household, and the weavers in Chimbu (average 2.6 adult pigs per household) held the largest pig stocks and thus faced the highest non-human 'committed' demands on their traditional garden produce incomes.

Chapter 3

Monetary incomes

In the usual study of commodity demand, the income of the consumer, the price of the good in question and the price of relevant substitutes and complements constitute the important explanatory variables in a commodity demand function. However, when 'leisure' is treated as a commodity and it is assumed that the individual has a freedom of choice in his everyday work-leisure allocation, part of the total income that he earns depends on the amount of leisure that he forgoes. The cash obtained from the cash-earning activity is a function of the leisure time forgone to acquire it, multiplied by the appropriate cash-earning rate per unit of work time.

It is convenient, in such circumstances, to define an amount $\bar{I}$, called 'potential income'. Inasmuch as the consumer also receives some income other than that which is derived from the particular cash-earning work (e.g. from property income, cash transfers, etc.), $\bar{I}$ will depend on three factors:

- (i) The *total number of hours* over which the work-leisure choice can be effectively made, H . In Chapter 2 it was argued that the effective choice period for the particular sample being studied herein was only 40 hours per week.
- (ii) The price of leisure per unit of time, i.e., the average *hourly earning rate* one can obtain in the work activity for which leisure was forgone, w .
- (iii) The *other* (i.e. non-weaving) receipts of the consumer, net of transfers made for taxes, fees, gifts to others, traditional payments, etc. This component will be called E ($E \geq 0$).

Thus,

$$\bar{I} = wH + E$$

But, wH , or potential work income, consists, itself, of two components:

- (i) wW , or *actual cash earnings* from the work activity per unit of time (week); where W is the number of hours that the worker chooses to spend in income-earning work activity, and
- (ii) wL , the *cash earnings forgone* by consuming leisure directly (i.e. by not working).

Of course,

$$H = W + L$$

The third component E is also important in the analysis. E can be expressed in either of two ways:

- (i) $E = Y_C + Y_S - C$ where Y_C is the other cash incomes of the worker and his dependent household. Some of it is earned income (i.e. from the sale of coffee, other dependents' wages, etc.) and some of it comes from cash transfers in the form of gifts and receipts from traditional payments (bride payments, etc.). Y_S is the non-monetary (subsistence) incomes of the household, and C is the weaver-household's cash transfers to other people and institutions. These include head taxes, licence fees, committed school fees, traditional payments and other transfers made, e.g. 'gifts' to clansmen, remittances to kin, etc.

The same quantity can be expressed thus:

- (ii) $E = Y'_C + Y_S + T$ where Y'_C is the other (non-weaving) cash incomes of the weaver household net of head taxes, predetermined and non-current expenditures, but not including traditional sector transfers. Y_S is non-monetary income and T represents net traditional cash transfer receipts, i.e. cash transfers received from bride payments, death compensations, remittances from kin, gifts from clansmen and friends, etc. minus cash transfers made by the weaver-household on these same customary items.

This and the two following chapters are concerned with all aspects of the quantity $\bar{I}$ (potential income). The current chapter deals specifically with the monetary income components of $\bar{I}$. Chapter 4 examines non-monetary income components and Chapter 5 deals with aspects of cash outlays and particularly those cash transfers mentioned above.

Weaving incomes

The average weekly income earned from weaving differed quite considerably amongst the fifty-seven weavers surveyed in this study. Because cash payments were made on a piece-rate basis, one of the major factors affecting this variability was the number of hours of effort which the weaver chose to apply to the weaving process. This is the main dependent variable of the current study.

These earnings also depended on several other factors, all of which affected w , the average hourly earning rate of the particular weaver. Data on the hours worked by the weavers will be examined a little more closely in Chapter 6 and comprise the main subject of the analysis carried out in Chapter 7. Only factors relating to the variability in w will be presented below.

Average weekly earnings from weaving. Not all weavers actually received their payment for the weaving which they completed during any given survey week within that week itself. Often payment for one week's production might not be received until several weeks later. The measurements of average weekly earnings from weaving used herein, however, were based on the payment due for each survey week's production and thus corresponded to the amount $W \times w$, that is, the calculated average hourly earning rate times the number of hours worked per week. Summary statistics on the average weekly earnings from weaving for each of the fifty-seven weavers are presented in Table 3.1.

Table 3.1 Average weekly earnings from weaving, by area subgroup and total sample

Area subgroup	Average earnings/week (\$)	Range of average weekly earnings within subgroup (\$)
Goroka (17)	13.33	8.30-25.01
Chimbu (8)	2.64	1.36- 4.23
Marawaka (13)	3.86	1.46- 6.76
Yonki (5)	8.46	4.27-15.46
Tarabo (5)	3.18	2.52- 4.06
Highlands total (48)	7.43	1.36-25.01
Port Moresby (9)	4.64	0.82-11.00
Total sample (57)	6.98	0.82-25.01

Source: Data Appendix.

The mean of all average weekly earnings from weaving, when taken over the whole sample, was \$6.98 per weaver per week. The range in average weekly earnings was quite dramatic, extending

from \$0.82 per week to \$25.00 per week. The highest earner was an experienced independent operator who worked in his own *haus blanket* in a village about 25 km from Goroka. Not only was he a skilful weaver but he had also established informal contacts in Goroka which enabled him to sell his output at a price above raw material costs and the usual labour rates paid elsewhere. He thus retained the surplus which in most other cells accrued to the cell management.

Average weekly earnings of this magnitude were not common and only six of the fifty-seven weavers (10.5 per cent) were found to earn more than \$15 per week. At the other end of the scale, seven weavers (12.3 per cent) had average weekly earnings of less than \$2 per week.

Some of the highest weekly earnings were found amongst the Gorokan sample of weavers. The mean for this group was \$13.33 per week, almost double that of the mean for the complete sample. The lowest average weekly earnings for a group of weavers was at Chimbu where the mean weekly earnings of the eight weavers concerned was only \$2.64 per weaver per week. Half of this group earned less than \$2 per week.

The mean average weekly earnings of the thirteen weavers at Marawaka was \$3.86 per weaver per week. Only two weavers had earnings in excess of \$6 per week but only one earned less than \$2 per week. At Tarabo the average weekly earnings of the five weavers was also low at \$3.18 per weaver per week.

There were two independent operators in the Yonki sample. These were estimated to earn an average of \$15.46 and \$12.36 per week respectively. They were responsible for lifting the mean average weekly earnings of this subgroup to a fairly high \$8.46 per week.

The range in average weekly earnings amongst the nine weavers from Port Moresby was quite substantial. Whilst the mean for this group was \$4.64 per weaver per week, the lowest earner in the entire sample operated in this area; he earned only \$0.82 per week. The highest earner from Port Moresby earned approximately \$11 per week.

The calculated average hourly earning rate from weaving (w).
The average hourly earning rate depended on a number of factors and in making calculations of this rate it was necessary to consider nearly every individual, and certainly each of the various cell groups, separately. A detailed account of the method by which the earnings rate for each weaver was calculated can be found in Philp (1976). Fortunately, this method simplified matters considerably and appears to have allowed for most, if not all, of the factors which caused the rates to differ amongst individual weavers, with-

out capturing the effects of each factor separately. In rather broad terms, the variation in hourly earning rates can be attributed to three sets of factors:

(i) The skill and dexterity of the weaver. Weaving is a craft which calls for certain manual skills, and variations in natural ability alone appeared to be an important variable determining earning rates. It seemed reasonable to expect that these skills improved with experience.

Whilst it was difficult to make reliable comparisons of skill and dexterity directly, because of the variety of styles and sizes of products being produced by different weavers at any one time, variations in the times taken to perform particular tasks were quite noticeable and certainly contributed to the variation in earning rates amongst weavers from a given cell.

A related factor which resulted in variations in rates across the cells was the availability of ancillary weaving capital. Mechanical bobbin winders, revolving warping machines and 'boat' shuttles were technically more efficient than their cruder counterparts. Furthermore, while it was noticeable that weavers within a particular cell developed similar techniques, the techniques used by the different cells varied quite considerably. As there was little or no contact between weavers of different cells, some cells used and continued to use less efficient techniques than others.

(ii) Article pay rates. Again, because of lack of uniformity of sizes and styles being produced in different cells and also because of the lack of uniformity in the method by which the article pay rates were calculated, comparison between cells was quite difficult. However, because the actual amount that was, or would be, paid for each article produced in each cell could be ascertained, it was possible to capture this variability in article pay rates in the calculations of w.

Some cells paid on a per unit of weight basis, others according to finished size and other cells used some broad rules of thumb that seemed to incorporate both. Some indication of the variations in the rates of payment for articles can be gained from Table 3.2.

(iii) Assistance provided by the cell management. In the Highland Weavers Pty Ltd workshop at Makia near Goroka, two or three men were employed to assist the weavers in performing some of the weaving tasks, mainly the scouring and combing fleece used in the production of floor rugs. Payment to these assistants was made by the company and not deducted from the earnings of the weavers. As scouring and combing are time-consuming tasks and account for approximately 30-40 per cent of the total time input required to produce a floor rug, any weaver who had some of these

Table 3.2 A sample of rates of payment for specified articles at various weaving cells

Weaving cell	Approximate size of large rug (inches) ^a	Approximate weight (lbs) ^a	Net payment to labour (\$)	Approximate rate per sq. ft ^a (cents)
<u>Fleece floor rugs</u>				
Highland Weavers Pty Ltd, Makia	96 x 56	11.0	5.40	14.5
Chimbu	96 x 60	10.5	5.60	14.0
Marawaka:				
Mission	78 x 53	10.0	5.00	17.4
Administration	86 x 53	11.0	4.50	14.2
Yonki Mission	88 x 56	10.0	9.00	26.3
Independents (selling privately)	84 x 50	8-9	12.00 (approx. only)	41.2

Weaving cell	Approximate woven size of cloth (inches) ^a	Net payment to labour (\$)	Approximate rate per sq. ft ^a (cents)
<u>Woven cloths (including ponchos)</u>			
Tarabo	50 x 25 poncho ^b	1.80	20.7
	62 x 31 poncho	2.00	15.0
	78 x 50	2.50	9.3
Port Moresby ^c	55 x 44	1.80	10.7
	85 x 70	4.10	10.0
	60 x 50	2.10	10.0
Highland Weavers	54 x 27 poncho	1.60	15.7
	100 x 59	2.60	6.5

^aImperial measures were the only ones used by the weavers at the time of the study.

^bA poncho requires some additional fabrication.

^cRate paid by Department of Business Development, Hohola.

tasks performed for him could produce a given article in faster time than an unassisted weaver and, *ceteris paribus*, would have a higher average hourly earning rate.

It was observed, however, that these combers, employed and paid by the cell management in addition to the piece-rate payments made to the weavers, could not supply *all* of each weaver's requirements of combed fleece. However, by knowing how much wool each comber could comb in a day and the way that the combed fleece was allocated amongst the various weavers, some allowances could be made for this factor in the calculation of the weaving time inputs and the average hourly earning rates for any weaver who received this form of assistance (Table 3.3).

Table 3.3 Average hourly earning rates (w), by area subgroup and total sample

Area subgroup	Average hourly earning rate (\$ per hour)	Range within subgroup (\$)
Goroka (17)	0.67	0.41-1.32
Chimbu (8)	0.20	0.13-0.30
Marawaka (13)	0.32	0.14-0.62
Yonki (5)	0.62	0.56-0.67
Tarabo (5)	0.34	0.23-0.49
Highlands total (48)	0.46	0.13-1.32
Port Moresby (9)	0.36	0.12-0.54
Total sample (57)	0.44	0.12-1.32

Source: Data Appendix.

The mean average earning rate for the whole group was 44¢ per hour, ranging from only 12¢ per hour for a young, inexperienced weaver in Moresby to approximately \$1.32 per hour for the experienced independent weaver near Goroka. The standard deviation for the total sample was 23¢.

The lowest earning rates for any particular group occurred, however, with the weavers of the Chimbu weaving cell. Four of the eight weavers in this group earned less than 20¢ per hour and the highest rate in the group was only 30¢ per hour, well below the total sample mean. Quite surprisingly, some of the Chimbu weavers were amongst the most experienced in Papua New Guinea and their low average earning rates were not the result of lower than average piece-rate payments. Rather, such low earning rates resulted from the painstaking care with which the weavers approached their craft. The Chimbu weavers produced some of the finest and technically the best quality floor rugs in the country. Unfortunately, their precision, quality and style were not appreciated on the market and popular demand was in favour of

chunky and heavier styles that could be produced much more quickly and with less expertise. The weavers concerned were unaware of their uneconomical techniques and so they persisted with them.

This lack of appreciation on the part of a weaver concerning how he might effect changes in his earning rate, w , was not confined only to the weavers of Chimbu. In fact, it appeared common to most of the weavers sampled. This factor, although not amenable to quantification, had of course quite an important bearing on the labour supply responsiveness of the workforce. Should the formal analysis later indicate that, in general, the weavers were fairly unresponsive to changes in earning rates, their lack of understanding of these basic business principles would appear to be one factor contributing to such a response pattern.

Some of the highest hourly rates were earned by the weavers at the Makia factory. The mean for this group was 62¢ per weaver per hour. The above average rates occurring for weavers at this cell could partly be attributed to the assistance which the weavers received from other employed personnel (i.e. combers); the availability of more efficient ancillary weaving equipment and the fact that most were quite experienced weavers who had been attracted away from the outer village cells.

The five weavers at Yonki also had quite high average hourly earning rates. The three who worked at the Swiss Mission at Yauna were paid a piece rate which was approximately double that paid in any other cell. The missionary manager of this cell found that he was able to pay these higher rates and still make a satisfactory profit (return over and above raw material and labour costs) for the mission. The two independents operating from Bioka village, like the other independent weavers near Goroka, were able to retain the surplus which would otherwise have accrued to the cell management. These four independent operators in the New Guinean Highlands thus had fairly high average hourly earning rates. The mean for this small group was approximately 85¢ per hour.

The mean average hourly earning rates at Marawaka (32¢ per hour) and for the five weavers at Tarabo (34¢ per hour) were both below the overall sample mean. Many of the weavers of these cells had not received any formal weaving training but had learnt the craft indirectly from other trainees. Furthermore, these cells tended to use pieces of weaving equipment which were rather more antiquated and less efficient than found elsewhere. Both factors partly contributed to the lower than average hourly earning rates observed for these weavers.

'Potential' weaving income. It was argued in Chapter 2 that the effective work-leisure choice period for the sample of weavers was limited to 40 hours per week. There appeared strong physical, institutional and cultural constraints on weaving

work time outside of this period. If one accepts this, then it becomes possible to define an amount which is 'potential' weaving income. It is the amount which could be earned if all of the potential 40 hours were devoted to cash-earning weaving activity and none were given up to 'leisure'.

Thus

$$\bar{I}_w = w \times 40$$

where

$\bar{I}_w$ is 'potential' weaving income.

Because of the direct relationship between $\bar{I}_w$ and w there is no need to recount again the variations that occurred in this variable amongst the sample. 'Potential' incomes for all weavers are given in the Data Appendix.

The 'exploitation' of potential income. Moulik (1973) was concerned with the response of Papua New Guineans to cash cropping. He attempted to analyse the reasons for an apparent 'under-exploitation' of either coconut or coffee production in three administrative districts of Papua New Guinea. Moulik's concept of 'underexploitation' could also be applied to this study. However, as it is only an indirect way of describing and analysing the labour effort actually supplied, it will not generally be used throughout the present study. Furthermore, when the income-leisure choice is freely and rationally made, the word 'under-exploitation' has unnecessary connotations.

The extent of the underexploitation of potential weaving income can be illustrated in the current case by looking at the ratio of the mean sample weaving income to mean sample potential income. Whilst the mean sample weaving income is \$6.98 per weaver per week, the mean sample potential income is \$17.69 per weaver per week. One could conclude from this that the 'average' weaver from the sample exploited slightly less than 40 per cent of the cash earning potential of this activity. He 'spent' in unearned income approximately 60 per cent of his total potential earnings on the non-work activities which in this study have been collectively defined as 'leisure'.

The rate of 'exploitation' of potential cash earnings varied considerably amongst the sample and ranged from a high of approximately 66 per cent to approximately only 17 per cent. Because

$$Y_w = wW \quad (Y_w \text{ being actual weaving income})$$

and

$$\bar{I}_w = wH$$

$$\frac{Y_w}{\bar{I}_w} = \frac{wW}{wH}$$

With H being constant, it is seen that an adequate analysis of underexploitation is given by the more conventional analysis of W (later presented as S_L) as undertaken in this study.

The other (non-weaving) cash incomes of the weaver and his dependent household

In addition to the weavers' cash earnings from their weaving, all except one of the fifty-seven weavers and/or their dependent households received some other cash incomes during the period covered by the survey. However, no weaver received a regular cash income from another source which required his regular attention during this same period. In most cases these other cash earnings resulted from either the combined household effort or from the efforts of other household members who did not have the opportunity to earn regular cash incomes from wage labour or other activities such as weaving.

The effect of the household's non-weaving cash income on the weaver's work effort is dealt with later in the more formal analysis. It is not suggested that the data on gross non-weaving cash income per household presented in the current chapter adequately reflected the relative importance of such income to each of the different weaver households. Obviously, the size (number of Adult Equivalent Consumption Units) of each household, the availability of non-monetary income, the household's access to consumer good markets, the level of the household's pre-committed payments for taxes and other such purposes, would affect the significance of this amount.

In the later analysis, the assumption can be made that the non-weaving incomes of the weaver household are exogenous within the decision time period defined, that is the amount is determined quite independently of the weaving input made by the weaver member of the household. In only a few cases did there appear evidence of a trade-off being made between weaving and some other income-earning activity within the defined decision period. In each case the choice involved work associated with the growing of coffee. The extent of this and the way in which it was handled in the analysis is outlined in Chapter 6.

Earned incomes. The term '*earned* income' has been used to distinguish the cash obtained by the weaver or other household members from non-weaving sources other than from gifts and traditional-type payments. The relative importance of the various

sources of this non-weaving earned cash income depended to some extent on the area in which the weaver lived. The data summary presented as Table 3.4 indicates the relative importance of some of the main sources of these particular cash earnings according to area subgroup. The average weekly earned cash income from all such sources for each of the fifty-seven weaver households is presented in the Data Appendix.

The predominance of coffee as a cash crop in the New Guinea Highlands was such that no less than 77 per cent of all the weaver households in those Highland areas where coffee was grown¹ received some additional cash income from this source. Income from coffee sales accrued mainly from May until about August and hence the survey period coincided with much of the coffee season in the Highlands.

A coffee garden, however small, was certainly regarded as a prestigious asset and despite any other occupation or alternative cash sources they might have, many, if not most, Highland households with rights to traditional land had, at some stage, grown a plot of coffee.

Coffee income was received when bags of parchment or cherry coffee were sold to the coffee buyers. For purposes of taking account of the income received from this source by the sampled weaver-households, all receipts recorded up to the end of the second survey round were averaged over the maximum number of weeks for which income-expenditure data were recorded for each household.²

Several weavers who lived away from their home villages claimed to have a coffee garden back in their village. However, they also claimed that the care of these gardens and the harvesting of the crop were now the responsibilities of other kin and that they, personally, no longer received income from these gardens.

Despite coffee income being a most important supplementary source of income for many weavers, only in Chimbu did some weaver-households earn more from coffee sales than from weaving during the survey period. The highest amount received by a Chimbu weaver household was estimated at approximately \$3.60 per week over this period. Two other Chimbu weaver-households had coffee earnings of \$2.00 per week or greater. Earnings from coffee alone constituted a very high 68 per cent of all the other (non-weaving) cash earned by the Chimbu sample group.

¹This excludes Marawaka.

²This was usually the four weeks prior to visit one, the two weeks of the first work survey period, the time between the first and second visits and the two weeks of the second work survey period.

Table 3.4 Sources of other (non-weaving) earned cash income by area subgroup

Area subgroup	Av. weekly earned cash Y (Y _{Earn.}) per household (\$)	Y _{Earn.} from coffee sales (\$)	Earnings from garden produce sales (\$)	Gambling wins (\$)	Other sources (\$)
Goroka (17)	2.27	0.49 (21.8) ^a	0.45 (19.8)	0.46 (20.3)	(38.1)
Chimbu (8)	3.09	2.11 (68.3)	0.40 (13.0)	0.22 (7.3)	(11.4)
Marawaka (13)	0.83	- (-)	0.04 (4.5)	- (-)	(95.5) ^b
Yonki (5)	2.82	1.08 (34.8)	0.49 (17.6)	- (-)	(47.6)
Tarabo (5)	0.62	0.47 (76.4)	- (-)	0.12 (20.2)	(3.4)
Highlands total (48)	1.90	0.68 (35.6)	0.29 (15.1)	0.22 (11.4)	(37.9)
Port Moresby (9)	0.37	- (-)	- (-)	- (-)	(100.0) ^c

^aAll bracketed figures refer to the *percentage* of the household's average weekly earned cash income obtained from each of the listed sources.

^b45 per cent of all the non-weaving earned incomes of weaver households in Marawaka came from the performance of *sing sings* (dances) for tourists and the sale of traditional artifacts.

^c31.6 per cent came from the sale of soft drink bottles.

Source: Data Appendix.

At Yonki, cash earnings from coffee sales accounted for approximately 35 per cent of the other earned income of the five weavers concerned and accounted for a very high 76 per cent of the other (non-weaving) cash earnings of the five weavers at Tarabo, although the actual amounts involved in the latter case were rather small (mostly less than 50¢ per weaver per week).

Even in the Goroka sample, ten of the seventeen weavers received some cash income from coffee sales, and coffee income accounted for approximately 22 per cent of all the other cash incomes of this group.



Plate 5 Weaver-households occasionally supplemented their cash earnings through the sale of surplus garden production. Here bundles of *kaukau* are being offered for sale at an informal roadside market near Goroka, Eastern Highlands District, Papua New Guinea.



Plate 6 Many weaver-households obtained substantial non-monetary income from their traditional gardens. Here the wife of a Marawakan weaver tends a taro garden, Marawaka village, Eastern Highlands District, Papua New Guinea.

Overall, for weaver-households in areas where coffee was grown, it was estimated that the average weaver-household received approximately 40 per cent of its non-weaving cash income from the sale of coffee. The weavers in Port Moresby and Marawaka sadly missed this supplementary cash source.

Quite a few weaver-households in the Highlands earned some other supplementary cash income from the sale of garden produce. However, the sale of such produce accounted for 15 per cent of the other earned incomes of these households and receipts from the sale of sweet potato constituted about half of this amount. This cash source was relatively more important for the Goroka group and accounted for approximately 20 per cent of their other cash earnings.

The main source of cash for the Marawakan weavers other than from their craft came from the performance of traditional dances (*sing-sings*) for the occasional planeload of tourists which visited the area and from the sale of traditional artifacts and decorations (*bilas*) to these groups and at the Goroka Show. Although receipts from such sources constituted approximately 45 per cent of all the non-weaving earnings of the Marawaka group, the amounts involved were usually quite small and averaged less than 35¢ per weaver-household per week during the period.

The Port Moresby weavers earned very little other cash apart from what they received from weaving. Four of the nine weavers had no other cash earning sources at all. Three others earned approximately 30¢ per weaver per week from the sale of soft drink bottles, one earned a small amount from the sale of fish and another received \$1.00 per week for washing his *wantok's* clothes.

Only four weaver-households out of the entire sample received cash from the paid wage work of other dependent household members. In two cases the cash income was earned by indigenous church pastors who received a single payment of \$30 per year. The other two had occasional jobs or produced handicraft items for sale and contributed approximately \$1.50 and \$2.20 per week to their respective households.

Gambling wins were often reported as a cash source in some areas and, as would be expected, such amounts were most difficult to determine with accuracy. Considerable time was spent in trying to ascertain whether the reported 'winnings' were net of losses. The New Guinean card game of 'Lucky' bewilders the observer but casual observations left the impression that there was regular 'winners' and regular 'losers'. The sample of weavers appeared to include persons of both categories. Several of the sample, and especially some of the Gorokan weavers, appeared to possess greater experience, intelligence and business acumen than the average villager and reported regular winnings.

Two weavers (one from Goroka and the other from Chimbu) owned small village trade-stores. These stores opened infrequently, were mainly stocked from the earnings of weaving and operated by the weaver or his kin in the evenings and at the weekends. The stores sold such items as tinned fish, rice, stick tobacco and confectionery. Freely given credit and lack of understanding about the concept of 'profit' in the pricing of goods made net earnings from this source almost accidental. It was calculated that the Gorokan weaver had net earnings (net only of stock purchase costs) from this source of approximately \$1.60 per week. His Chimbu counterpart would have been fortunate to have cleared 30¢ per week.

Other irregular cash earnings recorded in the survey accrued from such sources as the sale of pigs, the sewing of clothes, the panning of gold in local creeks and from the infrequent (casual) performance of other (non-weaving) labour for wages.

Cash receipts from traditional customary transfers. For some households, a substantial source of other cash income came from the receipt of what one might call traditional customary cash transfers. Since the introduction of the monetary economy in New Guinea, cash has become a regular and permanent component in the traditional exchange system. There were two types of payments that were common to all areas: bride payments and death compensations.

Bride payments were made by the groom and his clansmen to the bride's clan in several 'instalments' prior to the actual marriage. In addition to a collection of items such as feathers, armbands, shells and associated *bilas*, stone and/or steel axes, plus a predetermined number of pigs, the payment had come to involve a substantial cash component.

The household that formally received the cash payment quite often did not consider the full amount to be its own and available for its own outlay on goods and services, etc. Sometimes the cash received was immediately distributed amongst clansmen and, perhaps, used to honour debts created in past exchanges.

The second type of traditional payment common to the study area was that of *death compensation*. Although the methods of payment and the rationale behind such payments were more difficult to follow, they appeared to have been made to the clans, and sometimes specifically to the close relatives of the person who had died. As with the bride payments, it was necessary to discern the amount of cash actually received by the household concerned and the amount that was free for its own allocation on goods, services or other outlays. Only the latter part was taken into account and recorded.

Although only six of the fifty-seven weaver-households had received cash income from traditional customary payments during

Table 3.5 Average weekly non-weaving cash incomes (gross) by area subgroup and total sample

Area subgroup	(1) Earned Y (\$)	(2) Gifts and trad. payments (\$)	(3) All non-weaving cash Y per h/h (\$)	(4) (2) + (3) (%)	(5) (3)/N (\$)
Goroka (17; 49) ^a	2.27 (0.30-5.66) ^b	0.71 (0.00-4.87) ^b	2.98 (0.47-7.14) ^b	23.8	1.03
Chimbu (8; 40.3)	3.09 (1.20-4.65)	1.55 (0.04-4.55)	4.64 (1.84-8.73)	33.4	0.92
Marawaka (13; 51.5)	0.83 (0.00-2.43)	0.45 (0.00-1.76)	1.28 (0.00-4.10)	35.1	0.32
Yonki (5; 16.5)	2.82 (0.07-7.23)	0.41 (0.00-1.43)	3.23 (0.14-7.73)	12.7	0.98
Tarabo (5; 10.7)	0.62 (0.33-1.12)	0.91 (0.13-2.02)	1.53 (0.76-3.14)	59.5	0.71
Highlands total (48; 168)	1.90 (0.00-7.23)	0.76 (0.00-4.87)	2.66 (0.14-8.73)	28.6	0.76
Port Moresby (9; 11.1)	0.37 (0.00-1.25)	2.42 (0.44-7.79)	2.79 (0.63-7.79)	86.7	2.26
Total sample (57; 179.1)	1.66 (0.00-7.23)	1.03 (0.00-7.79)	2.69 (0.14-8.73)	38.3	0.86

^aThe first number in brackets is the number of weaver-households in subgroup; the second is the number of AECUs belonging to weaver-households within subgroup.

^bRange within subgroup.

Col. (1) = Average weekly cash receipts of the weaver-household from earnings other than from weaving.

(2) = Average weekly cash receipts of the weaver-household from gifts and traditional payment transfers.

(3) = Average weekly non-weaving cash incomes of the weaver-household, i.e. (1) + (2).

(4) = Percentage of household's non-weaving cash incomes received in the form of gifts, etc.

(5) = Average weekly non-weaving cash income available per AECU in the weaver-household.

Source: Data Appendix.

during the year before the first survey contact with them and up to the completion of the final survey round, no fewer than thirty-five out of the fifty-seven households (or 61 per cent) had contributed to such payments over the previous twelve months, during the survey period, or else expected to have to make such contributions in the year ahead. The average amount of the transfer receipts of the six weaver-households mentioned was just over \$20 per weaver-household.

Gifts of cash and cash goods. In addition to the cash transfers and exchanges resulting from traditional customary activity of the type outlined above, a large number of small transfers which were being made almost daily between kin, clansmen and close friends were observed and recorded. These transfers will be called 'gifts' although, strictly, this is a misuse of the word. It is rare indeed, in New Guinean society, to find that a gift is actually bestowed without reciprocation being expected eventually. The transaction is, perhaps, analogous to a very informal and unrequested loan with an indeterminate repayment period. The obligation to accept a gift offered seemed, in some cases, virtually to be just as strong as the obligation to make one. Repayment is guarded by a customary sanction which calls for eventual reciprocation, although the form in which this will be made, like the date of repayment, is not stipulated explicitly. 'Gifts' of cash or cash goods were made, therefore, either to repay a past gift received or with the intention of creating a new obligation on the part of the recipient to repay the donor in the future. In this chapter only the gift income (transfers) *received* is dealt with, and outlays made in this regard are discussed in Chapter 5.

The average weekly income received by weaver-households in the form of gifts plus traditional payments, and the total non-weaving cash income per household per week, are both given in the Data Appendix and summarized in Table 3.5. The relative importance of all non-earned cash transfers received (i.e. from gifts and other traditional sector transfers) is also indicated in this table.

Chapter 4

Non-monetary incomes

Throughout much of Papua New Guinea, where the transition to specialized monetary production is still far from complete, a substantial component of total real income is not a part of the monetary exchange system. Many goods and services are produced directly by the household and they are, in turn, consumed by them without passing through the market. Inasmuch as a consumer's demand for any good or service (be it food, clothing, entertainment or leisure) is related partly to the level of his total income, one must ensure that, in measuring total income, the large non-monetary component is not ignored merely because it has not been valued in the market place.

It is quite difficult to compare or to aggregate the non-monetary with the monetary components of total real income but if labour response is partly a function of total income then a satisfactory resolution of this problem is required. It is, however, necessary to keep in mind the limitations imposed by the fact that non-monetary income lacks complete comparability with the cash component in the real world of the Papua New Guinean mixed economy.

In this study only one (but by far the most significant) of the many sets of goods and services that constitute a household's non-monetary income will be considered; this is the set of household-produced food items. One could, of course, include self-provided housing, traditional articles of clothing, craft products, household utensils, tools and fuel supplies, as well as the provision of services such as defence, social security, entertainment, education, etc (see Fisk 1975b:255-60). It is most difficult to obtain a meaningful method of valuing such an array of items and services. Whilst the problem is certainly not avoided by confining the analysis to this single component of non-monetary income, it seems reasonable to contend that own household food production is the major and most variable component of all non-monetary income.

During the earlier stages, the production of subsistence food crops is the predominant activity of all members of the

household and it is from subsistence production that the household obtains all it regards as the essentials of life. Even at this stage, however, some goods and services available only from the monetary sector are desired by the subsistence producer, and to gain access to them he seeks to supplement his subsistence production with a crop or an activity from which he can earn the cash necessary for their acquisition.

It appeared, however, that the weavers of this study were at a more advanced stage of the transition to a full monetary economy. Unlike a large majority of other village folk, the weavers had the opportunity to earn regular cash incomes which were well above the village norm. Before the survey was made it was expected that weaving would be regarded simply as a cash-earning activity supplementary to the individual's major involvement in subsistence gardening. This was not so, even in the remoter village areas where some of the weaving cells existed. Instead, the weaver regarded himself as a small commercial businessman (*man bilong bisnis*), involved in a Western style enterprise, and with which he associated certain conventions regarding the appropriate times of the day and the days of the week on which it was customary to work at this particular monetary endeavour. During these particular times and on these particular days it was most unusual for the weaver to perform work in his garden.

It is therefore argued that, for purposes of this analysis, the amount of non-monetary income received by the household (i.e. the quantity of the household's garden produce) is determined independently of the weaving activity of the weaver member of the household. Whilst the long-run decision on how much of the available household land should be brought under cultivation, the length of the fallow, etc., and hence the overall size and productivity of the household garden may well have been made with some regard to the potential availability of weaving income, it was a rather lumpy decision. Having been made, the labour input, and especially the male weaver's labour input, required to perform his traditionally prescribed gardening tasks, was fairly well defined. In almost all sample cases the traditional labour requirement from the weaver appeared sufficiently small to be performed adequately outside of the hours of the week which could otherwise have been used to earn a cash income from weaving. The garden work performed by the weaver did not conflict with the cash labour-leisure choice during the choice period to which this analysis refers. The simplifying, but not unreasonable, assumption was thus made that, within this period, the size of the household's non-monetary income was exogenous to the weaver's work-leisure choice.

In the short run, the garden produce available to the household was a function of the predetermined garden size, rainfall and other physical factors, the number of female and non-weaving male labour units, the work effort contributed by

each non-weaving household member, etc. The relatively small labour input that the New Guinean male does commit to his subsistence gardening is very productive indeed. By performing the few irregular traditionally prescribed tasks and allowing the household women to do the rest, he is generally able to ensure an adequate food supply for his family and his pigs. All weavers who had gardens appeared to perform the tasks required of them. It would have been interesting, however, to see whether there was any relationship between the cash work input of the male weaver and the availability of other adult males within his household who could assist him in performing his prescribed garden work. Unfortunately, only three of the sample households had non-weaving adult male members and in two of these cases they were elderly parents who no longer performed effective garden work.

The traditional garden is a feature of New Guinean village life and the size of one's garden (together with the size of one's pig herd and number of wives) is still a most important measurement of status. Women take much pride in their household gardens and do not neglect them merely because their husbands happen to have sizeable cash earnings. Because of this factor and because of the noticeable independence of action between the household's men and women in conducting their day-to-day affairs, there appeared good reason to believe that the effort supplied by the household women to gardening was quite independent of the weaving activity of some other household member.

The problem of valuing non-monetary income sources

Although it is possible to measure all the diverse varieties of garden produce in units of weight, it is not possible realistically to equate the worth of this physical amount with that of other forms of income measured in monetary units. The problem is, of course, to value (i.e. to impute a price for) the physical units of garden produce so that comparisons and aggregations of all forms of income can be made.

This might not be difficult in a predominantly commercial economy where the market and the process of exchange bring into equilibrium the value to the producers and the value to the consumers. However, where the self-consumed proportion of household garden production is high and where this represents a substantial proportion of total real income, where *regular* markets do not always exist, and where those that do are subject to many imperfections and cultural sanctions, the market is an imperfect assessor of the value of produce retained by the household for its own consumption. Furthermore, even where traditional village food markets do exist they are usually effectively separated from one another and the prices in one can vary so markedly from another that erroneous conclusions can be drawn about the

subjective worth of an identical amount of an identical product in two different market regions. Such a situation was found with some of the sample weaver-households.

Households in Marawaka could obtain approximately 1.5¢ per lb for sweet potato if they chose to sell to the local administrative workers in the area. Those in Chimbu could, however, obtain approximately 5¢ per lb for the same product at their local produce market. The average weekly production (in units of weight) of the households in each of the two areas proved to be strikingly similar. Households did not often sell sweet potato on the market in either area and those that did would have sold much less than 10 per cent of their total weekly production. Even then, the amount of sweet potato that was offered on the market for sale was invariably a surplus over and above that required for the household's human members, its pigs, or that which might have been required by and given to other clansmen whose own gardens were less productive. It seemed unreasonable, therefore, to infer from the sale of this minor proportion of total household garden production (which might otherwise have been left to rot!), that the effective income value to the average household in each of the two areas of identical physical amounts of the same product was more than three times greater in the case of the Chimbu than in the case of the household from Marawaka. The local market price could, therefore, seriously exaggerate the income of one group compared with that of another, so some attempt was made to devise a more appropriate method.

Fisk has drawn considerable attention to this problem in relation to valuing subsistence income for inclusion in the national income accounts of countries where this non-monetary component is known to be quite substantial (Fisk 1975b). No one method of imputing a price for this subsistence component is perfect and any price chosen will have considerable limitations:

There are numerous different prices that could be used as the basis for imputing a value to subsistence production and consumption, and there is no absolute sense in which it can be said that any one basis is the 'right' one. The most appropriate basis in any one case will depend very largely upon the purpose for which the final estimates are to be used (Fisk 1975b:277).

In this study interest was focused on the direction and extent to which the subsistence income of the weaver's household, in conjunction with the household's other exogenous cash incomes, affected the quantity of effort the weaver committed to his cash-earning activity. Instead of attempting to choose and justify one particular method, the household's non-monetary (food) income component was valued in two distinct ways. Each method was then used in the empirical model and the different sets of results obtained when using the two value methods will be reported.

Although local market prices have the above limitations when used in valuing subsistence food production for comparison between households of two different price regions, they provide a reasonable indication of the relative values of different types of produce within a single area. The household invariably harvested other crops besides sweet potato even though the latter was the main form of garden produce in the sample areas. In order to aggregate pounds of sweet potato with pounds of taro, bundles of *kumu*, cobs of corn, sticks of sugarcane, etc. an attempt was made to take into account the local market price of these other goods relative to the local price of sweet potato (*kaukau*) and obtain a measure of aggregated vegetable produce which was called *kaukau equivalents*.¹ Then, having expressed amounts of all the various vegetable types in comparable units one had a basis to attempt different valuation methods. The validity of this method rests, of course, on the fact that *kaukau* was clearly the main staple in all areas of the survey.

Method 1: Local market prices. This is the simplest and most common method of valuation used by economists and is often accepted without question. As pointed out above and in the writings of Fisk, it is a method fraught with limitations and inconsistencies and one which tends to exaggerate unduly the measured income differences between households in different areas when subsistence incomes are a substantial component of total real incomes and local produce market prices vary significantly amongst the areas concerned.

The number of pounds of KkE obtained during the first data collection period was multiplied by the price of sweet potato per pound as observed in the local market during that same period. A similar calculation was made during the second survey period using the price then obtaining. The two sets were simply added together and calculated out on an average weekly basis.

¹Example: If the price of sweet potato was found to be 2.5¢ per lb during the week of the survey, and that a pumpkin of 4-5 lbs was selling for 30¢, corn was six cobs for 10¢ and *kumu* 10¢ per bundle, the aggregation method would be as follows: all sweet potato was actually weighed in pounds. Each pumpkin brought home with an estimated value of 30¢ was regarded as being of equivalent exchange value to 12 lb of sweet potato (i.e. $30¢ \div 2.5$), each six cobs of corn as equivalent to 4 lb sweet potato (i.e. $10¢ \div 2.5$) and each bundle of *kumu* as also being equivalent to 4 lb of sweet potato. In this way the different garden produce could be aggregated into units of *kaukau equivalent* (KkE). The units are expressed in units of weight but the aggregation is made on the basis of local exchange values.

Method 2: Uniform imputed prices. This method attempts to avoid the distortions to the calculation of subsistence consumption caused by applying the large price variations for *kaukau* which often occur between the various local markets to the consumption of households whose level and type of consumption are basically similar. In this case it is assumed that similar amounts of non-marketed *kaukau* have similar values to all households regardless of variations in the market prices. The problem is to determine a particular uniform price that is in some way meaningful.

To do this it was assumed that the perceived monetary sector alternative to household produced and consumed *kaukau* was not so much the purchase of this item on the local market but the purchase of some readily available trade-store substitute. This was consistent with some observed aspects of indigenous behaviour, that is villagers who had their own gardens appeared somewhat reluctant to bridge temporary production inadequacies by purchasing *kaukau* at the local market. They saw this as a shameful admission of their own gardening incompetence and an equally shameful admission of their failure to have created sufficient obligations with other clansmen in the past for which they might now call in their time of need.

The one trade-store good which was the most general substitute for *kaukau* was rice. The task thus became one of finding a value for *kaukau* relative to that of rice and one which could be applied uniformly to value, in monetary terms, the physical units of KkE that were recorded for each household. From a survey of trade-store prices, it was found that the average price of rice, during the relevant months of 1974, was approximately 20¢ per lb. It remained to calculate an average price per pound of *kaukau* by some equivalence with the price of rice.

The conversion of one to the other was based on the relative calorific value of *kaukau* and rice. The calorific values of native foods were taken from sources originally compiled by Eben Hipsley and were those used by Fisk (1975b: Tables I and II). The relevant information is condensed in Table 4.1.

It must be remembered that the measure of units of KkE was constructed on the basis of the exchange values on the nearest local market of other crops relative to sweet potato. Thus one pound of KkE is not necessarily equal to one pound of sweet potato in terms of calorific value. In fact, the table suggests that most other traditional food items contain considerably fewer calories per pound than does sweet potato.

It was estimated that approximately one-third of all units of KkE were not actually sweet potato; and for purposes of simplification it will be assumed that the non-sweet potato component of KkE had an average calorific value per pound equal to only half that for sweet potato (i.e. approximately 195 calories

per pound). Although this was only an estimate, it is felt to be sufficiently accurate so as not to affect significantly the sensitivity of the results.

Table 4.1 Calorific values of relevant traditional and other foods

Food item	Calories per lb harvested weight
Sweet potato	390.0
Taro	279.5
Yams	322.5
Cassava	476.0
Miscellaneous greens (<i>kumu</i>)	207.0
<i>Pit pit</i>	41.6
Bananas	190.4
Corn	134.3
Sugar cane	107.1
Rice (white/brown)	1600.0
Tinned fish	916.0

Source: Calculations based on folios 21 and 22 of *Territory of Papua New Guinea Needs Allowance Survey for Local Officers of the Public Service of Papua New Guinea*, December 1966.

Thus, one pound of KkE has a calorific value of $\frac{2}{3} \times 390 + \frac{1}{3} \times 322.8$ or approximately 320 calories per pound. Note that rice had 1600 calories per pound. Thus, in terms of calorific value, one pound of rice equals $1600 \div 320 = 5$ lb of KkE. At the price of 20¢ per lb for rice this gives KkE a relative value of 4¢ per lb.

This figure (4¢ per lb) was also the dry season price of sweet potato on Goroka market in 1974. Thus, it was not only a reasonable reflection of the relative value of *kaukau* compared with its common monetary sector substitute but it is also well within the bounds of the actual prices being charged for the major traditional crop in the Highlands' produce markets and was the actual price obtaining in the most prominent market in the New Guinean Highlands during an important period of the year with which the survey corresponded.

The 'subsistence' incomes of Port Moresby weavers

Subsistence income in the form of home-grown and consumed garden produce was available only to the five Highland groups included in the sample. Only two of the forty-eight Highland

families studied did not receive any income from this source. On the other hand, not one of the nine weavers working in and around Port Moresby had their own gardens or received regular incomes from this source. Most of the weavers lived considerable distances from their home villages and traditional garden lands and so were unable to supplement their cash incomes in the way that the Highlanders could.

Although the Moresby weavers could not supplement their income by exploiting their traditional economic system and the village garden lands of their clan group, they did, in fact, exploit a very basic and widespread traditional custom which enabled them to achieve very similar ends in terms of their own total welfare. This custom, which is often referred to as *wantokism*, enabled most of the individual weavers in Port Moresby to feel assured of a regular and sufficient supply of basic food and a place in which to live. It could be regarded as the equivalent expression in a monetized urban economy of the traditional village custom of freely providing *kaukau* to one's *wantoks* who temporarily find themselves in less favourable circumstances than one's own.

By attaching themselves to the households of relatively affluent *wantoks*, who were customarily obliged to guard their less fortunate clansman's welfare, some of the young migrant weavers in Moresby were able to relieve themselves of the struggle to provide their own adequate diet and shelter. In a city where basic food prices were quite high, the value of this income received in 'kind' was often substantial.

Arrangements between the individual weavers and their *wantok* custodians varied from case to case. In some cases the weaver contributed quite substantially to his *wantok's* purchases of food-stuff and the net income flow to the weaver was consequently low. In other cases the weaver seemed to contribute little and was almost totally dependent on his *wantok's* generosity. Furthermore, the quality of the diet provided varied a little from household to household.

In order to value this source of income to the weaver the following procedures were adopted. Most weavers received one evening meal per day from their *wantok* household but were responsible for purchasing their own lunches if they required them. Where the main meal usually consisted of a plate of boiled rice and tinned fish this was valued at 40¢ per day (the price charged by some government hostels in Moresby for this meal). If the weaver was supplied with more expensive food, cups of tea, biscuits, etc. his income from this source was valued at 50¢ per day.

It was also necessary to try and relate the value of the food received from the *wantok* household to the uniform price method of valuing KkE flows received by the weaver-households in

the Highland areas. Again, to compare rice and fish with *kaukau* it was necessary to resort to the method of relative calorific values. A large plate of boiled rice together with one-half of a 15 oz tin of fish (valued in total at 40¢) contains approximately 2000 calories. Approximately the same number of calories can be obtained from 5 lb of sweet potato, which at 4¢ per lb would cost only 20¢. Thus, when using a uniform price to value all non-monetary income sources, it was necessary to divide the original value of the food received in kind by the Moresby weavers by two to make it comparable with the Highland amount.

Whilst this procedure is reasonably suitable for allowing the non-monetary incomes of the Port Moresby weavers to be compared with that of the Highlanders, it would not be a suitable basis for comparison with the non-monetary incomes of other urban workers.

No attempt was made to impute a value for owner-occupied housing amongst the Highland groups so consequently no attempt was made to value the accommodation component of the income in kind received by the Moresby weavers from their *wantoks*. For the intended purpose, concerned simply with making the Moresby weavers' incomes and incentives comparable with those of weavers in the Highlands, this was unnecessary.

The relative importance of non-monetary incomes amongst weaver households

The imputed value of non-monetary production and consumption is obviously quite sensitive to the method of valuation used. However, by calculating and recording the number of units of KkE per week acquired by each household, it was possible to compare non-monetary incomes by reference to real rather than monetary terms. The average quantity of KkE acquired by each household per week is presented in the Data Appendix. Although this method of quantifying and aggregating non-monetary income was most effective in the Highland areas where the goods consumed were relatively homogeneous, it does not readily permit direct comparison in terms of physical quantities of this non-monetary income with that of the weavers from the Moresby subgroup. However, it is hoped that the methods applied to the valuation of this and other non-monetary (food) incomes will permit a reasonable comparison even with the weavers in the rather different circumstances of Port Moresby (see Table 4.2).

The amount of garden produce, as measured in units of KkE, produced and/or consumed by the average weaver-household surveyed in the Highlands was approximately 128 lb per household per week (phpw). Not all of this produce was available for consumption by the human members of the household. If it was so available, then this represents, on average, 36.6 lb of KkE per AECU per week.

However, a major consideration of the household in the production, harvesting and disposal of the garden produce was in providing adequate fodder for the household's stock of pigs. Although in cases of very severe shortage of garden produce (especially sweet potato and cassava), the household pigs would probably have been required to fend for themselves, it was very rare indeed for the pigs to receive less than their share of the household's weekly harvest of *kaikai*. A simple assumption was made that an adult pig consumes (or is allocated) the same amount of KkE per day by weight as an adult human. The pig, of course, mostly consumed the damaged and inferior-sized sweet potato and cassava tubers and the general scraps left after human consumption. However, as the method of weighing and valuing the daily household harvests did not allow for variations in the quality of the produce, the assumption made concerning the relative consumption capabilities of pigs and humans in crude units of harvested weight appeared quite reasonable. Although no attempt was made to test the assumption objectively, it accorded with the estimates of many village men given to the writer during the frequent informal discussions he had with them on this and related topics.

If allowance was made for the amount consumed by the household pig stock, as observations of New Guinean Highlander households suggested it should, the amount of KkE left for each adult equivalent human member of the household was approximately 22 lb per AECU per week (see Data Appendix).

It is interesting to consider the variations which occurred between the various household subgroups of the total sample in relation to these statistics. First, it is to be remembered that the weaver households in Port Moresby did not have access to any gardens, and although a method of comparing the value of their non-monetary incomes with those of the Highland weavers has been developed, it is pointless to extend this to a comparison in terms of KkE, a physical quantity. The following account thus refers to the five Highland subgroups.

Although initial impressions from column (1) of Table 4.2 suggest that the Chimbu weaver households had the highest non-monetary incomes in terms of units of KkE, by producing, on average, 187 lb of KkE phpw, they were also the households with the largest numbers of family members and the largest stocks of pigs. After allowing for consumption by the pigs, the amount of KkE available for human consumption was approximately 23.7 lb per AECU per week.

There was a striking similarity in the average amount of KkE available for human consumption per AECU between the weaver-households of the Marawaka, Chimbu and Yonki areas (see column (3)) although there was a considerable amount of disparity when the quantity was considered in gross household terms. The reasons why the average weaver-households in the other two Highland areas

Table 4.2 Average weekly receipts of *kaukau* equivalent (or non-monetary income in real terms), by area subgroup (1b weight)

Area subgroup	(1) Av. KkE/hh	(2) Av. KkE/N	(3) Av. KkE/Q	(4) <u>Range</u> KkE/Q
Goroka (17; 49; 72.3) ^a	81.2	28.2	19.1	0.0-52.2
Chimbu (8; 40.3; 61.3)	187.0	37.1	23.7	17.5-55.2
Marawaka (13; 51.5; 92.5)	170.8	43.1	24.0	7.0-41.0
Yonki (5; 16.5; 32.5)	156.6	47.4	24.1	14.0-31.5
Tarabo (5; 10.7; 17.7)	51.1	23.9	14.4	11.2-19.0
Highlands total (48; 168; 276)	127.8	36.6	22.2	0.0-56.2
Port Moresby (9; 11.1; 11.1)	..	..	..	..

^a The first figure in the bracket is the number of weaver households in each subgroup; the second (N) is the number of adult equivalent consumption units (AECU) in each subgroup – no correction for pig consumption; the third (Q) is the number of human AECU *plus* adult pig equivalents in each subgroup – a correction for pig consumption of *kaukau*.

Col. (1) = Average quantity of *kaukau* equivalent (KkE) received per household (in lb per week).

(2) = Average quantity of Kke per AECU per week, not corrected for pig consumption.

(3) = As (2) above but correcting for pig consumption.

(4) = Range of (3) above within each subgroup.

Source: Data Appendix.

were not as well endowed in this regard can be seen partly in the following.

Although the average Gorokan weaver-household obtained only 19.1 lb of KkE per AECU per week, this would seem largely due to the fact that fourteen of the seventeen weaver-households in the area were in the early stages of establishing themselves in a new village near their weaving workshop. At the time of the first survey round they had not fully established their gardens on the land that was provided for them. Many of the non-monetary income receipts in the form of garden produce came as

gifts from the nearby Bena village people or from the informal arrangements made by the wives of the weavers to obtain harvesting rights from the Bena people in return for helping the latter work their gardens.

The Bena Bena is a highly productive agricultural area and the three weaver-households from this subgroup who were of local Bena stock (rather than being migrant settlers from other parts of the Highlands) had quite high yields of KkE. These three households averaged 214 lb of KkE per household per week but, being more established than the others and having built up sizeable pig stocks, the KkE available for human consumption was only a little over 22 lb per AECU per week.

The weaver-households in Tarabo were, on average, the poorest, in terms of receipts of KkE, of any of the weaver families in the Highlands, with only 14.4 lb of KkE per AECU per week. This low figure can, perhaps, be partly attributed to the times of the year on which the data were collected in this area. Whilst an endeavour was made to collect measurements of receipts of KkE for a sample week during each of the two distinct seasons of the year, the first visit to Tarabo came at the very end of the wet season when apparently garden production had already started to show a marked decline. As the second round was in the dry, the estimates are probably biased downwards. The impression was gained, however, that three of the five weaver-households in this area were not accustomed to the usually large harvests of garden produce found elsewhere in the Highlands. These three weaver-households each consisted of a young single weaver who had (or shared) responsibility for either a younger brother or an elderly mother. Although some garden produce was regularly received as a gift from other villagers, their own garden production appeared quite limited at this particular stage of their life cycle and would probably only improve when they had taken wives who would care for their gardens.

Only two weaver-households in the Highlands did not have their monetary incomes supplemented by non-monetary garden production at all. In both cases the 'household' consisted of a single weaver, unattached to any other family, without any dependent relationship with others and with no access to garden land. Both were weaving at the Goroka (Makia) weaving cell and both came from other (distant) parts of the Highlands. During the survey period both claimed that they purchased all the garden produce they consumed from the Goroka market or from other local sellers.

The range of observations for the receipts of KkE per AECU per week was quite considerable when taken over the whole of the Highland sample, that is from zero pounds to over 56 lb of KkE per AECU per week. Thirteen weaver-households obtained more than 30 lb of KkE per AECU per week and eleven households

produced or acquired less than 12 lb of KkE per AECU per week. The range of observations within each area subgroup was such that there was considerable overlap between the various areas and this indicated that the volume of garden production acquired by households in the sample was not solely or mainly explained by a particular area characteristic.

So that this non-monetary income could be compared and aggregated with the cash earnings and other receipts of the weaver and his dependent household, the physical units of KkE had to be valued in monetary terms. It has been argued that it is inappropriate to value this produce at what appears to be its opportunity cost, namely the price obtainable at the local produce market (buyer and seller prices being the same), and an alternative method of valuation that led to a uniform price for KkE in all areas was suggested. The value of KkE per household using this uniform price valuation and the value of all non-monetary income per AECU within each household are given in the Data Appendix and summarized in Table 4.3.

When using this particular (uniform price) valuation method, the average unadjusted value of KkE obtained by the average weaver household in the Highlands was \$5.11 phpw. After adjusting for the consumption by pigs this amounted to approximately 89¢ per AECU per week. The corresponding average household cash receipts from weaving activity for the Highland sample was \$7.42 phpw. Non-monetary income from garden production was thus a very important supplement to the household's cash income from weaving. This latter cash source would have permitted an average (unadjusted) cash expenditure of approximately \$2.12 per week for each AECU that was attached to a weaver household. However, just as some of the household's production of garden produce was virtually pre-committed to pigs, so too was part of the household's cash receipts precommitted to expenditures other than those on current goods and services. The next chapter will discuss such outlays and the way in which they were treated in the formal analysis.

The constant price method of valuing KkE was extended in an attempt to compare the non-monetary incomes of the weaver-households in the Highlands with the non-monetary (obligatory food receipts from *wantoks*) incomes of the Port Moresby weavers (see Data Appendix).

Whilst the non-monetary receipt of the average weaver-household in Port Moresby was only \$1.05 per week, the defined 'households' in this case had very few dependents. Most, in fact, consisted of a single male weaver, and they did not have any pigs to feed. The average value of non-monetary income per AECU per week amongst this sample subgroup was approximately 85¢ per week, thus making it quite close to the sample mean for all the Highland subgroups, that is 89¢ per AECU per week. Again, however, the range within the subgroup was quite substantial: from nothing

Table 4.3 Average weekly value of non-monetary incomes, by area subgroup and total sample (dollars)

Area subgroup ^a	(1)	(2)	(3)	(4)	(5)
	KkE/hh @ uniform p. (4¢ lb)	KkE/hh @ local p.	KkE/Q uniform	KkE/Q local	Range NMY/Q uniform
Goroka	3.25	2.48	0.76	0.58	0.00-2.25
Chimbu	7.48	9.09	0.95	1.19	0.70-2.21
Marawaka	6.83	3.23	0.96	0.45	0.28-1.64
Yonki	6.26	6.05	0.96	0.93	0.56-1.26
Tarabo	2.05	1.32	0.58	0.37	0.45-0.76
Highlands					
total	5.11	4.03	0.89	0.70	0.00-2.25
Port Moresby ^b	1.05	2.10	0.85	1.70	0.00-1.75
Total sample	4.48	3.75	0.88	0.74	0.00-2.25

^aHousehold N and Q for each subgroup are the same as given in Table 4.2

^bAll values actually refer to non-money income (or the value of *wantok* income) rather than the cash value of units of KkE.

Col. (1) = Average value of KkE per household, valued by the uniform price method, i.e. @ 4¢ per lb.

(2) = As (1), but valued at the local market price.

(3) = Average value of KkE per AECU, after correcting for pig consumption and using uniform price method.

(4) = As (3) but using local market price.

(5) = Range of non-monetary income per AECU (correcting for pig consumption and using uniform prices) within each subgroup and total.

Source: Data Appendix.

to \$1.75 per AECU per week. This statistic suggests that the average weaver-household in the Highland areas of Marawaka, Chimbu and Yonki benefited more from non-monetary income sources than did the Moresby group, whilst the average weaver-households from Goroka (excluding the three Bena families) and Tarabo benefited somewhat less.

For comparison, the same non-monetary income component for each household has been valued by using the appropriate local market prices (see Data Appendix). The distortions which occur when this method is used can be seen clearly from a comparison of the data summary presented in columns (3) and (4) of Table 4.3. Nowhere is the distortion more evident than between the average weaver-households of Marawaka and Chimbu.

Whilst the average physical volume of KkE available per AECU in both Marawaka and Chimbu was strikingly similar, when this identical produce is valued according to the prices obtaining in the nearest local market, the Chimbu family appears to be over 2½ times better off than the Marawakan. Of course, if the household in each area did in fact sell all or most of its garden produce and use the proceeds to purchase food and other items then, *ceteris paribus*, this might be closer to the truth.² The fact is, however, that the average New Guinean household sells little or none of this produce but uses it directly for its own consumption. The relative value of this produce to the consumer was thus inadequately indicated by the local market price structures and was more appropriately measured by the alternative method that has been suggested.

Finally, the importance of non-monetary income in relation to total household income (all cash receipts plus non-monetary income valued at uniform prices) and in relation to all of the exogenous (non-weaving) incomes of the weaver household will be considered. Data for each of the sample households on total weekly income and those on the total weekly exogenous incomes of the weaver-households are given in the Data Appendix and summarized in Table 4.4.

It can be seen that, when taken over the total sample, non-monetary income constituted approximately 31.6 per cent of the total income of the average weaver-household. The lowest proportion occurred with Port Moresby weaver-households which, on average, obtained only 12.4 per cent of their total income by way of the meals their *wantok* custodians were obliged to provide. The proportion was highest in Marawaka, the most traditional and isolated of all the areas visited in the study (57.1 per cent). The weaver-households in Marawaka were a most privileged group and the only local families able to earn a regular monetary income without leaving the district. For almost all the other Anga households in this subdistrict the proportion was likely to have been in excess of 90 per cent.

The conclusion to be drawn from these data is simply that, on average, non-monetary income was still a most important component of the total income of the weaver-households in Papua New Guinea, especially in the Highland areas where the weaver families lived in their traditional villages and had access to garden land. However, it also supports the contention that, by and large, most weaver-households had reached a stage where they were predominantly involved in monetary sector activity.

⁴The extent to which the sales receipts were used to purchase equally cheap or expensive local market garden produce would partly offset the real value of this discrepancy.

A summary of the average gross income per AECU is presented in column (3) of Table 4.4. The sample average was quite high at \$4.50 per week. Despite the relatively high non-monetary (garden) incomes of the Chimbu and Marawakan households, their larger family sizes and the lower average earnings from the weaving activity resulted in their having incomes per AECU well below the sample mean. In total, the weaver-households from Goroka and Port Moresby, most of whom lived and worked in places quite distant from their traditional home villages, still appeared to be better off, in terms of their total command over goods and services, than their counterparts who worked in weaving cells close to their home villages.

Table 4.4 Total gross income and the relative importance of non-monetary income, by area subgroup and total sample

Area subgroup ^a	(1) Total hh income (\$)	(2) NMY/ total (%)	(3) Av. gross Y per N (\$)	(4) NMY/ exogenous Y (%)
Goroka	19.59	16.7	6.80	52.3
Chimbu	14.75	50.7	2.93	61.7
Marawaka	11.97	57.1	3.02	84.2
Yonki	17.94	34.9	5.44	66.0
Tarabo	6.75	30.3	3.15	57.0
Highlands total	15.21	33.6	4.35	65.6
Port Moresby	8.47	12.4	6.87	27.4
Total sample	14.15	31.6	4.50	62.5

^a Number of households and N for each subgroup same as in Table 4.2.

Col. (1) = Total gross household income = average weekly weaving income + average weekly exogenous cash income and gross non-monetary income (valued at uniform prices).

(2) = Household's non-monetary income as a percentage of its total gross income (as defined above).

(3) = Average gross income per AECU (uncorrected for pig consumption).

(4) = Household's non-monetary income as a percentage of its gross exogenous (non-weaving) income.

Source: Data Appendix.

The weavers, of course, had some freedom in adjusting their level of cash earnings and could do so by committing more or less time to their weaving activities. Thus one (and quite a large) component of total income, namely cash receipts from weaving, was not determined independently of the labour-leisure choice and was, in fact, largely determined by that choice. It would seem more

appropriate, therefore, to consider the importance of non-monetary income as a proportion only of the total exogenous income receipts (non-weaving cash receipts plus non-monetary income) of the weaver household (see Table 4.4).

It can be seen that non-monetary income was generally a major component of the average household's non-weaving income. The average household in the total sample obtained approximately 62.5 per cent of all its non-weaving income from these sources. In Marawaka where no coffee was grown and other cash-earning opportunities were very much limited, non-monetary incomes constituted over 84 per cent of all the non-weaving incomes of the average weaver-household. In Port Moresby, however, despite the fact that many weavers drew quite heavily on the non-monetary incomes provided by *wantoks* in the form of regular meals, etc., this source was still relatively small compared with the other cash which they received, mainly in the form of gifts, from an even wider circle of kin and clansmen who had obtained regular employment in the city's monetary economy.

Chapter 5

Monetary outlays

Whilst the usual demand analyses for most ordinary commodities such as food, clothing and rent proceed on the assumption that cash income is an exogenous variable with respect to the demand in question, this assumption is clearly inappropriate in the case of the demand for leisure. By choosing to take more or less leisure (perform less or more work), the individual weaver was able to adjust the level of his monetary income and hence the amount of cash he had available for expenditure on goods and services. At most, only the non-weaving component of the weaver-household's income could be assumed exogenous in this type of analysis. The demand for leisure (or the labour-leisure choice) and the demand for all particular commodities are thus being determined simultaneously and an ideal analysis of demand would therefore entail a full system of simultaneous demand equations.

It was not possible, however, to undertake a simultaneous estimation of the full system of $n + 1$ demand equations, nor was this necessary for the main purpose of this study. Such an estimation would have required a larger sample and a more consistent and detailed set of data than it was practicable to obtain in the field with the limited resources and time available.

However, despite the shortcomings of the expenditure data and the fact that it was not possible to use all of them in the consistent and ideal way suggested by the general model outlined in Chapter 7, the data collected on the cash outlays of weaver households were sufficiently interesting in their own right to warrant presentation and some discussion.

Household expenditure data are needed for two other reasons: (a) expenditure weights required for the construction of appropriate regional price indices are derived from these data, and (b) monetary transactions were not confined to normal, regular expenditures on goods and services but invariably included other, often lumpy and irregular, payments on items such as taxes and fees and other such fixed monetary commitments and on gifts to friends, bride prices and other traditional-type payments made in money. All such outlays of cash have been recorded and treated herein as special transfers made by the weaver-household. These

outlays were usually offset to some degree by cash receipts of a similar nature, as discussed in Chapter 3. The money available to the household for its normal and regular expenditures was thus increased or reduced depending on whether the net transfer payments were positive or negative, that is whether the cash transfers received exceeded or fell short of the cash transfers that were made by the household. The net transfers figure so calculated was included as a component of the non-weaving income of the household.

Uses of cash for special transfers

A substantial proportion of the average weekly cash incomes of a large number of New Guinean weaver-households was used for special transfers. In fact, no less than 42 per cent of the total cash incomes of the sampled households were found to have been used in this way.

There appeared to be three basic types of special transfers:

(i) Taxes and other committed transfers. These were part of the modern or introduced commercial economy and included outlays which the weaver tended to regard as fixed in the short run. Included in this group were head taxes paid annually to local government councils, licences which had to be renewed annually and school fees and expenses for schoolchildren that the weaver previously may have committed himself to support.

Most Papua New Guineans over 18 years of age paid head taxes to their local government councils. The amount varied quite considerably from area to area. Whilst the tax was \$10 per adult male per annum in the Chimbu, it was only 60¢ per annum in Marawaka. The tax was set, during 1974, at approximately \$8 or \$9 per annum around Goroka, \$7 p.a. in the Yonki district and \$7 p.a. in the Okapa and Tarabo area. Fifteen of the weavers claimed that they did not pay head taxes at all and in some cases this was because they were under the age limit for the tax. In some other cases, no doubt, this was a matter of evasion, although not always with intent.

School fees also constituted an important commitment for some weavers. A total of thirty-one of the fifty-seven weavers sampled were responsible for meeting the school fees and other school expenses of either their own children or the children of relatives. The average outlay was approximately \$7.40 p.a.

Eight weavers paid for a licence or registration of some type. In most cases this amounted to \$6 p.a. for a trade-store licence, and was often paid on behalf of a brother or fellow clansman.

Included in the category of committed transfers were any fixed and formal debt repayments made by the weavers. Only one

weaver from the entire sample was involved in debt repayments of this type during the survey period. This weaver had amassed a substantial debt with Highland Weavers Pty Ltd, the suppliers of raw materials. During the survey period he was required to repay most of this debt and the repayments involved averaged out at just over \$10 per week during the expenditure period recorded.

Outlays of type (i) made by each of the fifty-seven weaver-households are recorded in the Data Appendix and variations in the average amounts of this type of cash transfer made by households in each of the six sample areas can be noted from Table 5.1. From this table it can also be ascertained that cash used for taxes and other committed transfers constituted approximately 5.9 per cent of the special transfers made by the average weaver-household in the sample, or only 2.4 per cent of its average weekly cash income.

(ii) Gifts and other traditional, customary cash transfers. A substantial proportion of all the cash used for special transfers was passed to others either in the form of bride and other traditional payments, remittances to kin in home villages or simply as part of the normal day-to-day gift exchanges which are an ingrained part of New Guinean society.

Although an attempt was made to ascertain the average weekly amounts outlaid by a weaver-household on each type of transfer mentioned above, it was exceedingly difficult to distinguish between them. Often what was recorded as a cash remittance to a home village or a large gift given to a friend could have been ultimately intended for a brideprice or death compensation and, no doubt, some amounts recorded as ordinary gifts (perhaps to visiting clansmen) were eventually remitted to kin in home villages. Unlike type (i) payments, these can be either outlays or receipts and thus the net transfer can be a positive or a negative figure. The number and size of the weaver's transfers of cash in the form of gifts and contributions to traditional payments appeared to be related to a number of factors. These would include the volume and size of past transfers received and the obligation to reciprocate, the weaver's current financial circumstance relative to those about him, the size of the cash component in traditional type payments, the overall levels of monetization of the area in which the weaver resides and in his home village, etc. Certainly the ability to give and contribute was related to the level of one's current income and even the size and number of claims made upon the cash earner was probably related to what others believed to be the size of one's weekly cash earnings.

By defining a net amount of transfers and entering this sometimes negative amount as part of the non-weaving component of household income (E), one probably oversimplifies what is a fairly complex transaction. Two suggestions of a better specification come to mind but would need much anthropological verification

before they could confidently be entered in an analysis of the type being undertaken herein.

One could treat such gifts and transfers as being akin to an informal social welfare tax imposed by the majority of less fortunate clansmen to equalize partly the distribution of cash between all in the group. The amount given (or 'paid') in this informal tax might increase proportionately (or more than proportionately) with the level of one's cash income. It was certainly consistent with the writer's casual observations of behaviour to assume that the fulfilment of an individual's traditional cash obligations had claim on his cash earnings before any normal expenditures he might wish to make above the level necessary for his minimum subsistence.

An alternative is to consider these customary transfers as purchases of status and/or security. For example, the gift giver hopes that he may be cared for in his old age if, for the time being, he continues as a net donor. Factors such as status and security are, of course, almost impossible to quantify.

A summary of transfers of type (ii) by area subgroup and by total sample is given in Table 5.1. The way in which the volume and size of these transfers varied between households with different levels of cash income can be seen from Table 5.2. The fifty-seven weaver households were ranked according to the level of their weekly cash incomes. They were then divided into three equal groups of high, medium and low cash earners. The average weekly amounts laid out by the representative household of each income group on each of the various categories of transfers was then calculated. It can be seen from Table 5.2 that the amount of cash simply transferred as gifts to others increased with mounting levels of household cash income. The proportion of the representative household's cash income laid out in this way is also seen to decrease very slightly with higher levels of cash income. Furthermore, it can be noted that transfers for bride and other traditional customary payments and for all types of transfers in general not only increase with higher levels of cash income but the proportion out of total cash income so transferred also increases.

Transfers of type (ii) absorbed approximately 69 per cent of the special transfers of the average weaver-household of the sample, or 28 per cent of total weekly cash income. Only one weaver out of the fifty-seven surveyed reported that he did not make any transfers of this type during the survey period.

Table 5.1 indicates that the Gorokan weavers were generally quite heavily involved in making gifts, remittances and other traditional type transfers. The average weaver-household in this subgroup transferred approximately \$5.47 per week, or approximately 33 per cent of its average weekly cash income, in this way. Most

Table 5.1 Taxes, committed transfers, gifts and traditional customary transfers of cash income, by area subgroup and total sample (\$ per week by average household)

Area sub-group	(1) Total cash Y	(2) Special transfers (total)	(3) Taxes, committed payments	(4) Gifts, customary transfers	(5) Savings (residual)
Goroka	16.3	7.03 (43.1) ^b	0.35 ^a (2.1)	5.47 (33.5)	1.21 (7.4)
Chimbu	7.33	3.02 (41.2)	0.27 (3.7)	2.48 (33.8)	0.27 (3.7)
Marawaka	5.14	1.65 (32.1)	0.08 (1.5)	1.09 (21.2)	0.48 (9.3)
Yonki	11.68	6.62 (56.7)	0.20 (1.7)	1.55 (13.3)	4.87 (41.7)
Tarabo	4.71	0.68 (14.4)	0.05 (1.0)	0.54 (11.5)	0.09 (1.9)
Highlands	10.10	4.37 (43.2)	0.21 (2.1)	3.00 (29.7)	1.16 (11.5)
Port Moresby	7.42	2.23 (30.0)	0.19 (2.5)	1.94 (26.1)	0.10 (1.3)
Total sample	9.67	3.90 (40.3)	0.23 (2.4)	2.71 (28.0)	0.96 (9.9)

^aDebt repayments by one Gorokan weaver amounting to \$10.27 per week were not included in this calculation.

^bThe percentage of other cash uses (2) to (5) out of the total cash income of household.

- Col. (1) The average weekly cash income received from all sources by the representative household.
- (2) Total average weekly amount of cash used by the household for special transfers (purposes other than the purchase of current goods and services) (= (3) + (4) + (5).
- (3) Average weekly cash transferred in form of head taxes, licences, fees and other committed expenses.
- (4) Average weekly cash transferred as gifts, transfers to home village and traditional customary payments, e.g. brideprice and death compensation.
- (5) Average weekly residual (savings), i.e. cash income not recorded as being spent on current goods and services or used for purposes (3) and (4) above.

Table 5.2 Taxes, committed transfers, gifts and traditional customary transfers of cash, by cash income level (\$ per week by average household of group)

	(1)	(2)	(3)	(4)	(5)
Cash income level	Average weekly cash Y	Taxes, committed transfers	Gifts of cash	Customary transfers (brideprice, etc.) and remittances	Total (2)-(4)
High	17.35	0.33 (1.9) ^a	2.35 (13.5)	3.73 (21.5)	6.41 (36.9)
Medium	7.61	0.18 (2.3)	1.06 (13.9)	1.08 (14.2)	2.32 (30.5)
Low	4.04	0.08 (2.0)	0.59 (14.6)	0.25 (6.2)	0.92 (22.8)

^aThe percentage of average weekly cash income transferred (by type of transfer (2) to (5)).

Source: Data Appendix.

of the weavers at Makia came from villages in other parts of the New Guinea Highlands and there was a considerable volume of remittances being made from the weavers to their home villages. There was also, however, quite a sizeable volume of transfers being made between the weaver families themselves. This, perhaps, could be seen as an attempt on their part to achieve a degree of social solidarity amongst themselves. Although they came from diverse tribal groups, they had elected to live together in a common village near their place of employment.

The Chimbu weaver subgroup, on average, outlayed approximately 34 per cent of their weekly cash incomes on traditional customary transfers and other gift giving. This proportion constituted approximately 82 per cent of all their special transfers. As indicated in Table 5.3, the cash component of brideprice in the Chimbu area was well above that for other parts of the New Guinea Highlands. In addition to this cash component, it was common for the Chimbu to have to purchase with cash the many sets of bird of paradise plumes (at \$5 to \$20 per set), other traditional *bilas* and artifacts and sometimes some of the pigs (at an average of \$80 to \$100 each) required in the exchange.

In Marawaka, transfers of cash for bride payments and similar customary payments were negligible. However, the weaver families, being relatively more affluent in cash than other Marawakans, transferred approximately 21 per cent of their total

cash income to kin and other clansmen by way of gifts. Most of these gifts would not be reciprocated in cash form. The only weaver in the total sample not to have made transfers of this type was a Marawakan who had only recently started weaving and who had the lowest income-earning potential of any weaver from the Marawakan subgroup.

Table 5.3 Cash component in bride payments, selected areas

Area	Amount ^a
Goroka (Bena and Asaro)	\$400-\$500
Kundiawa (Chimbu)	\$700-\$800
Marawaka (Anga)	nil
Yonki (Agarabi-Gadup)	\$100-\$120
Tarabo (North Fore)	\$120-\$200
Moresby migrants (in relevant home village areas):	
Gulf and Western District	\$300-\$500
Coastal villages, Rigo and Marshalls Lagoon	\$500-\$600

^a Amounts refer to the usual cash component of all recent brideprice transactions in the area (and not just for the weavers) during 1974.

The weavers at Yonki and Tarabo laid out a much smaller proportion of their weekly cash earnings on transfers of this type than other weaver-households in the Highlands. The reasons for this, however, differ between the two subsamples. Two of the weavers in the Yonki area were independent operators who received quite substantial earnings from weaving during the whole survey period, but to replenish their raw material supplies they had to make quite large outlays. Experience had probably taught them the necessity of holding fairly large liquid cash balances to meet these periodic but substantial outlays for raw material supplies. During the period over which the data were collected, they appeared to be trying to replenish these cash holdings (savings) and hence probably transferred less than was commensurate with their measured cash income levels. Had it been possible to collect data over a much longer period and so effectively to eliminate much of the lumpiness of their cash receipts and outlays, a different picture might have emerged.

The Tarabo weavers were, on average, low cash earners and the proportion of their total cash incomes transferred in gifts, brideprice contributions, etc. was also low and accords with the relationship between cash income and this type of transfer as suggested by Table 5.2.

Finally, the weavers from the Moresby area made gifts and other such transfers equal to approximately 28 per cent of their average weekly cash incomes. Quite a lot of these transfers were

to clansmen who had come to Port Moresby in search of work, or were sent to kin in the weaver's home village.

(iii) A residual. The final component of a weaver-household's cash income that did not go towards normal, regular expenditures was, in fact, an accounting residual, although part of it probably constituted savings. Much of it resulted from the limited recall of the informant and the general inaccuracies which were bound to arise when data had to be collected by the methods used for this study. Also, some of it derived from the relatively short time period over which incomes and outlays were recorded. During the survey period a household may have received a large customary cash payment, independent weavers may have sold a large number of items at one time, etc. and the survey period was too short to account for the full and even disbursement of these receipts.

Some initial attempts were made to collect accurate data on actual savings but these had to be abandoned eventually for, although most weavers were quite willing to tell of the cash amounts they held, and/or to show their bank passbooks, the whole concept of saving appeared quite foreign to most village people. Liquid assets on hand were not always a fair measure of one's true savings. Some weavers reported holding considerable sums of cash but subsequent investigations in many cases disclosed that this amount was being accumulated for a brother's bride payment or for a remittance to the home village to meet a compensatory payment, etc. Again, amounts that were probably true savings were reported as being held by other kin and the size of these holdings was not always known with accuracy. In such cases there was little distinction made between what was one's own and what was merely being held in one's custody.

Nearly one-half of the total sample had bank passbooks but only about ten weavers actually made a deposit or withdrawal during the survey period. Most appeared to have made deposits during some earlier period after being encouraged to do so by a government official or missionary. However, more often than not, this practice had been discontinued and some weavers were actually unaware that they could withdraw money if they so wished.

Four weavers who did make regular use of formal banking facilities¹ were the four independent operators in the Highlands. All had been encouraged to do so by officials of the Department of Business Development and other government officers who had helped them establish their businesses. The two Gorokan operators had increased their cash savings by approximately \$4.40 and \$2.30 per week over the total survey period. The amount was even higher

¹Not one weaver in the sample currently belonged to a Savings and Loans Society, an institution rapidly growing in popularity in some parts of Papua New Guinea.

in the case of the two independents from Bioka village who recorded savings of approximately \$10 and \$13 per week over the same period. However, because of the irregularity of their cash receipts and outlays on raw materials, together with the relatively short observation period, one was able to infer little about the normal, regular savings habits of even this small group of independent weavers.

The mean weekly value of the residual, when averaged over the total sample, amounted to approximately \$0.96 per weaver-household per week. This represented a little less than 10 per cent of the recorded cash income of the average weaver-household, or slightly less than 25 per cent of the recorded cash income that was not laid out on current goods and services. The savings-residual for each of the fifty-seven weaver-households is given in the Data Appendix.

With savings data so inaccurate and meaningless, no attempt could be made to incorporate this factor explicitly into the analysis. The residual, along with all the types of transfers herein considered, were simply deducted from the total cash income of the weaver-household, leaving only that amount of cash available for expenditure on current goods and services to define a discretionary income variable.

In the usual model of commodity demand where the work-leisure choice is assumed to be exogenous, one can abstract from the problem of savings by using the variable, total expenditure, in lieu of total income. As work-leisure choice is endogenous and, in fact, central to the analysis conducted in this study, this option cannot be used consistently. Work-leisure choice affects the level of total income available and, in turn, the level of total income partly determines the demand for other commodities.

Normal expenditure

Approximately 58 per cent of the total cash incomes received by the sampled weaver-households was spent by them on current goods and services. These constituted the household's normal expenditures. It is of interest to this study to consider the relative importance of various commodities or groups of commodities in the households' total expenditures and the way in which the relative importance of some commodities change as other important variables change.

As no attempt will be made to specify formally the demand function for each defined commodity (or commodity group) it is quite impossible in the simple type of analysis which follows to hold all the necessary variables constant whilst analysing the relationship between others. Although some of the inferences drawn therefore need to be treated with caution, nonetheless some interesting and informative patterns emerge.

The expenditure data will be analysed according to:

- (a) The area in which the weaver worked and resided. To some extent this reflected the relative availability of goods and their prices in different parts of Papua New Guinea.
- (b) The household's total cash income.
- (c) The household's non-monetary (subsistence) income.

A complete set of data on the cash expended on various current goods and services by each of the fifty-seven sampled weaver-households is presented in the Data Appendix and summarized by area subgroup and by total sample in Table 5.4.

It can be noted that approximately 54 per cent of the total normal expenditure by the average weaver-household sampled was on food items (including tobacco and alcohol). Although non-traditional staples in the form of rice and flour products (mainly navy biscuits) were relatively important, constituting just over 11 per cent of the normal cash expenditure of the average weaver-household, the cash purchase of traditional and other locally-grown garden produce from the local produce markets was also quite significant (constituting approximately 10 per cent of total expenditures). One might expect that the amount expended on these latter items by any household would depend to a large extent on the non-monetary income available to it. This is fairly well substantiated by Table 5.5. Each of the fifty-seven households was ranked according to the amount of non-monetary (food) income² available for the consumption of each AECU in the household per week. The total sample was then divided into three subgroups of equal size according to whether non-monetary income per AECU was high, medium or low. The value of this variable for the representative (average) household within each of the three subgroups was calculated (see column (1)) together with its average weekly expenditure on five food commodity groups (columns (4) to (8)). It can be seen from this table that the household's cash expenditure, both on traditional garden produce and on imported staples, increased as the non-monetary income available per AECU within the household decreased.

Neither table satisfactorily explains the considerable importance of such expenditures made by the average Chimbu weaver-household. Non-monetary incomes both per household and per AECU for those of this subgroup were above the overall sample mean. The high weekly expenditure on staples by the average Chimbu weaver-household of \$1.29 per week (or 29.9 per cent of all its

²Valued according to the uniform price method (see Chapter 4).

Table 5.4 Expenditures on current goods and services, by area subgroup and total sample
(\$ per week by average household of group or subgroup)

Area subgroup	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	Total cash income	Total cash expenditure on current goods and services	Range (1)	Range (11)	Traditional vegetables	Rice/flour products	Tinned fish and meat	Other foods, tobacco	Alcohol and stimulants	All foods	Clothing	Personal and household durables	Personal and household expendables	Rates	Miscellaneous
Goroka (17) ^a (2.9) ^b	16.32	8.68 (53.2) ^c	8.90 30.07	4.37- 11.46	1.37 (15.8) ^d	0.88 (10.2)	0.94 (10.8)	0.98 (11.3)	0.60 (6.9)	4.77 (54.9)	0.75 (8.6)	0.81 (9.4)	0.17 (1.9)	0.57 (6.6)	1.61 (18.5)
Chimbu (8) (5.0)	7.33	4.32 (58.9)	5.10- 11.59	2.20- 7.14	0.55 (12.7)	0.74 (17.2)	0.69 (15.9)	0.66 (15.3)	0.16 (3.7)	2.80 (64.8)	0.61 (14.2)	0.30 (6.9)	0.06 (1.4)	0.26 (6.0)	0.29 (6.7)
Marawaka (13) (4.0)	5.14	3.49 (67.9)	1.46- 10.36	1.36- 9.15	0.03 (0.8)	0.32 (9.2)	0.60 (17.2)	0.39 (11.2)	0.10 (2.8)	1.44 (41.3)	0.54 (15.5)	0.98 (28.0)	0.02 (0.6)	0.16 (4.6)	0.34 (9.7)
Yonki (5) (3.3)	11.68	5.06 (43.3)	4.41- 20.9	3.62- 7.09	0.18 (3.5)	0.58 (11.5)	0.77 (15.2)	1.18 (23.3)	0.65 (12.8)	3.36 (66.4)	0.69 (13.6)	0.44 (8.7)	0.16 (3.2)	0.18 (3.5)	0.23 (4.5)
Tarabo (5) (2.1)	4.71	4.03 (85.5)	3.28- 6.89	2.19- 6.10	0.25 (6.2)	0.60 (14.9)	0.48 (11.9)	0.64 (15.9)	0.02 (0.5)	1.99 (49.4)	0.30 (7.4)	0.21 (5.2)	0.20 (5.0)	0.32 (7.9)	1.01 (25.1)
Highlands (48) (3.5)	10.10	5.68 (56.2)	1.46- 30.07	1.36- 11.46	0.63 (11.1)	0.65 (11.4)	0.74 (13.0)	0.75 (13.2)	0.34 (6.0)	3.11 (54.7)	0.61 (10.7)	0.67 (11.8)	0.12 (2.1)	0.34 (6.0)	0.83 (14.6)
Port Moresby (9) (1.2)	7.42	5.17 (69.7)	2.89- 13.49	1.86- 9.51	0.17 (3.3)	0.50 (9.7)	0.39 (7.5)	1.27 (24.5)	0.21 (4.2)	2.54 (49.2)	0.70 (13.5)	0.32 (6.2)	0.05 (0.9)	0.94 (18.2)	0.62 (12.0)
Total sample (57)	9.67	5.61 (58.0)	1.46- 30.07	1.36- 11.46	0.56 (10.0)	0.62 (11.1)	0.69 (12.3)	0.83 (14.8)	0.32 (5.7)	3.02 (53.8)	0.63 (11.2)	0.62 (11.0)	0.11 (2.0)	0.44 (7.8)	0.79 (14.1)

^a Number of weaver-households in subgroup.

^b Average number of AECUs belonging to each household in the subgroup.

^c Total average weekly cash expenditure on current goods and services, by the representative household within the area subgroup as a percentage of its average weekly cash income from all sources (refers to bracketed numbers in Col (2) only).

^d Average weekly expenditure on each of the various commodity groups (5) to (15) by the representative subgroup household as a percentage of its total weekly cash purchases of current goods and services.

Col. (1) The average weekly total cash income acquired by the representative (average) household of the subgroup.

(2) The average weekly cash expenditure on all current goods and services made by the representative household.

(3) The range of (1) amongst the households within each subgroup.

(4) The range of (2) amongst the households within each subgroup.

Cols. (5)-(15) refer to the average weekly cash expenditures made by the representative household on: (5) traditional and other locally-grown vegetables sold in the local produce markets; (6) rice and flour products (mainly navy biscuits); (7) tinned fish and tinned meats; (8) other foods, consisting mainly of sugar, dripping, fresh and frozen meats and poultry, confectionery, ice-cream and convenience foods (pies, sausages, etc.), plus tobacco products; (9) alcohol (mainly beer) and stimulants (mainly betel nut); (10) all food items (5) to (9); (11) clothing goods, including shoes; (12) other personal and household durables (including tools), e.g. radios, suitcases, torches, towels, sheets, blankets, plates, knives, spades, cooking appliances, etc.; (13) personal and household expendables, e.g. soaps, washing powder, kerosene, hair oils, etc.; (14) fares, mainly on buses and PMVs; (15) miscellaneous expenditures, including gambling and entertainment.

Source: Data Appendix.

Table 5.5 Cash expenditure on selected goods in relation to availability of non-monetary (food) income to the household (% per week by average household in group)

Value of disposable non-monetary income for AECU	(1) Value NMY/ AECU (at uniform prices)	(2) Total cash income per household	(3) Total cash expenditure on current goods and services	Expenditure on						(10) Weaving effort (hrs per week)
				(4) Traditional vegetables	(5) Rice/flour products	(6) Tinned fish, meat	(7) Other foods and tobacco	(8) Alcohol and stimulants	(9) All foods (4)-(8)	
High (2.5) ^a	1.51	9.74	5.62 ^b (57.7)	0.36 (6.4) ^c	0.33 (5.0)	0.58 (10.3)	0.65 (11.6)	0.20 (3.5)	2.12 (37.7)	13.3
Medium (4.4)	0.91	8.71	5.32 (61.0)	0.47 (8.8)	0.69 (13.0)	0.76 (14.3)	1.15 (21.6)	0.33 (6.1)	3.40 (63.9)	14.7
Low (2.6)	0.38	10.36	5.81 (56.1)	0.78 (13.4)	0.81 (14.0)	0.72 (12.4)	0.72 (7.1)	0.41 (7.1)	3.44 (59.2)	15.6

^a Average number of AECUs within households of group.

^b Average weekly cash expenditure on current goods and services by representative (average) household of group as a percentage of its average weekly total cash income.

^c Average weekly expenditure on items (4) to (9) as a percentage of average weekly total expenditure on all current goods and services (by representative households).

Col. (1) The value of disposable non-monetary (food) income per AECU within each household. Non-monetary income is valued by the uniform price method (see chapter 4) and a correction is made for pig consumption of *kaukau*.

(2) Average weekly cash income from all sources of the representative household.

(3) Average weekly cash expenditures on all current goods and services by the representative household.

(4)-(9) Refer to commodity expenditures as defined in notes to Table 5.4.

(10) The amount of weaving effort supplied by the average weaver in the subgroup.

Source: Data Appendix.

current expenditures) can be explained partly by two factors. First, the average Chimbu household was larger than others in the total sample, i.e. 5 AECUs per household compared with the overall sample average of only 3.1; and, also, the fact that two of the Chimbu weavers spent most weekdays in the township, returning to their families in the village on weekends. Their personal consumption of purchased staple has inflated the subgroup average.

One also needs to explain why, in fact, any imported staple is purchased at all by households with apparently adequate traditional garden production to meet their total annual food demands. Aside from the fact that it offers a little variety to a diet based heavily on *kaukau*, casual observation suggested three or four other factors as an explanation. Rice (like many other trade store goods) was a convenient item with which to meet household food needs on days when, for some reason, the women did not attend their gardens or garden production was temporarily low. The relatively limited storage potential of most traditional staples largely precluded their being kept to meet the temporary shortages which were bound to arise in even the most productive gardens. In addition to these factors, the purchase and consumption of trade-store staples was becoming something of a status symbol amongst people in some areas and, furthermore, rice was becoming increasingly common in ceremonial feasts where it supplemented (and sometimes even substituted for) *kaukau*.

Tinned fish, and to a lesser extent, tinned meats were, perhaps, the most important regular cash purchases of many, if not most, New Guinean households. Tins of fish and meat could usually be found even in the smallest and most remote trade-store. The average weaver-household in the sample spent 69¢ per week (or 12.3 per cent of its total weekly cash expenditures) on these items. From Table 5.4 it can be seen that the relative importance of purchases of tinned fish and meats, that is the expenditures on these items as a percentage of total current item expenditures, was greatest in Marawaka and lowest in Port Moresby. The highest actual expenditure on such items was made by the Gorokan households (average, 94¢ per week).

As the traditional diet of the New Guinean Highlands is relatively poor in animal protein, tinned fish and tinned meat provide a valuable supplement. It was certainly common for a tin of fish to be mixed with traditional vegetable for the family's evening meal. Thus, even in Marawaka where traditional non-monetary (food) production and consumption was relatively high, the average Marawakan weaver-household spent 60¢ per week on tinned fish and meat (or 17.2 per cent of its total weekly cash expenditure).

The apparently low relative importance of expenditures on these items (and even on rice) by the Moresby weaver-households does not accurately reflect their actual consumption of tinned

meat, tinned fish and rice. Most of what has been defined as the non-monetary income received by this group, namely customary and obligatory gifts of food by the more affluent *wontoks*, actually would have consisted of meals of rice and tinned fish. The consumption of non-market garden produce amongst the Moresby weavers was negligible and the per capita consumption of (rather than cash expenditure on) rice and tinned fish probably would have been higher for these weavers than for those in the Highlands sample.

From Table 5.5 one can see some evidence of a decline in the relative importance of expenditure on tinned fish and meats with the increasing availability of non-monetary incomes (see column (6)), although this is not nearly as marked as the case of purchases of imported staples.

It would appear from Table 5.6 that expenditure on tinned fish and meats was closely related to the level of the household's average weekly cash income. As in Table 5.5, the fifty-seven weaver-households were ranked according to the level of the average weekly cash income of the household and then divided into three subgroups of equal size (of high, medium and low cash income level). Expenditure on tinned fish and meats certainly appeared higher in groups with higher cash incomes but the proportion of total current expenditures being made on such purchases appeared to fall as the level of cash incomes increased, indicating that the income elasticity of demand for these items was probably less than unity. Such a falling off in the relative importance of these purchases also seemed to be more marked than was the case of expenditure on imported staples (rice). Expenditures on other foods and tobacco products is less well explained by this simple analysis than expenditure on items already discussed, and quite a lot is probably hidden in the commodity aggregation. From casual observation it seemed likely that the relative importance of such expenditures out of total weekly expenditures, and especially the importance of the non-tobacco component of this commodity group, was partly related to the relative availability of such goods (a factor closely linked to the weaver's place of residence). Also, one can infer little from the apparent relationship between expenditure on other foods and tobacco and the availability of non-monetary income to the household.

Availability also appears to be an important factor in explaining the very small expenditures on alcohol and stimulants by the weavers of Marawaka and Tarabo. Alcohol was not available in either centre and the nearest town where it was available was, in both cases, quite distant. Table 5.6 indicates that expenditure on alcohol appears to increase, and to increase more than proportionately, with an increase in household cash income. This would indicate that the income elasticity for alcoholic beverages and stimulants was greater than one.

Table 5.6 Expenditure on total goods and services and selected items in relation to household cash income
 (\$ per week by average household of group)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Average weekly cash incomes (all sources)	Total expend. on current goods and services	Traditional vegetables	rice/flour products	Tinned fish, meat	Expenditure on					Weaving effort (hrs per week)
						Other foods/tobacco	Alcohol and stimulants	All foods (3) - (7)	Clothing	Other personal and household durables	
High (3.0) ^a	17.35	8.51 ^b (49.0)	0.98 (11.5) ^c	0.92 (10.8)	0.94 (11.0)	1.29 (15.2)	0.58 (6.9)	4.71 (55.3) ^d (27.1)	0.85 (10.0)	0.78 (9.2)	19.9
Medium (3.2)	7.61	5.19 (68.2)	0.61 (11.7)	0.60 (11.5)	0.62 (11.9)	0.84 (16.2)	0.27 (5.2)	2.94 (56.6) (38.6)	0.72 (13.9)	0.53 (10.2)	12.8
Low (3.2)	4.04	3.12 (77.2)	0.08 (2.6)	0.36 (11.5)	0.51 (16.3)	0.57 (18.3)	0.10 (3.3)	1.62 (51.9) (40.1)	0.32 (10.3)	0.54 (17.3)	11.2

a,b,c See notes to Table 5.5.

d Percentage of expenditure on all food items out of average weekly total cash income.

Cols. (1) - (10) = See Table 5.4.

(11) = See Table 5.5.

Little should be inferred from the apparent relationship between alcohol purchases and the household's acquisitions of non-monetary income as indicated in Table 5.5. Households which had low average non-monetary incomes per AECU were also likely to be those living in areas away from their traditional villages and garden lands and who had come to live in or near urban centres. It was in these centres that alcohol was most readily available.

Expenditure on all food items taken together does appear to increase with increases in the level of household cash income, but the proportion of the household's cash income spent on food items shows a tendency to decrease at higher cash income levels (see Table 5.6), supporting the more general contention that the demand for food items was basically income inelastic. The data, however, do not show any clear relationship regarding the relative importance of food purchases out of total household expenditure at different levels of household cash income (column (8), Table 5.6). As one might expect, cash outlays on food are shown to constitute a lower proportion of total cash expenditure for households with high non-monetary incomes than for households which are able to acquire only a relatively small proportion of their food requirements in the form of subsistence sector food production or from the obligations of their better paid *wantoks* to provide them with meals. This would explain the fairly low relative importance of food purchases in the total cash expenditures of the Marawakan households (Table 5.4).

The variations in expenditures on clothing items by the average weaver-households of the various area subgroups are somewhat more difficult to explain. Average household expenditure on clothing was quite high amongst Gorokan and Moresby weaver-households, which might lead one to suspect that this reflected the greater range and availability of clothing in the urban areas and the weavers' greater contact with all aspects of the monetary economy and with Western tastes. However, expenditures on clothing were also relatively high in Yonki and Marawaka where the range of clothing items available locally was, in each case, fairly limited. Clothing purchases, in fact, constituted over 15 per cent of the total purchases of the representative Marawakan weaver-household. The fairly high average figure is, perhaps, a little inflated by the substantial purchases of clothing items by two Marawakans who had visited Goroka during the survey period.

Table 5.6 suggests a close positive relationship between expenditure on clothing and the average weekly cash income of the household, and there is slight evidence that the relative importance of clothing purchases out of total cash expenditures diminishes with higher income levels. This latter fact would suggest that the income elasticity for clothing is close to, or slightly less than, unity.

Purchases of other personal and household durables (including tools) again varied quite markedly between households in the different geographical areas. Of course, a recent purchase of a radio, a lamp or several tools by one or a few households within a small subgroup would tend to inflate unduly the average value for the subgroup and the short survey period was inadequate in such cases where purchases tended to be made in infrequent bursts. Again, it is difficult to account for the high relative importance of these expenditures by the Marawakan weaver-households (constituting approximately 28 per cent of their total cash expenditures). As the Marawakans would have been exposed to such items much later than any other subgroup in the study, it is possible that they were seeking to build up their stocks of such items at the expense of bigger purchases of imported foods.

It can be noted from Table 5.4 that purchases of personal and household expendable items, for example soaps, washing powder, kerosene, hair oil and cosmetics constituted a relatively small part of all current item expenditures and no separate comment on them seems necessary. Fares, however, were quite an important item of cash expenditure generally, and were particularly important in some areas. Over 18 per cent of the total cash expenditures of the Moresby weavers was on bus and PMV fares around the city and on fares to and from their home villages. Fares necessarily incurred by some of the Moresby weavers to attend their looms were counted as a business cost and this had the effect of reducing the returns of their weaving labour. Again, the amounts spent on fares could depend on a large number of factors, for example the distance from one's kin, the availability of services, etc., for which sufficient reliable data were not available and for which a much more extensive survey period seems necessary before one can make a fruitful analysis.

Finally, the size of the household's total weekly cash expenditures on all current goods and services warrants some comment. Table 5.6 is relevant in this respect. A rather strong positive relationship is apparent between the household's expenditure on current goods and services (i.e. its normal expenditures) and its total average weekly cash income (see column (2), Table 5.6). However, the proportion of the household's cash income expended on current goods and services declined quite markedly with increases in household cash income. Can one infer from this that the increasingly larger component not spent for such purposes was saved and/or used for investment purposes? Data on such matters are most difficult to obtain and tend to be unreliable. The limited material available herein can, therefore, only be treated as being suggestive rather than as offering adequate proof.

If one now compares column (2) of Table 5.6 with column (5) of Table 5.2, one sees an interesting relationship suggesting a fruitful future area of research. Whilst the proportion of

household cash income spent on current goods and services tends to decline at higher levels of cash income, the amount and proportion of total cash income transferred to others and used within the traditional exchange system appears to increase and, in some respects, it increases more than proportionately.

From Table 5.6 one can also notice the relationship between the number of hours of weaving input per week performed by the weaver, the weaver-household's average weekly cash income, and its cash expenditure on current goods and services. On average there is a strong suggestion that the weaver-households having the hardest working weavers also had the highest average weekly cash incomes and made the highest average weekly expenditures on goods and services, that is weavers work to earn money for the goods and services that it will buy. It is thus reasonable to try and explain the variations in the supply of weaving effort within a theoretical framework which partly embraces the weaver household's demand for current goods and services. However, even the simple analysis of demand as conducted above suggests that the income elasticity of demand for a number of current goods and services and, in fact, for all normal expenditures in aggregate, is less than unity. Furthermore, earlier chapters have indicated that many weavers worked well below their potential and did not seem to want to earn all the cash they could from the opportunity provided to them.

Later in this monograph the formal analysis used to explain the variations in the weekly weaving input of the weavers in the sample group will attempt to allow for the most consequential and general factors which appeared to affect demand for current goods and services. However, it will also seek to include and specify other important variables which relate more specifically to the labour-leisure choice of the particular workforce group being studied.

The relative prices of current goods and services

As the sample was drawn from six different geographical areas of Papua New Guinea, each separated from another by considerable distances, it was natural to expect that the prices of many current items would vary significantly from one area to another.

If one were to estimate the demand function for each commodity or group of commodities, the prices of the item or group usually would have to be entered as an independent variable in the function. This, therefore, would call for the construction of a meaningful price index for each group of items that one wished to consider. As official and published price data for Papua New Guinea did not have the specific regional breakdown necessary for such an analysis, any price index required for the study had to be

constructed from the survey data collected by the researcher in the field. A basic requirement of price index construction and meaningful price comparison is that each item included in a defined commodity group index (food, clothing, etc.) be of the same quality or brand and be presented for sale in similar quantity packages. Most New Guinea trade-stores had a very limited range of stock and there was sometimes only a single trade-store in a particular area from which some subgroup of the sample was drawn (e.g. Marawaka and Tarabo). Thus, there were only a small number of stock items common to each and every trade-store which were sufficiently comparable to allow the construction of any price index.

From the limited price data that could be gathered it was possible only to construct a commodity group price index for food items. However, as has been shown above, expenditure on food items constituted approximately 54 per cent of all normal expenditure by the average weaver-household. It would seem fair also to assume that the relative prices between different price regions of other commodities (i.e. non-food items) would be reasonably reflected by the food item price index so constructed. The price index used took the general form of a Layspere's price index. Details relating to the construction of this index can be found in Philp (1976).

In addition to the formal construction of a price index an attempt was also made to price a particular bundle of goods in actual terms rather than as an index. The bundle was as follows:

- Part A 7 lb rice
 3 tins of fish (15 oz tins)
 3½ packets of navy biscuits

- Part B 1 pkt 20 cigarettes (cheapest brand available)
 1 pkt Muruk tobacco
 2 sticks twist
 1 lb sugar

Part A was selected as being representative of the three most common food items purchased from New Guinea trade-stores. The quantities were calculated to provide 1 AECU with approximately 2500 calories per day³ for one week. Part B represents simply what the writer judges to be a typical weekly purchase of tobacco and sugar by a representative cash-earning household in Papua New Guinea. All the relevant price data calculated by these methods are presented in Table 5.7.

³Assuming: 1600 calories per 1 lb of rice, 860 calories per 15 oz tin of fish, and 270 calories per 2 oz navy biscuits (3 per packet).

Table 5.7 Prices of food items by area

Area	(1)	(2)	(3)	(4)
Goroka	92.0	84.6	\$2.68	\$1.09
Chimbu	101.9	112.7	\$2.82	\$1.06
Marawaka	100.6	70.2	\$3.44	\$1.26
Yonki	97.6	96.2	\$2.82	\$1.10
Tarabo	94.7	80.3	\$2.88	\$1.14
Port Moresby	114.9	159.2	\$2.59	\$1.02

- Cols. (1) Using a Layspere's index and including only items purchased with cash.
- (2) Using a Layspere's index but including and weighting non-purchased (home produced) foods — prices used being the local market price of *kaukau*.
- (3) Actual price of a selected bundle: Part A plus Part B.
- (4) Part B of (3) above.

Chapter 6

Activity patterns

The activity patterns of New Guinean people and households have been studied and reported by a number of social scientists over the years prior to independence in 1975. The published works include those by Crocombe and Hogbin (1963), Hogbin (1964), Waddell and Krinks (1968), Waddell (1972), Moulik (1973) and Shand and Straatmans (1973). In each of these cases, the people studied were primarily agriculturalists who had recently introduced some cash crops into their essentially subsistence-based agricultural systems. Invariably, the subjects of the above studies were at a very early stage in the transition to a fully monetized economy. In all but a few cases, the time devoted by any individual to cash-earning activity was low compared with that involved in the subsistence sector. In the framework outlined by Fisk (1962, 1974, 1975) they would be classified as being in the second of four stages in the transition process.

Time rather than money is the resource common to all New Guineans. Their allocation of this resource amongst its alternative uses is thus of particular interest and importance for it enables us to gain an insight into the economic behaviour and motivations of New Guinea people. However, there has always been some difficulty in obtaining, by way of survey, sufficiently meaningful and accurate data in this regard. The methodological problems of collecting these data are substantial. In this study, where the sample of workers was widely scattered throughout the country and where even the households studied in a given centre were too widely dispersed to permit each to be contacted on the necessary daily basis, it was quite impossible to collect data on non-weaving activity which was of sufficient accuracy to support a detailed analysis.

It is usual to collect activity data by interviewing the respondent at the end of his working day and then asking him to recall what he was doing at various times during that day. Such methods produce data of dubious quality, especially where the people's consciousness of time is not well developed. Whilst this method had to be used to obtain information on the non-weaving activities of the weavers sampled, the measurement of the main

dependent variable, that is the effective labour time spent on weaving, was based on more precise methods.

It appeared quite inappropriate to designate all the weaver's time between his entering the workshop and leaving it as 'effective monetary work effort'. In fact, it was not uncommon for a weaver to spend up to eight hours of a given day within his workshop without bothering to produce even an inch of woven article. It was therefore felt that the quantification of the dependent variable had to be based on more exact methods. Unfortunately, such methods could not easily be extended to other non-weaving activities to permit a greater comparability of all time expenditure data. Such limitations to parts of the activity data, therefore, need to be recognized.

The identification of individual activities was also difficult because of the non-exclusive nature of some tasks. Work in the gardens was intermingled with firewood collection, collection of material for house construction and hunting. It was also intermingled with a considerable amount of pure leisure. Jones (1969) is justly critical of the tendency of many writers to regard all activities in a non-Western society which are not blatantly recognizable as 'subsistence activities' or 'monetary work' as being, therefore, 'unproductive' or 'leisure'. However, he would be wrong if he failed to recognize that a considerable portion of the time reported and recorded as constituting subsistence or monetary 'work' is, in fact, more accurately defined as being 'unproductive activity' or 'leisure' and is recognized as such by the participants.

In this study, 'leisure' was defined simply as a residual, when the accurately assessed labour time expended on productive weaving activity was deducted from a given number of hours over which the appropriate choice period was defined. Some of this leisure time may have been devoted to activities of the type described by Jones (which, anyhow, could have been done outside of the potential cash-earning period). Much of it, no doubt, was spent on cementing social relations and enhancing one's prestige, just as some leisure time is so spent in a Western developed nation. However, when questioned, the respondents often referred to their activities during this residual time as simply *sindaun nating* (doing nothing, being idle). Whilst one was acutely aware of the possible alternatives, it appeared to the writer, just as it was reported by Moulik, that 'a high proportion of active hours seems to be spent simply on leisure, such as gossiping or walking about the village' (Moulik 1973:116). For want of more appropriate terminology, the residual will be referred to as 'leisure', for pure leisure was probably the predominant component of it.

It was argued in Chapter 2 that the institutional constraints on monetary work time and the adopted customs and conventions concerning the accepted length of the working day and week, limited

the effective labour leisure choice period to only 40 hours per week. The study then was not concerned with how a New Guinean worker allocated all of his time between cash work, subsistence work, ceremonial and social activity, eating, sleeping and recreation but rather how and why these particular New Guinean cash workers allocated the time which they knew was available for earning a cash income, between effective work time (which would enable them to earn) and some alternative uses of this limited time (which would not).

In a transitional and Melanesian society there are, of course, a number of uses of time or demands on one's time other than just for cash work or 'leisure', regardless of how narrowly one defines the work-leisure choice period. Some of these demands on one's time are exceptionally strong and are accorded priority over all other alternatives. One such demand occurs in times of life crises when cash work, subsistence work, and all other activities are forgone so that a person can fulfil his customary obligations.

During the study period, the death of close relatives resulted in the absences of two weavers (one from Chimbu and the other from Marawaka) for periods of two days and four days respectively. Another weaver was required to attend a village court and several others reported that they went to their gardens to repair fences, having been warned by other villagers that their pigs had broken out and were ravaging neighbouring gardens. In cases such as these, and also in the case of a weaver's illness, the weaver was not in a position to make a free labour-leisure choice at all but rather, was forced to do what traditional custom or nature demanded. Days affected by such factors were not counted as part of the labour-leisure choice and the average weekly time devoted to weaving was calculated after adjusting for these exogenously determined and precommitted demands on one's time.

The extent to which the weavers engaged themselves in subsistence sector activities and other cash-earning pursuits, both within the 40-hour decision period and outside of it, will be considered in later parts of this chapter. The allocation of time to the predominant cash-earning activity — weaving — by the members of the sample, constitutes the main dependent variable of the whole analysis, and will receive prior attention.

Effective labour time spent weaving

The methods used to obtain this information have been detailed in Philp (1976) and summarized in Chapter 1. The time spent weaving was derived from the measured output and the observed and measured rate of production in each component of the weaving process (Table 6.1).

Table 6.1 Effective labour time spent on weaving activity, and time spent within the weaving workshop, by area subgroup and total sample (hours per week by average weaver)

Area subgroup (no. of weavers)	Effective labour time	Time spent in workshop
Goroka (17)	20.3	32.6
Chimbu (8)	13.2	29.5
Marawaka (13)	12.5	26.7
Yonki (5)	13.3	25.1
Tarabo (5)	9.7	16.5
Highlands total (48)	15.2	28.0
Port Moresby (9)	11.8	23.8
Total (57)	14.6	27.4

Source: Data Appendix.

Inasmuch as the measurement technique could not take account of the time involved in coordinating the individual weaving tasks, nor the fairly frequent technical breakdowns and administrative delays, the calculated time expended on weaving was probably an underestimate of the actual time spent by each individual on this activity in a week. As there is no reason to believe that these unmeasured factors were not randomly distributed amongst the sample, their omission should have little effect on the analysis.

The average effective labour time spent on the cash-earning activity, when taken over the total sample, was 14.6 hours per weaver per week and the standard deviation was 5.6. Thirteen weavers spent more than 20 hours per week on productive weaving activity and fourteen weavers spent less than 10. The range, over the sample, was from 6.8 to 26.2 hours per week.

The weekly time expended on weaving was highest amongst the Gorokan group who averaged approximately 20.3 hours per weaver per week on productive weaving activity. At the other end of the scale were the five weavers from Tarabo who, on average, spent only 9.7 hours per week actually weaving. The mean number of hours worked per weaver in each of the other centres showed less variation from the sample mean (Chimbu 13.2 hours; Yonki 13.3; Marawaka 12.5; and Port Moresby 11.8).

A considerable proportion of a weaver's day was often spent within the environs of the *haus blanket* (weaving workshop) but on activities which were unproductive in respect to acquiring a monetary income. Much working time (and cash-earning potential) was lost just sitting and chatting with one's friends and work-mates, in playing cards, rolling and smoking cigarettes, or simply sleeping on the bales of wool. As part of the more general

activity pattern survey, the time each weaver first entered the workshop and the time he finally departed each day were recorded. These statistics were collected over a two-week period only. However, a note was also made of any day during the full four weeks' observation and measurement period for which a weaver did not attend the workshop at all and an attempt was made to ascertain whether the absence was due to sickness, matters related to traditional life crises, or other such factors and commitments which prevented a genuine free work-leisure choice.

The hours attended per week, as distinct from the time actually spent in producing woven articles are listed for each weaver in the Data Appendix and summarized in Table 6.1. The mean, taken over the whole sample, was approximately 27.3 hours per weaver per week. Thus, the average weaver only spent a little over half (53.4 per cent) of the time in which he actually attended his workshop actively engaged in tasks that were associated with the production of articles and, hence, the receipt of cash income. Again, there was a considerable variation amongst the sampled weavers in respect to the percentage of time spent in productive weaving activity out of the total time merely spent in attendance. Five weavers worked effectively for at least 70 per cent of the total time they spent in their respective workshops whereas nine weavers actually worked for less than 40 per cent of this time.

Although three of the five weavers who spent their work time most productively were attached to the Makia factory, there were no other cells which had a concentration of weavers who were either significantly above or below average with respect to this variable. There were, however, some noticeable differences in the number of hours per week when some groups attended their workshops. As previously indicated, the Makia factory weavers had somewhat less flexibility than others in deciding on the number of days in a week they would go to work and on the time they could arrive and depart from the workshop. This factor had to be taken into account in the empirical analysis of labour response outlined in Chapter 7.

The Makia factory weavers attended their workshops for approximately 33 hours per week. Weavers at Tarabo, however, were frequently absent and attended, on average, for only approximately 17 hours per week. The eight weavers at Chimbu had an average hourly attendance of 29.5 hours per weaver per week and one Chimbu weaver spent a full 40 hours per week in the workshop during the survey period. However, he spent only 17 hours of this time on productive weaving activities. The weavers at Marawaka and Yonki spent an average of 26.7 and 25 hours per week in their workshops, respectively, and those at Moresby had an average attendance of 23.8 hours per week over the short period during which these data were collected.

It is, however, the calculated *effective* labour time expended on productive weaver activity, derived from the intensive observation and measurement techniques over the two fortnightly survey periods, that will constitute the main dependent variable. Time spent in attendance was not a suitable indicator of one's commitment to monetary labour nor of one's demand for income, as much of the time spent in attendance was for purposes other than earning money. Whilst this use of time was often valued highly by the weaver, it did not earn cash and, for the purposes of this study, was simply designated as 'leisure'.

Time spent in travelling to and from work

Some weavers, and particularly those from the Chimbu and Tarabo weaving cells, lived in villages which were a considerable distance from their respective weaving workshops. It was reasonable to suspect that variations in the relative proximity of weavers to their workshops might partly account for variations in the labour time they committed to the cash-earning weaving activity. The problem was to incorporate this factor into the analysis so that its effects could be ascertained correctly.

An obvious possibility, but one which was eventually discarded, was to count the time taken to walk to and from work as part of weaving work time. However, just as a considerable amount of the time spent within the workshop went on activities which did not lead to the production of woven articles and the acquisition of cash income, so too did the time spent in travelling to work. It was also observed that, on many occasions, a weaver would walk for $1\frac{1}{2}$ to $2\frac{1}{2}$ hours, supposedly to attend his loom, and yet on arrival make little or no actual attempt to produce. Furthermore, as the local trade-store was often close to the *haus blanket*, it sometimes happened that, even on a day when a weaver did not intend to work at his trade, he made the trip merely to visit the local store. Whilst a two-hour walk to attend one's occupation would appear a most arduous task to a European, and one which would probably be considered by him as necessary 'work' rather than leisure, it is difficult to believe that the New Guineans regarded it in this way. Just as being seen within the *haus blanket* gave the weaver the guise of a *man bilong bisnis* (business man), so too did his departure from the village in the morning have the same effect in relation to his fellow villagers. Whilst the time spent for these purposes had definite value in enhancing one's prestige, it did not produce a cash income and in relation to the rather narrower purposes of this study, it was decided to treat walking time in another way.

If walking time was treated as productive work time, then the average hourly wage would vary with the hours of work performed per day, that is as the 'fixed' walking time was spread over a successively greater number of total working hours. The collection

meaningful data would have been almost impossible and the analysis made unduly complicated had this approach been taken. The alternative adopted herein was both more consistent with the writer's observations of behaviour and more manageable for purposes of the analysis. As a maximum work-leisure decision period of 40 hours per week was assumed, it was thus necessary to examine the effects of travelling time on the work-leisure choice within that period. As one would expect, the weavers who lived in distant villages tended to arrive at work later and leave earlier than those living close by, although all the travelling was not necessarily done during the time which otherwise could have been used for work. Any time spent in walking to and from the *haus blanket* within the 40-hour period, however, reduced the amount of time which could have been spent weaving (and thus earning cash). An alternative interpretation of the effect this travelling time had on the labour-leisure choice of the weaver was to view it as committing the weaver to more non-work ('leisure') time than he might have taken otherwise. The significance of this interpretation will become clearer in the following chapter.

Travelling time was recorded as the potential time spent travelling to and from work by each weaver during a full working week - that is the time he would have to spend walking from his village to the workshop and back twice daily for each of the five potential working days within a week. It was not necessarily the time actually spent on this activity by a weaver over the short survey period when, in fact, he might have been absent from his workshop on one or more days (see Table 6.2).

Table 6.2 Time spent in travelling to work, by area subgroup and total sample ('potential' hours per week, by average weaver in group)

Area subgroup	Travelling time
Goroka	1.5
Chimbu	15.5
Makia	6.0
Yonki	4.2
Tarabo	25.0
Highlands	7.8
Port Moresby	2.6
Total sample	7.0

Source: Data Appendix.

Only five weavers had their looms within the village or house in which they resided. The fifteen weavers at Makia, however, lived only 10 minutes' walk away from the Highland Weavers Pty Ltd factory and most of the weavers at Port Moresby were within 20

minutes travelling time from their looms. The latter group of nine travelled to work on a bus or PMV. For the weavers at Chimbu and Tarabo, travelling to work was considerably more time-consuming. Two of the Chimbu weavers regularly walked for approximately 1 hour and 50 minutes each way from Mogl village. Another two returned to Pari village only on weekends and stayed near the township during the week. By doing so, these men reduced their potential weekly travelling time from 22.5 to 7.5 hours per week. The mean potential travelling time for the eight weavers in Chimbu was still a high 15.5 hours per weaver per week.

The Tarabo weavers represented the extreme case in the sample. The five weavers from this cell all lived in a village some 2½ hours' walk away from the workshop (25 hours potential travelling time per weaver per week). The walk was exceptionally arduous and involved a steep mountain climb and a river crossing. Whilst one would think that 5 hours' travelling time per day in this terrain would be the major factor in deterring their weaving effort, it was at this cell that one or more of the weavers were, on occasions, observed making the walk but not bothering to come into the workshop. Instead, the weavers concerned might purchase some tobacco or food at the nearby trade-store, gamble for an hour or so with some card players by the roadside, and make the long walk back to their village. Two of the weavers from the Yauna mission cell and four from Marawaka walked for an hour or more each day on days they attended work. The mean travelling time for the thirteen weavers at the two Marawaka weaving cells was approximately 6 hours per weaver per week although two of these weavers lived within 5 minutes of their weaving cells.

Time spent on other monetary work

Twelve weavers in the sample spent some time in other cash earning activities during the survey period. The average time spent on such activities by these twelve men was approximately 3.2 hours per week. When averaged over the total sample, the time spent on other monetary activities appears small indeed (less than 0.7 per weaver per week).

Over 40 per cent of the total amount of time spent by the sampled weavers on such activities was due to one Gorokan man who owned a small trade-store. All of this weaver's trade-store work was done after 4.00 p.m. on working days and during the weekends and, hence, was outside of the effective weaving-leisure choice period.

Most of the other monetary work performed was related to coffee growing and, again, this was usually performed by the weaver on the weekends. In two cases,¹ however, this was not so

¹Only one of which was recorded during the two-weekly survey period.

and a weaver absented himself from weaving work to perform tasks associated with the pulping and drying of the cherry coffee. In both cases, the weavers' actions were perfectly rational. The picked coffee represented a considerable past investment of household labour but required the weaver's immediate attention to process it if he was to collect the rewards of these past labours.

In this situation the labour time spent on the coffee preparation was treated as being outside the usual weaving work-leisure choice. The days lost on such activities were not counted as part of the choice period and the data concerning average weekly effective labour time were simply calculated over an appropriately shorter period for the two individuals concerned. The average weekly time spent on other money-earning activities is given in the Data Appendix and summarized in Table 6.3 below.

Time spent in subsistence sector activity

Although six of the nine weavers from Port Moresby and three of the forty-eight Highlanders reported that they did not work in subsistence gardens, or on any other subsistence activity, during the period over which data were collected, it would be usual in a transitional economy for cash earners to continue to devote a substantial amount of time to traditional subsistence activities. A man is, however, likely to spend much less time on such activities if he resides away from the home village where he is likely to have rights to cultivable land. It will be shown that the weavers of the sample generally spent less time on subsistence activities than most of the groups of Papuans and New Guineans studied by other researchers. However, in quite a few individual cases, and in some areas, the weavers certainly spent significant amounts of time on such activities.

Whilst the male's role in traditional gardening is quite arduous and intensive it is not constant. Although some of the male weavers and the other village men admitted that they sometimes neglected their gardens, the sexual division of labour in gardening activity appeared to permit the menfolk a considerable amount of free time to devote to other work or to leisurely activities. The intrusion of Western law and order and the cessation of warfare has made redundant much of the time that village men have traditionally spent on aggression or defence preparation.

In all the Highland areas visited, it was the role of the man to clear and break up new garden ground, to dig the necessary drains and to build and repair all fences. It was also the man's task to attend to all house building and repair. In addition to this work, there were tasks associated with certain types of garden crops that were the sole preserve of the menfolk. The planting, care and harvesting of sugarcane was performed only by men in all the areas contacted. In Marawaka, the planting of pit

pit, yams and, sometimes taro was performed by men alone. The planting of taro was mostly the work of the village men in the Yonki area; in Chimbu, and to a lesser extent in other areas, the care and harvesting of bananas was performed only by the males. In general, and where required, the male weavers of the sample performed these prescribed functions.

However, it was left to the household's womenfolk to perform the constant and tedious daily gardening tasks and women alone were responsible for all aspects of the production of sweet potato, the major food crop throughout the Highlands. The womenfolk ensured that there was adequate vegetable for the household's food requirements and it was they who were responsible for regularly harvesting sufficient sweet potato and cassava to feed the household pigs.

After discussing the matter of 'men's work' and 'women's work' with the weavers and village folk, the impression was gathered that the work customs associated with the crop types were much less rigid in 1974 than they had been in the past. Where once (in some areas) crops such as yams and taro were planted, cared for and harvested by men alone, women were now 'permitted' to perform all but the planting of these crops. One wonders whether such change in custom was not a manifestation of the more recent involvement of men in cash-earning activity and a move towards a sexual division of work function of another type, where men specialize in cash-earning activity and women carry out all aspects of traditional subsistence production.

Two types of subsistence activity were defined:

- (i) that associated with subsistence gardening; this was taken to include clearing the land, digging up the garden, digging drains, planting, cultivating and harvesting crops, building and repairing the fences surrounding the gardens;
- (ii) that associated with other subsistence activities: taken to include the cutting and collecting of timber (including firewood), house building and repairing, hunting and fishing.

The average number of hours spent by the weavers on each of these two types of subsistence activities is summarized in Table 6.3.

Classification of tasks into one of the two categories was often blurred by the non-exclusive nature of some activities. Fence building and repair was intended to be included in the first category whilst house building and repair belonged to the second. However, it was likely that the collection of timber for both house building and fence repairing was sometimes done

simultaneously. The method used to collect data on these non-weaving activities also did not permit differentiation between the time spent on productive and non-productive activity. One suspects that a large proportion of time supposedly spent on gardening activities could be more accurately described as 'leisure'. Whilst the distinction between productive work and 'leisure' could be made and measured in respect to the predominant cash-earning activity, it was not practicable to attempt to obtain such measures for the non-weaving work activities of each weaver.

However, provided one was aware of the limitations, it was possible from the survey data to obtain some rough indication of the relative amount of time this particular group of cash earners spent on subsistence sector activities. This could then be compared with time spent on similar activities by other groups which have been studied by previous researchers. It was also possible to ascertain the extent to which the weavers worked on subsistence sector activities during the times of the day and week they knew or felt could have been devoted to their cash-earning activity.

None of the weavers from Port Moresby spent time in subsistence gardening activity and this, of course, was due to their being migrant residents in a large urban area where no traditional garden land was available to them. However, some of these weavers spent small amounts of time (average 1.1 hours per week) fishing or performing household tasks, for example lawn cutting, house repairing, etc. for their *wantok* custodians.

When calculated over the complete sample, the average weaver was shown to spend approximately 3 hours per week on subsistence gardening activities and approximately 3 hours per week performing other subsistence tasks during the survey period. The average weaver from the Highland areas spent approximately $3\frac{1}{2}$ hours per week on subsistence gardening activity.

The group with the highest average weekly expenditure of time on subsistence gardening per weaver was from Marawaka. This was the most traditional of all areas contacted and one's standing in this community was still closely related to one's gardens and traditional wealth. The thirteen Marawakan weavers spent, on average, just under 7 hours per weaver per week on their garden activities and approximately $4\frac{1}{2}$ hours per week on other subsistence activities.

The Chimbu weavers, whose households harvested the highest average weekly volume of *kaukau*, could not attribute this large garden output to the work of the male weaver members of the households. The weavers in this area spent only 2.9 hours per weaver per week in their gardens and another 1.5 hours per week on other subsistence activities.

Table 6.3 Time spent by weavers in selected non-weaving activities, by area subgroup and total sample (hours per week by average weaver in group)

Area subgroup	Other monetary activities	Subsistence gardening activities	Other subsistence activities
Goroka	1.4	1.8	4.5
Chimbu	1.5	2.9	1.5
Marawaka	0.2	7.0	4.4
Yonki	0.2	2.9	1.5
Tarabo	-	2.2	2.9
Highlands total	0.8	3.5	3.4
Port Moresby	0.2	-	1.1
Total	0.7	3.1	3.1

Source: Data Appendix.

However, as Chimbu weaver-households were generally of a larger size than those found elsewhere, there were obviously more people to share in the general gardening tasks.

The survey period was too short to obtain a really satisfactory indication of the time spent on subsistence sector activities by the fifteen weavers attached to the Makia factory. During the first round, most of the weavers were busily engaged in house building on their new village site. Some of the men were spending 10-12 hours per week on this task and those not engaged in house building were active in trying to establish gardens on the small pieces of land allocated to each weaver family. By the time of the second survey round this activity had begun to settle down and the average weekly time spent on other subsistence activities recorded for the members of the group was approximately $4\frac{1}{2}$ hours per weaver per week. In addition, 1.8 hours per weaver per week were spent in subsistence gardening activity.

The five weavers from the Yonki area spent an average of 2.9 hours per weaver per week on subsistence gardening and another 1.5 hours per weaver per week on the other subsistence tasks. The Tarabo group spent slightly less time on gardening activity (an average of 2.2 hours per weaver per week) but more on other subsistence work activities (approximately 3 hours per weaver per week).

Whilst these recorded time inputs to subsistence work were probably an adequate indication of the limited amount of time spent by the weavers on such activities during the weeks for which it was possible for them to weave, they may well underestimate the hours that would be observed in subsistence sector work if one were able to record this statistic over a much longer period (e.g. a year).

It is interesting to compare the sample groups studied by other researchers with the geographically scattered homogeneous workforce group sampled and studied herein. Even if the labour input to subsistence activity was slightly underestimated in the current study, as a result of the short survey period and the other contingencies mentioned, it is obvious from Table 6.4 that the weaving workforce differs in its cash work/subsistence work allocation from the more traditional groups of cash croppers studied by other writers.

For all other groups, with the one exception of Hogbin's (1964) rubber smallholders and tappers from the Kerema area, the time spent in cash-earning activity was substantially less than that spent on subsistence work activities. In the case of the weavers, however, the time spent on subsistence activity was, on average, less than half of that devoted to productive weaving effort (and only a quarter of that spent within the weaving workshop). Furthermore, members of all other groups studied (with the exception mentioned above) spent, on average, at least twice the time on subsistence activity as did the average weaver.

The present study does not attempt to explain the allocation of time over a full weekly period (168 hours). Rather, it relates specifically to the assumed 40 hours per week for which a weaver (because he was then free from institutional and social constraint) knew he could use for the purposes of earning a (substantial) cash income. It was necessary, therefore, to review the data recorded for subsistence work and distinguish between the time spent on this activity within the more narrowly defined decision period and that which was carried out during the hours or days when weaving work was not really an effective alternative. This was done by reviewing each relevant data schedule and noting those hours spent on subsistence work activities during the hours between 8.00 a.m. and 4.00 p.m., Mondays to Fridays (see Data Appendix). It was found that, during the two weeks over which such data on each weaver were collected, only five of the fifty-seven weavers sampled performed subsistence work within the defined 40-hour period. In fact, out of a total of 683 hours spent by the sample group on all subsistence work during the two survey weeks, only 40.5 hours (or 5.9 per cent) were actually spent within a period of time which might otherwise have been devoted to weaving.

Furthermore, 21 of these 40.5 hours represented time spent in gardening and other subsistence sector work by two of the independent weavers operating in the Highlands. Whilst it has been argued that the independent weavers also appeared to adhere to a convention regarding the appropriate length of a typical working week, it might be that they used their greater freedom from institutional constraint to be more flexible in choosing the times of the day they sat down to their looms.

Table 6.4 Hours per week spent in subsistence and monetary work, selected studies^a

Study	Description	Subsistence gardening	Other subsistence activity	Total subsistence	Cash-earning activity
Waddell and Krinks (1968)	(a) Sivepe	16.9	4.4	21.3	5.0
	(b) Inonda	14.6	10.9	25.5	3.7
Crocombe and Hogbin (1963)	Inonda	-	-	14.0 men 15.1 women	12.0
Waddell (1972)	Modopa	15.6	6.1	21.7	4.5
Moulik (1973)	Eastern Highlands	14.7	3.1	17.8	5.8
	Milne Bay	9.1	4.8	13.9	3.0
	Madang	10.8	2.9	13.7	3.7
Hogbin (1964)	Kerema Bay				
Current study	(a) smallholders/tappers	6.0	2.0	8.0	34.5
	(b) project group leaders	11.4	8.2	19.6	7.6
	(c) subsistence households	14.1	8.0	22.1	4.8
	<u>Weavers</u>				
	Total sample (57)	3.0	3.1	6.1	27.4 ^b (14.6) ^c
	Highland areas only (48)	3.5	3.5	7.0	28.0 ^b (15.2) ^c

^aWhere possible and where necessary adjustments were made to the recorded statistics of the other studies so that they corresponded to the definition of 'gardening' and 'other' subsistence activities used in the current study.

^bTime spent within workshop (average of 2 weeks).

^cDependent variable - calculated productive weaving time (average of 4 weeks observation).

Whatever the case, it was apparent that the trade-off between weaving work and subsistence work during the defined decision period was small indeed. The model that follows will proceed on the simplified assumption that the relevant choice within the decision period was simply between weaving for a cash return on one hand and leisure (on non-work) on the other.

As weaver-households in the Highlands were often substantial producers of garden produce and as the (predominantly) male weavers themselves generally did not spend a lot of time in gardening activity, one might expect that the gardening work done by other (non-weaving) household members was quite considerable. Over the same two-week survey period, data were collected on the time spent on gardening activities by other household members (predominantly the wives of the weavers, although the wives' mothers and sisters and the weaver's children assisted in a number of cases). The measurement of the work time input performed by these individuals had to be collected by even less precise methods. The average weekly time spent on subsistence gardening activities by non-weaver adult household members measured in quarter-days, is presented in the Data Appendix. If a full workday is taken to be 10 hours, then one quarter-day (the unit used for recording the data) was approximately $2\frac{1}{2}$ hours. It was found that the average time spent by the non-weaving members of the forty-eight Highland households² on subsistence gardening activities was approximately 31 hours per household per week. The weaver, therefore, supplied only about 10 per cent of the total labour expended on gardening activities by the average Highland weaver-household (Table 6.5).

Table 6.5 Time spent on subsistence gardening activities by non-weaving members of the weaver households, by area subgroup

Area subgroup	Average number of non-weaving household members (AECUs) per average household	Time spent in subsistence gardening activities (hours per week)
Goroka	1.9	18.3
Chimbu	4.0	52.2
Marawaka	3.0	37.6
Yonki	2.3	39.9
Tarabo	1.1	14.5
Highlands	2.5	31.0
Port Moresby	0.2	-

Source: Data Appendix.

²The statistic excludes the nine weavers in Moresby, none of whom had traditional gardens.

It appeared that the average weaver's main concern was with production in the monetary sector of the economy and with the acquisition of cash income. The subsistence gardening activities were left more to the household members whose opportunity cost in the monetary economy was either low or zero and the weaver supplemented (or complemented) this labour during those times of the week when his own opportunity cost to the monetary economy was also zero. The high productivity of subsistence agriculture in Papua New Guinea, together with the women's traditional role in performing the more time-consuming gardening tasks, thus permitted the weaver and his family to enjoy the best of both worlds. Cash could be earned to acquire the goods which could only be obtained within the monetary sector, whilst subsistence garden production could be maintained at a sufficiently high level to ensure that the household was able to meet some, even most, of its basic needs without recourse to cash. However, in terms of Fisk's stages of transition, it would appear that the members of the weaving workforce were generally at a later stage of the transition to complete monetization than those Papua New Guineans engaged in some of the rural economic pursuits. Also, they appeared more cash-oriented than most other groups of Papua New Guineans studied to date.

Chapter 7

Labour supply response: an empirical model

In this chapter a more formal analytical approach is adopted. Apart from the insights one might gain in relation to the economic behaviour of the sampled group of New Guinean cash workers, the methodological approach used in this chapter is offered as an alternative to that more generally associated with studies in the area of economic anthropology. However, some readers may prefer to pass on to Chapter 8 at this stage.

An empirical economic model is constructed to examine the effect of a number of explanatory variables on the amount of labour effort supplied per week by a 'representative' individual weaver. The model developed is based on the theory of consumer demand and is, in effect, a simple transformation of the demand for a good — 'leisure'. Although it has some features in common with the models of Nakajima, Mellor and Fisk, it also differs from them in some noticeable respects.

First, Fisk and Makajima are primarily concerned with subsistence farmer households whose members spasmodically undertake some cash cropping or wage labour activity. The current model, however, relates to a single member of a family household where those subsistence activities that do exist are largely undertaken by the non-weaving household members and the weaver is faced only with a cash versus leisure decision during the effective choice period. The emphasis is thus on the weaver's choice.

Second, the model to be presented attempts to be consistent with the theoretical assumption of utility maximization that underlies the contemporary approach to demand analysis but in a manner which also permits the estimation and testing of the model's parameters by simple econometric techniques. The parameters can then be used to calculate the values of the elasticities that quantify 'labour response'. The main developments in the econometric analysis of demand that have occurred in the last 20 years (see Brown and Deaton 1972; Philips 1974) all indicate that the credibility of the estimates and the calculated elasticities are only assured if these rigorous and formal procedures are followed. A formal econometric analysis becomes necessary because

of the numerous factors that in one way or another can be hypothesized to affect the cash work/leisure choice. If the economically interesting relationships, for example between the labour effort committed and the wage rate, are to be correctly identified and accurately estimated, then it is essential that all 'other factors' are held constant. This is the *ceteris paribus* assumption which underlies virtually all economic theory and which can be carried through into empirical research by the powerful methods of econometrics.

Although the apparent theoretical rigour of the following model has to be relaxed somewhat at the point of estimation owing largely to the limited size of the sample, the absence of some appropriate price data and the simple estimation techniques available to the researcher, it is argued that the method has considerable advantages over earlier and less formal empirical studies undertaken into the economic behaviour of semi-subsistent consumer/producers. Likewise, the presentation of the underlying model in equational and estimatable form has advantages over the graphical presentations of Nakajima and others. Krishna (1969:186), commenting on the Nakajima model, makes the point that 'no matter how abstract our primary concepts (such as a utility function) are, the fruits of theorising must, in the decade of econometrics, be predicted relations which are empirically testable. They must have variables whose empirical correlates exist in the available data or can be computed without prohibitive cost.' The models of Nakajima, of Fisk and of Wharton do not, in the form in which they are presented, lend themselves to this style of empiricism.

Contemporary consumer demand theory attempts to bridge the gap that exists between a sound theoretical reasoning and a theoretically consistent empirical study. The demand for a good is usually expressed as a function of a number of variables, for example the price of the good in question, price of related goods, household income and perhaps some socio-demographic variables that one considers important. This function is then often given a simple functional form (linear or log linear). However, the estimated parameters can lead to nonsensical conclusions unless a number of theoretical restrictions are imposed on the demand equations. Theory is necessary to confirm and ensure the logical consistency of the particular relationships that one hypothesizes to exist amongst the relevant variables. Contrary to popular belief, the data do not tell the true story and theory has to be imposed on the data to make them meaningful.

The earlier pragmatic approaches to functional forms are, however, no longer favoured and a preferred procedure is to specify a particular utility function directly and then derive a demand equation by the constrained maximization of it. In this way, all the theoretical general restrictions are automatically satisfied and the demand model will be internally consistent. Unfortunately, this formality is costly in terms of the model's generality.

Under the present state of the art the number of utility functions with algebraically specifiable forms is few indeed and those implied by the indifference maps of the earlier theorists are probably too complex even to contemplate. One must therefore seek to specify a utility function that seems relevant to the problem at hand in that the demand functions derived from it have properties which are appropriate to the particular sample or society being investigated and which, of course, are suitable for estimation and yield parameter estimates which can provide meaningful interpretations of economic behaviour.

In each of the earlier mentioned theories there is to be found a recurring concept. Nakajima (1969:167) identifies the 'minimum subsistence standard of income for the whole family'. Mellor (1963:52ff.) examines this concept in some detail defining both a 'minimum biological subsistence level' and a 'culturally determined subsistence level' in his model. Fisk (1975a) embraces a similar concept in both the Subsistence Enterprise and the Monetary Enterprise component of his exposition. In economies where the intrusion of cash is recent and incomplete and where cash incomes are still low, it may well be expected that cash expenditure decisions are frequently made in the region of this minimally acceptable level. An econometric model able to incorporate such a concept and examine its implications would thus be most desirable.

Linear demand models which incorporate 'subsistence' or 'precommitted' bundles have been fairly prominent in the literature since Stone's work of the mid-fifties (Stone 1954). The demand equations that incorporate these subsistence bundles are derived from a utility function that has become known as the Stone-Geary utility function. The resulting linear expenditure system and various extensions of it have also been used to analyse demand and savings behaviour in parts of the developing world (see Lluch, Powell and Williams 1977) but applications to date have been restricted to rather large national data sets. The Stone-Geary utility function¹ and the method by which our empirical model of labour supply response has been derived from it is described formally in Appendix A.

Basically, the ordinary demand functions derived from the Stone-Geary utility function imply that expenditure on any good

¹At the risk of displeasing econometricians but at the same time (one hopes) encouraging the general reader to consider the merits (and obvious limitations) of econometric techniques, a minimum of algebra will be presented in this chapter and the usually rigorous qualifications and mathematical conventions will either be dispensed with or relegated to Appendix A. Readers requiring a more formal and complete exposition are referred to Philp (1976 and 1979).

(i), which we can represent as $p_i x_i$, can be broken down into two parts. The first part represents some 'minimum' expenditure which the consumer commits himself to in order to obtain a minimum level of subsistence. This level does not necessarily need to be a biologically determined minimum. It may include an additional, culturally determined — or 'minimally acceptable' — component of expenditure. This 'subsistence' expenditure is represented by $P_i \gamma_i$, with the γ_i representing the minimum subsistence quantities or bundles. At given prices, the sum of all the subsistence expenditures of the various goods ($\sum_j p_j \gamma_j$), measures 'subsistence income'. Thus, when this subsistence income is deducted from total available income (y), the remainder (or, $y - \sum_j p_j \gamma_j$), which should be a positive amount, represents 'super-numerary income'. Finally, this supernumerary income is allocated among the various goods being considered in proportions, β_i (where $i = 1 \dots n$). These β_i are often referred to as 'marginal budget shares' and are assumed to sum to 1.

It is a relatively simple procedure to extend this system to incorporate 'leisure' as one of the goods and thus γ_L would represent some precommitted or minimally acceptable quantity of leisure consumed within the defined cash work-leisure choice period.

The precommitted quantities (γ_i) defined in most Stone-Geary based demand functions are assumed to be fixed (i.e. the same for all households and all time periods). It is possible, however, to go one step further and make these γ_i quantities themselves functions of various socio-demographic and institutional factors that one may wish to hypothesize as having important explanatory powers in particular situations. An approach similar to this was adopted by Manser (1976) and by Howe (1977), amongst others. Manser made the subsistence quantities a function of previous consumption and Howe used it to allow for variations in household composition.

In the present model we define three sets of goods. These are food items (q_1), other items, including savings (q_2) and 'leisure' (q_L). The price of leisure is denoted as w , the wage rate. The other two goods are assumed to be current goods and services and the income term has to be defined as I to represent 'potential income', where

$$I = I = wH + E \quad \text{and}$$

H is the number of hours per week in the effective choice period and is made up of q_L (hours per week spent on 'leisure') and S_L (hours per week of effective work).

E consists of other (i.e. non-weaving) cash income plus the estimated cash value of subsistence (or garden produce) income plus net cash transfers received.

The hypotheses concerning the subsistence or precommitted quantities are as follows:

The precommitted demand for food items (γ_1) is a simple function of the number of AECUs in each household (denoted N) (thus, $\gamma_1 = \lambda_1 N_h$).

The precommitted demand for other items (γ_2) is a simple function of the availability of and the relative access to such items. This is measured by an index of 'accessibility' (A) (thus, $\lambda_2 = \delta_2 A_h$). The concept embodied here is that precommitted demand for non-indigenous consumer goods (i.e. the minimum amount considered to be culturally acceptable) expands the greater the degree and intensity by which the social group has been exposed to such goods. It represents, in effect, the so-called 'demonstration effect'.

Finally, there is γ_3 , the precommitted demand for 'leisure'. Some of the factors hypothesized to affect this quantity resulted from the way 'leisure' was defined for the purposes of this study. It depended on three factors, namely,

- (a) whether the weaving cell had an appointed supervisor or not (denoted $S = 1$ if it did, 0 otherwise);
- (b) whether the weaver was both young and unmarried (denoted $D = 1$ if he was, 0 otherwise); and
- (c) the time taken by the weaver to commute between his residence and his place of work (T), measured in potential hours per week (thus $\gamma_3 = \alpha_0 - \alpha_1 S + \alpha_2 D + \alpha_3 T$).

All variables and terms mentioned above have been defined, measured and discussed in the previous chapters.

The model equation, referring as it does to the supply of effective labour effort, or S_L , and incorporating the various additional hypotheses outlined above, has now to be derived.

The procedure (as detailed in Appendix A) is to redefine the ordinary equation in terms of the good, 'leisure' (or, q_7) and to substitute into it $I = wH + E$, in lieu of the usual household income term, y . Next, the factors which we have hypothesized to effect the three subsistence quantities, γ_1 , γ_2 and γ_3 (i.e. λN , δA , αS , etc.) also have to be substituted into the model equation. Finally, this demand for leisure equation has to be respecified in terms of S_L , the supply of effective labour effort, using the identity $H = q_7 + S_L$.

All this yields a rather complicated-looking equation which, in lieu of some less precise and less useful graphical or verbal presentation, represents our empirical model:

$$\begin{aligned}
 S_L = & (1 - \beta_7) (H - \alpha_0) + (1 - \beta_7)\alpha_1 S^* - (1 - \beta_7)\alpha_2 D^* \\
 & - (1 - \beta_7)\alpha_3 T - \beta_7 \left(\frac{E}{W}\right) + \beta_7 \left(\frac{P_1 \lambda_1 N_h}{W}\right) \\
 & + \beta_7 \left(\frac{P_2 \delta_2 A}{W}\right) + u \quad \dots(1)
 \end{aligned}$$

It should also be noted that this particular function represents some compromise to the theoretical rigour that a full linear expenditure system entails. We are, in effect, subtracting just one equation from a set and estimating it alone and, consequently, this can be expected to produce some bias and loss in efficiency in our results.

Such a pragmatic compromise has been necessary because of the rather small size of the cross-sectional data set and also because it was not possible to collect accurate regional price indices for goods other than basic trade-store items. In addition to this, systems of equations require sophisticated estimation techniques (i.e. maximum likelihood estimation) not found in the normal regression and statistical computer packages available to most researchers (including the author). One can take some solace from the authoritative Brown and Deaton (1972:1158) who state that 'Single equation methods, even if less satisfactory from a theoretical point of view, may still be able to outperform complete models in terms of fit to past experience and ability to project the future.' The estimation will thus be undertaken by the ordinary least squares (OLS) method, seeking justification in the considerable support given to the view that OLS is able to compare favourably with more complicated estimation techniques when sample size is small. Furthermore, as researchers familiar with fieldwork and data collection in traditional societies will appreciate, there are often considerable and fundamental conceptual problems in actually identifying and defining the relevant explanatory variables. There are even greater conceptual and practical difficulties in obtaining reliable measurements. The scope for definitional and measurement error is thus quite large. This study has deliberately opted for a smaller and more manageable sample size (given the fieldwork resources available) in an attempt to obtain greater precision in the definition and measurement of the important variables so that the potential errors referred to above can be minimized. As such, it supports a contention expressed in Koutsoyiannis (1973:501) that 'the results of econometric research will most probably be improved by an improvement in data collecting and processing techniques rather than by improvements or sophisticated refinements in econometric methods'.

The estimation of the model

The labour response model of equation (1) has now to be estimated (i.e. values have to be found for the parameters) and

thus it must be re-expressed in its estimating and stochastic form:

$$\begin{aligned}\hat{S}_L = & b_0 + b_1(X_1) + b_2(X_2) + b_3(X_3) + b_4(X_4) \\ & + b_5(X_5) + b_6(X_6) \quad \dots (2)\end{aligned}$$

From the coefficients b_0 - b_6 we can then compute values for the various theoretical structural parameters expressed in (1). These relationships and the expected signs of the coefficients can be found in Appendix A.

As indicated in this and previous chapters, there are considerable definitional and measurement difficulties associated with a number of the explanatory variables. When estimating the model, it is a simple procedure to try the various alternatives and evaluate the extent to which different versions affected the results. Because there were two alternative constructs of E (net non-weaving income, including the non-monetary household food production) and three alternative ways of constructing the relevant price indices, at least six versions of the model could be reported. The reader will, however, be spared this and only the most successful version (which, incidently, contained the most feasible of the alternative definitions) will be reported below.

Initially, equation (2) including all its six independent variables was estimated. The set of regression coefficients, whilst all having the theoretically expected signs, did not all have low standard errors. The first five of the coefficients plus the constant b_0 were significant at the 5 per cent confidence level or better, but b_6 was not. It was concluded that the 'index of accessibility' to which b_6 related was not able, in the form in which it was defined and constructed from the data and incorporated into the model, to contribute to the explanation of variability in the main dependent variable. An additional problem associated with variable 6 could also be due to p_2 , the price index for 'other items'. As it was not possible to construct an index for 'other items' with the same precision as for p_1 this too may have contributed to its poor performance.

The final variable, p_2A/w , was then dropped from the equation and it was re-estimated. The results were as follows:

$$\begin{aligned}\hat{S}_L = & 14.57 + 5.18S - 2.99D - 0.21T - 0.20E/w + 0.63p_1N/w \\ & (0.98) \quad (1.26) \quad (1.12) \quad (0.06) \quad (0.05) \quad (0.19) \\ & ^2 \\ & R = 0.66 \quad \quad \quad F = 19.9\end{aligned}$$

(Standard errors are given in parentheses.)

All coefficients were now significant at the 1 per cent level or better and the independent variables of the model explained

approximately 66 per cent of the variation in the effective work effort supplied by the sampled workforce. An R^2 of this magnitude is considered to be quite acceptable for cross-sectional data and compares most favourably with the results obtained by Betancourt (1971) on a much larger Chilean cross-sectional data set.

We can now proceed to use the regression coefficients to derive values for the underlying structural coefficients. The two which are of greatest interest are λ_L (the precommitted demand for leisure) and β_L (the marginal budget share or marginal propensity to consume leisure).

Table 7.1 Estimated values of structural coefficients

α_0	α_1	α_2	α_3	β_L	λ_L
21.78	6.47	3.73	0.26	0.20	3.15

Whilst the values for β_L are given above, values for γ_L are derived using α_0 to α_3 . However, because both S and D are dummy variables there are four values for γ_L . At the same time the mean sample values for all other variables can be used to obtain estimates for $\hat{S}_L$ and $\hat{q}_L$. Results are presented in Table 7.2.

Table 7.2 Estimated values for γ_L , $\hat{S}_L$ and $\hat{q}_L$ (hours/week)

	S = 0, D = 0	S = 1, D = 0	S = 0, D = 1	S = 1, D = 1
γ_L	23.59	17.12	27.32	20.85
$\hat{S}_L$	14.44	19.62	11.47	16.64
$\hat{q}_L$	25.56	20.38	28.53	23.36

The marginal budget share, or marginal propensity to consume leisure, β_L , was estimated at 0.20. Because single equation OLS estimation was used there is no assurance that the sum of the β_i was equal to 1 and hence the above value must be carefully interpreted. However, it is very close to the value of 0.21 obtained by Betancourt (1971) for his low income group of Chilean households.

When labour effort and leisure are defined as they were for this study it can be noted that estimates for γ_L , the precommitted (or non-discretionary) demand for leisure, are particularly high and constitute from 84 to 95 per cent of the total demand for leisure by this particular sample of workers. The highest proportion was for the unsupervised, young and unmarried workers.

There are two elasticity values of particular interest to this study:

- (a) Work effort with respect to change in earning rates (denoted η_w). This is the measure of labour response central to the study; and
- (b) Work effort with respect to change in 'other' (or non-weaving) income. This value is denoted as η_E .

The equations for these two elasticities are, again, presented in Appendix A.

These elasticities have to be calculated at some specified values of the relevant variables. Mean sample values will be used. However, because there are two dummy variables (S and D) there are four values for S_L and hence four values for each elasticity.²

Values for η_w were always negative when mean sample values of the model's variables were used and ranged from -0.06 to -0.11. It can thus be stated that, for the particular weaver workforce being studied, the elasticity for work effort with respect to (variation in) earning rates was found, on average, to be negative and highly inelastic. A 10 per cent increase in the average hourly earning rate would reduce the work effort supplied by the average (or representative) weaver by between 0.6 and 1.1 per cent. Some weavers may have been responding positively and some negatively to the wage rate incentive but the average converged towards zero. The reduction in work effort appears to have been less for the supervised and older married weavers and greatest for the unsupervised single youths. Ideally, a much larger sample would have allowed subgroupings according to these socio-demographic characteristics and separate estimations for each subgroup would have given more conclusive and interesting results.

Finally, we can examine the extent to which average work effort (or that of the 'representative' weaver) changed or varied in response to the differing amounts of non-weaving (and pre-dominantly garden produce) income available to the weaver-household, assuming this amount is exogenous to the work/leisure choice. Again, the values for η_E are estimated at mean sample values for the independent variables of the model. The values for this elasticity ranged from -0.03 to -0.05. Whilst the response was in the expected direction, it was also very weak (i.e. highly inelastic). A 10 per cent increase in non-weaving income of the weaver-household would tend, on average, to be associated with a decrease in cash work effort by one-half of one per cent or less.

The implications of these results will be discussed in the concluding chapter.

²Elasticities can also be calculated using values of the relevant variables which are alternatively one standard deviation above and below the sample means; see Philp (1979).

Chapter 8

Conclusions

This study has attempted to describe and to analyse aspects of the economic behaviour of a relatively small group of piece-rate cash workers in a transitional Melanesian economy. For each of the fifty-seven workers studied, involvement in the cash economy had been of quite recent date. Almost half of this workforce sample had no previous cash work experience and many were the only members of their clan group to have had the opportunity of regular cash work. Although the cash work provided each with a monetary income, all but a few of the workers relied on the traditional subsistence economy, or the *wantok* obligations ingrained in traditional society, for a substantial proportion of the food and shelter requirements of themselves and their families.

In earlier empirical studies of Melanesian economies (e.g. Moulik 1973) mention was made of the 'underexploitation' of income-earning potential. The current study lends some support to his general observations. On average, a member of this particular workforce effectively spent only 14.6 hours of the potential 40 hours per week available to him for the production of woven products. In cash terms, the average weaver had the potential to earn, in 1974, \$17.69 per week. However, average earnings were only \$6.98 per week, indicating that slightly less than 40 per cent of the potential earning capacity was 'exploited' by the average member of this workforce. Furthermore, there was no evidence that the balance of the available work time was spent on any other productive monetary or non-monetary pursuit.

There was, of course, considerable variation in the effective work time spent by the weavers of the sample. In fact, the range was from 6.8 hours per week to just over 26 hours per week and variations in average weekly weaving incomes ranged from \$0.82 to just over \$25.00 per week. Average hourly earning rates also showed considerable variability. Although the sample mean was approximately 44¢ per hour, the range was from 12¢ to \$1.32 per hour. Weaving thus provided most of those fortunate enough to be employed within the industry a chance to earn a cash income that was at least comparable with that which was potentially available in other cash-earning activities at the time.

A central theme of this study has been an evaluation of the labour effort response of a sampled workforce whose members could be described as 'semi-subsistent' and whose involvement in the cash economy had been relatively recent. The workforce was distinguished by the very considerable degree of freedom that existed in the work/leisure choice of its members. The expenditure patterns described in Chapter 5 are thus not independent of the work/leisure choice decision of the worker. Inasmuch as they depend partly upon the cash earned from the particular cash work activity, they also depend upon the amount of work effort that the worker chooses to put into it.

The labour effort committed by the individual is, similarly, some function of his demand for current goods and services and his non-weaving cash and non-cash incomes net of obligatory transfers, as well as the wage or earning rate. The demand for current goods and services is, in turn, a function of their price, the household's total income and such factors as the size of the household and the relative availability of goods and services to it. In addition, there are, in circumstances such as those present in a country such as Papua New Guinea, a number of socio-demographic and institutional factors which directly affect the amount of cash work one can do.

The analytical problem of identifying and then disentangling these diverse influences on the work effort decision and then identifying and quantifying the elasticity of work effort with respect to the wage rate (the fundamental 'response' concept) certainly lies beyond the scope of simple tabular and descriptive analysis. In this study the answer has been to attempt the construction of a formal econometric model of labour effort response based on widely accepted and tested consumer theory. Within a defined decision period over which cash-earning work was possible, the time not spent in productive cash-earning work was defined as 'leisure'. The demand for 'leisure' can then be treated in much the same way as the demand for any other good. Thus, the supply of work effort can be considered simultaneously with the demand for the items which the cash work income enables one to procure and which, in turn, probably motivates one to work.

This approach has numerous counterparts within the mainstream of labour economics throughout the developed world. There are very few instances, however, where this has been attempted in Third World situations and even fewer have attempted to analyse small sample anthropological data collected by the analyst himself.

In the vein of contemporary developments in consumption theory and analysis, we incorporate the notion that, in allocating his income between goods and in earning that income, a consumer attempts to maximize his satisfaction or utility. The model developed then assumes a particular algebraic form for the utility function and a set of demand equations, including the demand for

'leisure', are derived from it. This procedure has been shown to produce empirical models which yield much more plausible results than the normal pragmatic model equations that were in common use two decades ago.

The model equation was derived from what has become known as the Stone-Geary utility function. This function can be shown to have characteristics which made it particularly relevant in explaining demand behaviour under circumstances of the type observed in Papua New Guinea where the transition to a fully monetized economy was incomplete. Demand equations derived from the Stone-Geary utility function allow for two separate components of the demand for each particular commodity. The first component, and the one that interests us most, can be described as a 'precommitted' or 'minimum subsistence' quantity which, provided income is greater than the sum of expenditures on these subsistence bundles, is an amount determined independently of incomes and relative prices. After the minimum subsistence bundle of each of the defined goods is purchased, the remaining or 'supernumerary' income is allocated in fixed proportions between the various goods.

'Minimum subsistence' quantities have been part of the analytical models of a number of economists who have looked at labour supply problems in semi-subsistent situations (e.g. Fisk, Nakajima and Mellor). The extent of the demand for the 'subsistence quantities' of each of the goods defined in the Stone-Geary model can be related to any number of socio-demographic variables which one might hypothesize to affect behaviour in the cultural and economic environment being studied. The novelty of the analysis conducted herein has been that the 'subsistence quantities' (the γ_1 of the equations) of the three goods defined by the model (i.e. food items, all other items and leisure) have been made functions of several 'non-economic' variables. These included such things as household size, an index of the relative availability of goods and services and, in respect to leisure, the availability or otherwise of supervision in the workplace, whether or not the weaver was young and unmarried, and the time it took the weaver to travel to work.

In relation to the conclusions which might come out of the analysis, it should be pointed out that the utility function from which the model equation was derived was defined only with respect to current goods and services and to 'leisure'. All cash outlays other than for these purposes, e.g. taxes, fees, brideprice contributions and other traditional payments, informal 'gifts' to kin, etc., were assumed not to yield utility and were simply treated as transfers to be deducted from gross non-weaving income. As such, the potentially important effect that these outlays or commitments (depending on how one might interpret them) might have had on the incentive to work and thus to earn additional cash was removed from the analysis. This suggests a fruitful area for further investigation and research effort.

One of the basic and important tests for the labour supply model specified and estimated in this study is the extent to which it has been able to explain the substantial variations in the measured units of effective work time committed by the sampled workers. In this respect the model appeared to perform reasonably well. The independent variables specified in the model were able to account for approximately 66 per cent of the observed variation in the dependent variable. Such a result is considered quite acceptable for cross-sectional data. No doubt had traditional sector transfers and other such behaviours been correctly interpreted and incorporated into the model there could have been some reduction in the remaining 34 per cent of unexplained variation in the dependent variable.

Because of alternative procedures used in the measurement of both the price indices and the valuation of non-monetary incomes, six versions of the model were initially estimated. Slightly better results were obtained from those procedures which, in the previous chapters, were argued to be most appropriate (e.g. valuing subsistence garden produce at a constant price which related to its cash sector alternative, rice).

When initially estimated, the best performing model yielded coefficient estimates that were all significant at the 1 per cent (99 per cent) confidence level with the notable exception of that relating to the index of accessibility of goods and services. Unfortunately, the way in which this index was conceived and measured did not contribute to the explanation of variability in the main dependent variable (effective labour effort per week) and the equation was reformed and re-estimated without it. All model coefficients could then be taken to be statistically significant at the 1 per cent confidence level or better.

A step-wise regression was also undertaken whereby the usual 'economic variables' (e.g. non-weaving incomes and relative prices) were entered as one group and the 'non-economic' variables (e.g. the supervision factor, marital status and age, time taken to travel to work) as the other. The economic variables by themselves contributed just under 30 per cent of the explanation of variation in average weekly cash labour effort. The non-economic variables contributed the remainder of the 66 per cent of the variation that was explained by the model. From this one might conclude that, whilst purely economic factors appear to have some influence on the work behaviour observed in this non-Western environment, their effects are often overshadowed by 'other factors', some of which are peculiar to the sample. Ideally, a much larger sample might have allowed groupings which could have eliminated some of these effects and produced more interesting results. However, small sample anthropological studies have no alternative but to accept these analytical limitations.

When the elasticity of work effort with respect to wage rate was estimated for the average or 'representative' worker, it was shown to be negative in direction but highly inelastic. The range of values for the relevant elasticity was between -0.06 and -0.11, implying that wage rate increases of 10 per cent would lead, on average, to a fall in the labour effort committed by around 1 per cent or less. The fall-off in effort would be greater for single, unsupervised workers and less for their married and supervised counterparts. This response should in no way be considered as perverse or indicative of indolence. It is quite consistent with the expectations of economic theory and, although comparisons with similar samples in other non-Western situations are not available, it is quite consistent with behaviour in some Western economies. For example, Abbott and Ashenfelter's (1976) large time series study of United States data estimated average labour elasticities over the period to range from -0.07 to -0.14. Likewise, a study by Tulpule (1978) using Australian time series data estimated the labour supply elasticity at -0.13. Our sample of New Guineans is thus not unique in the 'backward sloping' section of the supply curve for labour effort.

The result requires further interpretation. As Fisk's conclusions indicate, 'affluence' is a relative rather than an absolute concept. It is the relationship of one's available resources relative to one's perceived needs. The similarity between the labour effort response of a group of New Guinean piece-rate workers and the average American and Australian worker observed over a period of time may at first appear unusual. The desire to trade potential cash income for greater leisure certainly appears indicative of an affluent society. Perhaps the New Guinean workers perceived themselves to be relatively affluent in terms of traditional or subsistence wants and resources. The average Australian and American worker being investigated by Tulpule and by Abbott and Ashenfelter, on the other hand, was living and working through an era in which average monetary wealth and Western-style affluence was increasing rapidly. The similarity in the measured average labour response behaviour may not be so inexplicable after all.

However, it is not only whether there is a positive or a negative response to wage-rate variation that interests us, but why there is evidently very little response. The highly inelastic response has already been partly explained by the fact that the measurement relates to the 'average' worker. However, the formula for the calculation of the elasticity of work effort with respect to wage rate (see equation 12, Appendix A) gives us additional insights. The direction and the magnitude of the response hinge on the relative size of E (net non-weaving income of the household) and the size of the subsistence or precommitted demand for food by the household, denoted by $\lambda_1 p_1 N_h$. In this study a substantial component of E was the non-monetary garden production of the weaver-household, and in the subsistently affluent economy of

Papua New Guinea this component was quite high and sufficient to meet the basic food requirements of a large number of the households. The values for E and for the 'minimum subsistence bundle', $\lambda_1 p_1 N_h$, were thus likely to correspond closely in many cases and hence explain the particularly low values for η_w .

It appears that the effect of relatively high subsistence income on work effort can best be explained in the above terms. Measurements of the direct effect of non-weaving income on cash work effort (the elasticity η_E) produced values which were negative (as expected) but also highly inelastic or unresponsive. Within the range of values for the sampled workforce at the time of the study, the relative value of the individual worker's 'other net income' thus had little direct effect on his willingness to work for cash. The household cash earners appeared to have regarded their principal monetary work (weaving) and their activities in respect to the traditional sector as quite separate. They had different rewards and met different needs. The village craftsmen were able to keep these two functions separate and relatively free from any conflicting use of their time. The high productivity of traditional agriculture and the limited and irregular role that men played in traditional garden activity meant that there was adequate time for this involvement during periods when the weaving cells were closed and thus the cash opportunity cost was zero.

The effect 'subsistence affluence' has on individual work effort that is of most interest to economic planners is not simply that it produces an indifference to cash rewards and/or a general lack of industriousness. Rather, it helps explain an economic response that is perfectly rational. In order to encourage greater participation in monetary sector activity, the cash-earning incentive has to be both secure enough and adequate enough relative to the other alternatives available. These alternatives include, amongst other things, a greater reliance on the monetary sector for one's livelihood, a continuing reliance on the subsistence economy for the basics with some cash supplementation (for those desired or necessary outlays that can only be made with cash) and/or the consumption of additional leisure. Thus, the less than enthusiastic response on the part of the workers sampled herein was hardly perverse, nor was it surprising that factors other than wage rates and other incomes accounted for most of the observable variation that existed in their cash-leisure choice.

As Fisk has been most careful to point out, economic rationality rather than indolence can explain the cautious response to cash sector activity under conditions of 'subsistence affluence'. The model developed in this study, based as it is on the concepts and methods of modern neo-classical consumer analysis, is certainly not inconsistent with these assertions. The economic circumstance of Papua New Guinea of the latter part of the 1980s will undoubtedly differ from that which existed in 1974. Continuing population growth, the inexorable spread of the monetary economy and a

greater desire for the goods and services that it offers, are gradually eroding the conditions of subsistence affluence. A change in attitudes towards cash work may well be associated with this erosion but, regrettably, the transition towards complete monetization will not continue as painlessly as it has done in the past.

Appendix A

An empirical model of labour/leisure choice

For the purposes of developing the model it will be assumed that the underlying utility function is Stone-Geary. 'Leisure' is added as the $n+1$ th good and a demand equation (or set of equations) is derived from the constrained maximization of the utility function.

A single-period utility maximization with no uncertainty or inter-period borrowing or lending is also assumed. The aim is to maximize the utility function of the form

$$\begin{aligned}
 U = U(q_1, \dots, q_n, q_{n+1}) &= \sum_{i=1}^{n+1} \beta_i \log(q_i - \gamma_i) \\
 &= \sum_{i=1}^n \beta_i \log(q_i - \gamma_i) \\
 &\quad + \beta_{n+1} \log(q_{n+1} - \gamma_{n+1}) \quad \dots (1)
 \end{aligned}$$

subject to the budget constraint

$$\sum_{i=1}^{n+1} p_i q_i = \bar{I} \quad \dots (2)$$

where

q_i refers to the quantity of the i th good;

p_i refers to the price of the i th good;

all goods $q_1, \dots, q_n$ are assumed to be *current* goods and services;

$\bar{I}$ is 'potential' income;

$\bar{I} = wH + E$; and

$w = p_{n+1}$ is the average hourly earning ('wage') rate;

H = the total number of hours over which the labour/leisure choice is being made;

E = non-weaving income (i.e. exogenous income + *net* transfers received);

$$H_L = q_L + S_L$$

where

q_L are the hours spent at 'leisure' during H ; and

S_L denotes those hours of effective work effort during H .

Furthermore, it is assumed that

$$\gamma_L = \alpha_0 - \alpha_1 S^* + \alpha_2 D^* + \alpha_3 T \quad \dots (T1)$$

$$\gamma_{1h} = \lambda_1 N_h \quad \dots (T2)$$

$$\gamma_{2h} = \delta_2 A_h \quad \dots (T3)$$

(these terms already being defined in the text).

Note that goods 1 and 2 are assumed to exhaust all possible types of current goods and services. Thus, the j ($j = 1, \dots, n$) individual commodities have been aggregated into k ($k = 1, 2$) commodity groups, namely, (1) food items and (2) 'all other' goods.

The derivation will be done in two stages:

- (i) the usual derivation treating the quantity, γ_i , as a constant;
- (ii) the γ_i functions (i.e. T1-T3 above) will then be substituted in the equations derived under (i).

Thus, solving generally,¹ the first order conditions are:

$$U_i/U_L = \beta_i (q_L - \gamma_L)/\beta_L(q_L - \gamma_L) = p_i/w$$

and Equation (2), whence

$$p_i q_i = p_i \gamma_i + \beta_i [w/\beta_L(q_L - \gamma_L)] \quad i = 1, \dots, n. \quad \dots (3)$$

¹I wish to acknowledge the substantial assistance given by Dr P.J. Lloyd, formerly of the Department of Economics, Research School of Pacific Studies, Australian National University, in the mathematical segments of this work. Any errors, however, are my responsibility.

When adding the n equations in (3) one obtains

$$\sum_{i=1}^n p_i q_i = \sum_{i=1}^n p_i \gamma_i + [w/\beta_L(q_L - \gamma_L)] \sum_{i=1}^n \beta_i \quad \dots (4)$$

But by assumption

$$\sum_{i=1}^n \beta_i = (1 - \beta_L).$$

Substituting in (4) and rearranging terms yields

$$\sum_{i=1}^{n+1} p_i q_i - \sum_{i=1}^{n+1} p_i \gamma_i = w/\beta_L(q_L - \gamma_L).$$

Substituting this in equation (3) and using $\sum_{i=1}^{n+1} p_i q_i = \bar{I}$ one obtains

$$p_i q_i = p_i \gamma_i + \beta_i [\bar{I} - \sum_{i=1}^{n+1} p_i \gamma_i] \quad \dots (5)$$

The commodity demand function is then simply obtained by dividing throughout by p_i and rearranging terms.

$$q_i = (1 - \beta_i) \gamma_i - \beta_i \sum_{j \neq i} \frac{p_j \gamma_j}{p_i} + \beta_i \frac{\bar{I}}{p_i},$$

$$i = 1, \dots, n+1 \quad \dots (6)$$

The demand equation for leisure, q_L , can be written specifically as

$$q_L = (1 - \beta_L) \gamma_L - \beta_L \sum_{j \neq L} \frac{p_j \gamma_j}{w} + \beta_L \frac{\bar{I}}{w} \quad \dots (7)$$

Note that when the function is expressed in this form all quantities on the right-hand side of the equation also relate to units of time.

Substituting back into (7) for $\bar{I} = wH + E$, gives

$$q_L = (1 - \beta_L) \gamma_L - \beta_L \sum_{j \neq L} \frac{p_j \gamma_j}{w} + \beta_L H + \beta_L \frac{E}{w} \quad \dots (8)$$

Respecifying in terms of the quantity of labour effort supplied, S_L (through $H = q_L + S_L$) gives, after rearranging terms

$$S_L = (1 - \beta_L)(H - \gamma_L) + \beta_L \sum_{j \neq 1} \frac{(P_j \gamma_j)}{w} - \beta_L \left(\frac{E}{w}\right)^{(a)} \dots (9)$$

The final two variables on the right-hand side of the equation can be described verbally.

$\sum_{j \neq 1} \frac{(P_j \gamma_j)}{w}$ is, in effect, the weaving labour cost of obtaining the 'subsistence' or precommitted quantities of goods required by the household. (E/w) can be thought of as the compensatory value of non-weaving income in terms of the hours of weaving effort that would have been required to earn this same amount of cash.

By substituting equations T1 to T3 in equation 8 and then respecifying in terms of S_L the following, and final, function for the supply of labour effort is obtained:

$$S_L = (1 - \beta_L)(H - \alpha_0) + (1 - \beta_L)\alpha_1 S^* - (1 - \beta_L)\alpha_2 D^* \\ - (1 - \beta_L)\alpha_3 T - \beta_L \left(\frac{E}{w}\right) + \beta_L \frac{(P_1 \lambda_1 N_h)}{w} + \beta_L \frac{(P_2 \delta_2 A_h)}{w} \quad (b) \dots (10)$$

This can be expressed in the usual estimating form as

$$\hat{S}_L = b_0 + b_1(X_1) + b_2(X_2) + b_3(X_3) + b_4(X_4) \\ + b_5(X_5) + b_6(X_6) \dots (11)$$

where

$$b_0 = (1 - \beta_L)(H - \alpha_0), \quad b_0 > 0$$

$$b_1 = +(1 - \beta_L)\alpha_1, \quad b_1 > 0$$

$$b_2 = -(1 - \beta_L)\alpha_2$$

$$b_3 = -(1 - \beta_L)\alpha_3, \quad b_3 < 0$$

$$b_4 = -\beta_L, \quad b_4 < 0$$

$$b_5 = +\beta_L \lambda_1, \quad b_5 > 0$$

$$b_6 = +\beta_L \delta_2, \quad b_6 > 0$$

There are two elasticity measurements that are of interest to us:

- (i) The elasticity of the supply of labour effort with respect to the average hourly earning (or wage) rate, w . The formula for this, after deleting variable 6 from the model, is

$$\eta_w = \frac{\partial S_L}{\partial w} \cdot \frac{\bar{w}}{\bar{S}_L} = w^{-2} \beta_L [\bar{E} - \lambda_1 p_1 N_h] \cdot \frac{\bar{w}}{\bar{S}_L} \quad \dots (12)$$

and

- (ii) The supply of labour effort with respect to net exogenous income, E . This can be expressed as

$$\eta_E = \frac{\partial S_L}{\partial E} \cdot \frac{\bar{E}}{\bar{S}_L} = \frac{-\beta_L}{\bar{w}} \cdot \frac{\bar{E}}{\bar{S}_L} \quad \dots (13)$$

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