

The Decline in the Agricultural Share of the Labour Force in Indonesia: 1971-1985



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Declaration

**Except where otherwise indicated
this thesis is my own work**



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Abstract

The study analyses the decline in the agricultural share of the labour force in Indonesia in the period 1971-85, both at the national and provincial levels. The 1971-85 period, in terms of economic conditions, comprises two distinct sub-periods: the first, 1971-80, was characterised by rapid economic growth, while the second, 1980-85, was characterised by slower economic growth.

The rapid growth of the economy in the first period was associated with a substantial decline in the agricultural share of the labour force. But, when the economy slowed down in 1980-85 the agricultural share of the labour force declined only slightly. Thus, at the national level, the change in the agricultural share of the labour force seemed to be influenced by the slower growth of GDP. This association follows a general pattern discerned in the long-term development process of many countries. However, when we examine the relationship using provincial data, this association has not always been the case for Indonesia. The change in the agricultural share of the labour force across provinces can not be explained satisfactorily only by the change in income per capita.

The main aims of this study are: first, to examine factors affecting variations in the agricultural share of the labour force by province; second, to explain factors affecting variations in the change in the agricultural share of the labour force during the years of rapid economic growth from 1971, and during the years of slow economic growth; and third, to examine the effect of rural development and "urbanisation" on the change in the agricultural share of the labour force by province in 1971-80, and 1980-85. We develop a two-sector model to explain the change in the agricultural share of the labour force. This study suggests several other factors that explain variations in the agricultural share of the labour force at the provincial level, namely : labour productivity per worker in both the agricultural and non-agricultural sectors, the educational attainment of the labour force, landlessness, distribution of land, and agricultural mechanisation.

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Glossary, Symbol, and Abbreviations

ASLF	Agricultural Share of the Labour Force
ASEW	Agricultural Share of Earning Workers
BPS	(<i>Biro Pusat Statistics</i>) Central Bureau of Statistics
Bappenas	(<i>Badan Perencanaan Pembangunan Nasional</i>) National Development Planning Board
Inpres	(<i>Instruksi Presiden</i>) presidential instruction
<i>kabupaten</i>	regency, or sub-provincial administrative district
Repelita	(<i>Rencana Pembangunan Lima Tahun</i>) Five Year Development Plan
RGDP	Regional Gross Domestic Product
GDP	Gross Domestic Product
Sakernas	(<i>Survei Angkatan Kerja Nasional</i>) National Labour Force Survey
Susenas	(<i>Survei Sosial Ekonomi Nasional</i>) National Social and Economic Survey
Supas	(<i>Survei Penduduk Antar Sensus</i>) Intercensal Survey
λ (or λ_a)	Agricultural Share of the Labour Force

Chapter 1

Introduction

This chapter examines the background and framework of the study.

1.1 Background of the Study

The 1971 census recorded the Indonesian population as 118.4 millions; of this total, more than 17 per cent lived in urban areas. In 1985, the Intercensal Survey recorded the population as 164 millions, an increase of 2.13 per cent per annum from 1971. Of this total population, more than 26 per cent lived in urban areas. The most recent data indicate that population was 179.6 millions in the mid-1990 (*Lembaga Demografi*, 1990, p. 1). The 1985 data resulted in a population density of around 94 persons per km² compared to 62 persons per km² in 1971 (*Seri Supas* 85, No.3, Table.3). However, when we look at provincial data, the figures vary substantially, being significantly higher in Java (almost 800 persons per km² on average in 1985, excluding DKI Jakarta).

The total labour force in 1971 numbered 41.3 millions. The figure increased to around 64 millions in 1985, an increase in order of 3.2 per cent per annum from 1971. Of the total employed, around 66 per cent were engaged in agriculture in 1971 and 55 per cent in 1985. The agricultural share of the labour force varies considerably, being lower in Java and in some rich-resource provinces outside Java.

In terms of economic conditions the 1971-85 period consists of two distinct sub-periods. The first, 1971-80, was characterised by rapid economic growth, while the years 1980-85 were a period of slower economic growth. Real GDP (at 1973 constant prices) grew at 8.1 per cent per annum in the first period, but the growth fell to 4.8 per cent per cent on average in the second period. This implies that annual real income per

capita grew, with population growth at 2.32 per cent per annum in 1971-80 and 2.13 per cent per annum in 1980-85, at around 5.7 per cent in the first period and 2.6 per cent in the second period ¹⁾. Sundrum (1986, 1988) categorised 1968-81 as one of rapid economic growth period, and the period 1981-86 as slow economic growth. In the first period, part of the increasing receipts from the export of oil, which largely accrued to the government was invested in infrastructure such as irrigation, rural public transport, and road rehabilitation. Agricultural inputs such as fertilizers were subsidized by the government. As a result, agricultural output, especially rice production increased rapidly by international standards. Education received high priority. Real development expenditure on education grew at around 24 per cent per annum in the first period compared with 19 per cent per annum for total development expenditure. In the second period, the growth rate of real development expenditure fell to about 9 per cent per annum. This was due in large part to the declining world oil prices, which through their impact on government revenues adversely affected investment in various sectors of economy.

The rapid growth of the economy in 1971-80 was associated with a substantial decline in the agricultural share of the labour force, from 66.3 per cent in 1971 to 55.9 per cent in 1980, a fall of more than 10 percentage points. In 1980-85, when the economy slowed down, the agricultural share of the labour force declined only slightly to 54.7 per cent in 1985, a fall of only 1.2 percentage points. In short, the change in the agricultural share of the labour force appeared to be influenced by the slower growth of GDP. This association follows a general pattern of long-term development proposed by Clark (1957, p. 492), Kuznets (1966, pp. 105-113, 1971, pp. 199-208) and others, that as countries develop the share of agricultural sector in total labour force declined. However, when we look at provincial data, we see that this has not always been the case for Indonesia in the periods under study. We know that patterns of regional economic activity vary across regions (Hill and Weidemann, 1989). The change in the agricultural

1) Population growth rates are BPS's estimates (Seri *Supas* 1985, No.3: Table 1).

share of the labour force by province in Indonesia can not be explained entirely by changes in income per capita. There are other factors that explain variations in the agricultural share of the labour force at the provincial level.

1.2 Aims of the Study

The main aims of the study are:

- (1) To examine factors affecting variations in the agricultural share of the labour force by province in 1971, 1980 and 1985.
- (2) To explain factors affecting variations in the change in the agricultural share of the labour force during the years of rapid economic growth, 1971-80, and during the years of slow economic growth, 1980-85.
- (3) To examine the effect of rural development and "urbanisation" in the change in the agricultural share of the labour force by province in 1971-80 and 1980-85.

There have not been many studies on the change in the agricultural share of the labour force in the context of economic development in Indonesia. Most writers generally presume that the decline in the agricultural share of the labour force when income grows is a natural phenomenon that will occur in all countries. In addition, most studies deal only with national trends, and ignore regional variations. Thus, a study on a broader regional front may give a more reliable picture of economic development in general, and the change in the agricultural share of the labour force in particular. This is especially the case in a country such as Indonesia which is well known for its very large regional variations resource endowments and per capita income.

1.3 Sources of Data

The employment data used in this thesis are derived from Indonesian Population Censuses of 1971 (series D, and Series E at the provincial level) and 1980 (Series S, No.2), and the Intercensal Survey (*Supas*) 1985 (Series No.5). We also use some unpublished data from the 1980 census and the 1985 Intercensal Survey. The latter

provide data on employment by sector (agriculture and non-agriculture) by age and education in each province; and employment by occupation (farmer and non-farmer) and age and education. As discussed by Hugo *et al.* (1987), Bakir and Manning (1983) and others, the use of census data for comparative analysis requires caution because of important differences in time reference, definition and procedures of enumeration. We briefly mention some of these differences here, and will return to them again in the course of the study.

In 1971, the time reference period was one week preceding the census enumeration. To be counted as 'employed' a person must have worked for a duration of at least two days during that week. In 1980, the reference period was one week preceding the census, and to be counted as "employed", a person must have worked at least one hour per day during that week. However, the difference in the time reference does not seem to have much affected the estimates of labour force (Bakir and Manning, 1983, p. 3). *Supas* 1985 used the same time reference as did the 1980 census. In order for a person to be considered "employed", the work performed during the hour/s of work has to be continuous. *Supas* 1985 was carried out in October-November 1985 to estimate the total population, and also to collect information on socio-economic aspects of the population and the housing conditions. The main difference between *Supas* 1985 and the 1980 census is that, in the *Supas* 1985, persons with no permanent residence (such as homeless persons, ships crews, isolated population groups, and Indonesian citizens who live abroad) were not covered.

The 1971 census gave several estimates of labour force in different publications called Series C, D and E. The Series C figures were based on a 10 per cent sub-sample of the sample census (which in turn was a 3.8 per cent of the total population). Series D and E (final figures) were based on the full 3.8 per cent sample of the total population. The series D and E figures differed substantially from the series C figures. For example, the Series C data recorded the number of unemployment as 890,000 or only 2.2 per cent of

the total labour force, while the Series D recorded the unemployed as 3.6 millions or 8.8 per cent of total labour force (Hugo *et al.*, 1987, Table A.2).

The 1971 census figures suffered from age mis-statement and under-reporting especially of young adult males (Jones, 1974, p. 8; Mertens, 1978, p. 25; Hugo, *et al.*, 1987, p. 368). According to Jones (1974, p. 11; 1983, pp. 364-65) this was due to the large proportion of the population recorded in the "others" category in 1971, especially younger males. This is a "residual category" which is usually considered to include "discouraged workers" or "half-hearted" first job seekers. As a result of the tendency to put these discouraged job seekers in the "others" category, labour force participation rates in the 20-29 age groups were very low. This low figure is well below the average figures for developing countries; at ages 20-29, the figure is even below the average figures for developed countries (Jones, 1981, p. 259). A large number of people were also recorded in the "others" category in 1980 (Hugo *et al.*, 1987, p. 249-251). Misclassifications of unemployed, of unpaid family workers, and of those attending school were considered responsible for the large proportion of "others" category in the 1980 census (Cremer, 1990, pp. 74-80). The share of the "others" category to the total working age population (10 years of age and above) in 1985 was 8.0 per cent or 9.6 million persons (Supas 1985, Seri No.5, Table 40.9) compared to 10.7 per cent or 11.2 million persons in 1980 (1980 census, Table 37.9). The better quality of interviews may be partly responsible for the lower share in the "others" category in 1985.

The 1971 census figures also probably underestimated agricultural employment. This was because of the time of the census carried out. The 1971 census was conducted in September 1971, a relatively slack season in agriculture. The 1971 census also included a question on whether a person was involved in activities in "the last season". Hugo *et al.* (1987, pp. 270-271) argue that, the seasonal variations (difference between the "last season" data and the data from the reference week) was substantial in 1971. According to

them, on balance that seasonal variation appeared not very great. This could be due to a number of reasons: (1) the higher incidence of poverty may force people to work harder during the slack season for extra income in agricultural sector, and (2) the new rice technologies combined with an increase in irrigated area may have increased multiple cropping which in turn would have created more employment.

According to Jones (1983, pp. 366-374), the total number of the labour force and the proportion in agriculture in 1971 was underestimated compared with the 1980 census figures. He argues that this is due to the fact that the 1980 census used a broader definition of "employed", and the questionnaire used had a tendency to record a larger number of employed people. In addition, the inclusion of more unpaid family workers which were concentrated in agriculture could also in part explain the larger proportion of people engaged in agriculture in 1980 compared to the 1971 figures ²⁾.

As in 1971, the 1980 census may have underestimated agricultural employment due to its timing in the relatively slack season of the agricultural year. Agricultural employment in 1980 was also affected by the new definition of "urban area" used in 1980 (Jones, 1984, pp. 122-123). Because of changes in definition, the percentage of villages classified as urban increased between 1971 and 1980 in Java (Rietveld, 1988, p. 75), Bali and Lampung, but declined in the other provinces (Sigit and Sutanto, 1983, Table 4.2).

The effect of seasonality on agricultural employment may be examined by comparing the census figures with *Sakernas* figures. The people recorded as employed in the agricultural sector were fewer in 1980 (28.8 millions: Table 45.9) than in *Sakernas* 1977 (29.7 millions)³⁾. *Sakernas* was conducted spread over both slack and busy

2) Labour force participation rates increased between 1971 (Census) and 1976 (Supas) especially for females. For females, they rose from 33.1 per cent in 1971 (Bukit and Bakir, 1983, Table 1.3) to 46.3 per cent in 1976 (Supas 76, VP78-01, Table 02). For males, they increased from 61.4 per cent to 77.0 per cent. According to Jones (1983, p. 374) the increase in participation rates was mainly due to the inclusion of unpaid family workers who were concentrated in agriculture; and as the 1980 census used the same questionnaire as Supas 1976, the 1980 census tended to record a larger proportion of people engaged in agriculture compared to the 1971 figures.

seasons (February, May, August, and November). On this basis, the 1971 and 1980 census figures on agricultural employment are mutually consistent (Hugo, *et al.*, 1987, p. 269). And, as stated by Jones (1984, p. 125), in spite of the problems of comparing employment data from different sources a comparison of the 1971 and 1980 censuses data does appear valid for examining broad trends.

Jones and Manning (forthcoming, p. A3) argue that the period 1980-1985 was characterised by a marked increase in labour absorption in agriculture. According to them this was associated with higher female participation rates in 1985 than in 1980 and in turn this was closely correlated with the recorded share of unpaid family workers, especially in agricultural sector. The share of unpaid family workers in total employed workers increased markedly in 1985, especially for females. The figures for females were 29.8 per cent in 1980 (1980 census, Table 48.8) and 42.5 per cent in 1985 (*Supas* 1985, Table 48.8)⁴. The lower proportion of "unpaid family workers" recorded in 1980 may be due to the heavier load work for interviewers and the long questionnaire used in an interview; so they have a little time for interpreting questions (Korns, 1987, pp. 9-10). The higher tendency to record females in the "unpaid family worker" category may be partly explained by the better quality of interviews in the *Supas* (Jones, 1987, p. 11, Korns, 1987, p. 10). The share of female unpaid family workers in agriculture is discussed in more detail in Chapter 7. Korns (1987, p. 4) suggests using "earning workers" as an indicator of trends in time series of the labour force as it is more stable. However, according to Jones and Manning (forthcoming, p. A2), "reliance on earning workers as a basis for estimating labour force encounters the problem that the fluctuating share of female workers is not merely a consequence of better coverage of the employed population but also to be related to different treatment of status groups in various surveys".

3) This figure is underestimated because in East Nusa Tenggara, Maluku, and Irian Jaya the data were collected only in Kupang regency, Ambon municipality, and Jayapura city.

4) For both sexes the figures were 17.8 per cent in 1980 (1980 census, Table 48.9), and 23.7 per cent in 1985 (*Supas* 1985, Table 48.9). Of the total working age population (10 years of age and above), the share of unpaid family workers were 12.3 per cent in 1985 (*Supas*) and 8.8 per cent in 1980 (Census) (Korns, 1987, p. 13).

In addition to censuses data, *Supas* 1976, *Sakernas* 1976, 1977, 1978 and 1986, and 1987 all provide data on the labour force. According to Bakir and Manning (1983, pp. 5-6), the sample size used in *Supas* and *Sakernas*, compared to the censuses, are much smaller, so the 'sampling error' in *Supas* and *Sakernas* is greater than in the censuses. However, the "non-sampling error" in census data tends to be larger than in the *Supas* and *Sakernas*. Despite the problems of agricultural employment data discussed above, no attempt has yet been made to adjust agricultural employment ⁵⁾. In this study, the analyses of agricultural employment mainly cover the periods 1971-80 and 1980-85, using the 1971 and 1980 censuses and the 1985 *Supas*. The agricultural share of the *labour force* in this study refers to the agricultural share of *employed people*. At the provincial level, DKI Jakarta and East Timor are excluded.

Data on national and regional income are provided by Central Bureau of Statistics (Provincial Income in Indonesia: various issues since 1971). There are three points to be made regarding the income data. First, at the regional level, there are two base-years for real RGDP: (a) at 1975 constant prices for the years 1975-84, and (2) at 1983 constant prices for the years 1983-1987. Second, at the national level, the base-year for real GDP series was 1973 for the years 1969-1983, and 1983 for the years 1983-1988 (*Nota Keuangan* 1990/91). Third, the base year for regional real RGDP in 1971 was not the same in all provinces. To bring these data to the same base-year, we apply a splicing technique (Ya-lun Chou, 1989). To estimate the change in income or labour productivity between two years at the provincial level (1971-80 and 1980-85), we use 1975 constant prices. At the national level, we use 1973 constant prices.

1.4 Outline of the Study

This thesis comprises nine chapters. Chapter two overviews the Indonesian economy and employment trends. Chapter three reviews theoretical aspects of structural change, and examines the association between the growth rate of income per capita and the

5) Adjustment of the agricultural labour force in 1971 has been attempted by Mertens (1978b).

change in the agricultural share of the labour force in an international perspective and in Indonesia. Chapter four discusses the role of demand and supply factors in the change in the agricultural share of the labour force at the national level. Chapter five examines the role of education, which expanded rapidly in 1971-80, in the change in the agricultural share of the labour force at the national level. Chapter six examines factors underlying regional differences in the agricultural share of the labour force. Chapter seven investigates factors underlying regional differences in the change in the agricultural share of the labour force in 1971-80, and 1980-85. Chapter eight discusses the role of rural development and "urbanisation" (the change in the agricultural share of the labour force due to movement to urban areas) in the change of the agricultural share of the labour force. A brief summary of main conclusion is given in Chapter nine.

Chapter 2

An Overview of the Indonesian Economy and Employment

This chapter provides an overview of the Indonesian economy and employment situation. The first part of the chapter which comprises four sections discusses labour force and employment. Section one presents data on the growth of population and other major indicators of employment. Section two discusses labour force participation rates. Section three discusses structural changes in employment, and section four examines employment by status. Part two of the chapter which consists of four sections examines the economic development of Indonesia since 1971 and how it relates to observed changes in employment. Section one discusses growth experience in 1971-80 and 1980-85. Section two investigates structural change in GDP. Section three examines total and sectoral labour productivity, and section four discusses the role of government in inducing the observed changes.

Part 1 : An Overview of the Indonesian Employment

1.1 Growth in Population

Indonesian population is characterized by three obvious features : firstly, there is a large population with a relatively high growth rate; secondly, the Indonesian population is not evenly distributed among regions; and thirdly, the quality of population is relatively low. The population Censuses of 1971 and 1980 recorded the number of population as 118.4 and 146.8 millions respectively, an increase of 2.32 per cent a year (Table 2.1). In 1980-85 the population growth rate fell slightly to 2.13 per cent a year. In 1985 population rose to 164 millions of which 26 per cent lived in urban areas. It is predicted that by the end of *Repelita V* the population will be around 193 millions implying an

increase of 1.9 per cent a year. Of that total population, around 32 per cent will be living in urban areas.

TABLE 2.1
POPULATION AND EMPLOYMENT INDICATORS, 1971-85
(MILLION)

	1971	(%)	1980	(%)	1985	(%)
Population	118.4	100.0	146.8	100.0	164.0	100.0
Urban	20.4	17.3	32.8	22.4	43.0	26.2
Rural	97.9	82.7	114.0	77.6	121.0	73.8
Population of Working Age (10+)	80.5	68.0 ^a	104.4	71.1 ^a	120.4	73.4 ^a
1.Labour Force	41.3	51.3 ^b	52.2	50.2 ^b	63.8	53.0 ^b
1.1 Employed	37.6	100.0	51.6	100.0	62.5	100.0
c.By Education						
NAS	16.2	43.2	15.3	29.6	13.6	21.7
DFPS	10.8	28.6	19.4	37.6	21.5	34.4
PS and above	10.6	28.2	16.8	32.8	27.4	43.9
2.Not in Labour Force	39.2	100.0	51.9	100.0	56.6	100.0
a.In School	11.2	28.5	18.8	36.1	26.2	46.3
b.House Keeping	19.7	50.3	22.2	42.7	20.8	36.7
c.Others	8.3	21.2	11.0	21.2	9.6	17.0
	Annual Growth Rate :					
	1971-80		1980-85			
Population	2.32*		2.13*			
Population of Working Age	2.92		2.90			
Labour Force	2.64		4.12			
Not in Labour Force	3.22		1.62			

Source : Indonesian Population Censuses of 1971 (Series D) and 1980 (Series S, No.2), *Supas* 1985 (Series No.5).

note : NAS : Never attended school

DFPS : Did not finish primary school

PS : primary school

* BPS' estimates

^a as % of total population

^b as % of total working age population(10+)

Population distribution is highly skewed. Java and Madura, which comprise only 7 per cent of the country's land area, were occupied by 99.5 millions people or 61 per cent of

the total population in 1985. This resulted in a population density in Java of 753 person/km² compared to 85 persons for Indonesia as a whole. By the end of *Repelita V* population density per km² is predicted to be around 864 person in Java and 101 persons in Indonesia as whole.

The working age population (defined as all persons 10 years old and over) has been increasing at a higher rate than that of the total population. It rose by 2.9 per cent per annum in 1971-80 and in 1980-85 compared with population growth of 2.3 per cent and 2.1 per cent in the same period. This was mainly because of the decline in the fertility rate beginning in the early 1970s. It fell by 2.4 per cent per annum in 1969-80, and an even a more dramatic fall of 5.4 per cent per annum occurred in 1980-85 (Hull and Dasvarma, 1988, pp. 115-119). This has already affected total population growth, but has not yet affected the population of working age, mainly over the age of fifteen (ILO, 1988, p. 7).

The population census of 1971 recorded the percentage of population which is economically active as 51.3 per cent. A slight increase in 1985 to 53.0 per cent was caused by a decline in the proportion of those not in the labour force, which in turn was due to the decline in the numbers of "house keeping" and those categorised as "others". These two categories fell by almost 3 millions between 1980 and 1985. A slowing economy during the period 1980-85 could have been responsible for the decline in the number of people recorded as "house keeping" which has pushed them out to seek additional income to support their family. A high percentage of the "others" category in 1971 and 1980 was partly due to statistical problem (Jones, 1974, 1983; Cremer, 1990). A large increase in the proportion recorded as students to the total of those not in labour force (from 28.5 per cent in 1971 to 46.3 per cent in 1985) reflected the expansion of education. The rapid expansion of education is also reflected in the improving educational attainment of the labour force. The proportion of those with no schooling dropped drastically from 43.2 per cent in 1971 to 21.7 per cent in 1985. In 1985, 43.9

per cent of the labour force was educated to primary school or above, in contrast to 1971 where 43.2 per cent of the total labour force had never attended school. In Chapter 5, the growth in education of the labour force will be discussed in more detail.

1.2 Participation Rates of the Labour Force

Participation rates, defined as the percentage of the population which is economically active, are influenced by demographic, social and economic factors. As shown in Table 2.2 participation rates at age 10-14 groups were low for both sexes as the great majority were in schooling or at home. According to Jones (1974, pp. 11-13; 1983, pp. 364-365) and Hugo *et al.* (1987, p. 250) males activity rates at age 15-29 in 1971 and 1980 are low in Indonesia on the basis of international comparisons as rates at these ages are normally higher in developing countries and tend to fall over time toward western level. He argues that this is due to the fact that a large proportion of males was recorded as "others", and it is likely that many of them constituted the 'discouraged unemployed' or half-hearted first-job seekers.

Cremer (1990, pp. 74-80) argued that the high percentage of 'others' in the lower age groups especially in 1980 could be attributed to three factors :

- (1) the misclassification of unemployed. Those who are temporarily not working such as farmers waiting for the harvest, or those who are looking for a job but do not admit this to the enumerator may be classified as 'others'. Discouraged workers may also be categorised as 'others';
- (2) the misclassification of unpaid family workers. Those who do not separate their time between work and attending school are classified as 'others'. Unpaid work, for males, is common in the younger age groups, but for females, it is common in the prime working age groups;
- (3) the misclassification of those attending school. Those who are attending non-formal training, or awaiting for higher education are classified as 'others'. Adjustment for the

high proportion of "others" category in the 1971 and 1980 was attempted by Jones (1981) and Bukit and Bakir (1983, pp. 23-60).

The low activity rates in the extreme age groups is associated with economic progress. Durand (1975, pp. 94-95) argues that economic and social progress changes the opportunity, and probably the willingness and capability of the young and the elderly to work for income. For the young their labour force participation is restricted by compulsory school-attendance. For the elderly, it may be due to the retirement age limit which declines as a country progresses economically.

Activity rates by sex shows that female activity rates are lower than those of males (Table 2.2). After 1980, female participation rates in the 15-19 age groups have tended to decline due to the expansion of education, while for males this tendency occurred at higher age groups (20-24). There are several factors which explain the differences between male and female participation rates. Firstly, the nature of society may partly explain the differences, in that the main role of adult males is economic activity whereas the female role is often restricted to household activities (Durand, 1975, p. 127). Secondly, as argued by Denti (1968, pp. 536-540) activity rates of females are more influenced by differences in national statistical reporting and classification procedures compared to males. According to him, the inclusion of large numbers of females in the category of "Unpaid Family Workers" appears to be the primary reason for the discrepancy between countries in female participation rates. The activity rates of females are also influenced by other factors such as training and the level of education, opportunities for work outside the home, fertility, marital status. It is often the case that the boundary between economically and non-economically activities for women is vague, especially in rural areas because economic activities in rural areas are not as formal as those in urban areas. In Indonesia, this means that there is an element of chance in how women are classified which is much higher in rural areas (Widarti, 1984, pp. 68-69). Female participation rates in Indonesia have accelerated considerably at all age groups above 19 compared to males between 1980 and 1985. The higher

participation rates in 1985 than in 1980 mainly through a tendency to record more females in the "unpaid family worker" category, may be partly due to the better quality of interviewers in the *Supas* (Jones, 1987, p. 11).

TABLE 2.2
LABOUR FORCE PARTICIPATION RATE BY AGE
IN URBAN+RURAL AREAS, 1971-85

	Male			Female		
	1971	1980	1985	1971	1980	1985
10-14	18.2	12.8	11.5	13.7	9.4	8.0
15-19	52.8	47.4	42.1	30.8	31.1	30.4
20-24	79.2	79.2	78.6	33.4	34.0	41.0
25-29	91.5	92.1	94.4	35.3	35.9	43.6
30-34	94.3	94.8	97.7	39.0	39.2	48.1
35-39	94.8	95.3	98.0	41.4	42.4	51.6
40-44	94.2	94.8	98.0	44.7	45.7	54.5
45-49	92.9	93.7	97.2	44.9	46.5	56.6
50-54	90.0	89.7	95.0	43.0	44.0	54.3
55-59	85.4	84.2	87.8	40.0	40.5	48.6
60-64	78.7	76.4	79.2	34.7	32.7	39.1
65+	62.2	53.1	57.9	24.0	18.8	22.6
Total	70.3	68.1	68.9	33.1	32.4	37.6

Source : as for Table 2.1

Female activity rates in urban areas are lower than in rural areas. In urban areas female activity rates are less influenced by differences in statistical methods than in rural areas (Denti, 1968, p. 537). Low female activity rates in urban areas occur not only because non-agricultural activities are limited for females but also because the nature of jobs in

urban areas forces women to leave home (Bukit and Bakir, 1983, p. 42). In rural areas employment can, to some extent, be taken up without leaving home.

1.3 Structural Change of Employment : A, M, S

One of the common indicators used to identify the relative importance of economic sectors in an economy is their contribution to employment. Sectoral employment data are presented in Table 2.3. They show that the A sector is the major source of employment in all periods ¹⁾.

TABLE 2.3
EMPLOYED PEOPLE BY SECTOR
(MILLION) 1971-85

	1971	(%)	1980	(%)	1985	(%)
A	24.94	66.3	28.83	55.9	34.14	54.7
M	3.33	8.8	6.79	13.2	8.38	13.4
Manufacturing and Quarrying	2.65	7.1	5.07	9.8	6.21	9.9
Utilities	0.03	0.1	0.07	0.1	0.07	0.1
Construction	0.64	1.7	1.66	3.2	2.10	3.4
S	9.36	24.9	15.93	30.9	19.94	31.9
Trade	4.08	10.8	6.68	13.0	9.35	15.0
Transportation	0.90	2.4	1.47	2.8	1.96	3.1
Communication						
Other Services	4.39	11.7	7.78	15.1	8.64	13.8
All Sectors (A+M+S)	37.63	100.0	51.55	100.0	62.46	100.0

Source : as for Table 2.1

The totals may not add up exactly due to rounding.

1) The definition of sector (main industry) used in the Censuses of 1971 and 1980 and *Supas* 1985 which is based on International Standard Industrial Classification (ISIC) classifies type of industry into nine sectors. To simplify the analysis, in this study, the sectors are classified into three sectors following the World Bank's classification, viz. A sector (Agriculture, Hunting, Forestry and Fishery), M sector (Mining and Quarrying, Manufacturing, Utilities and Construction, and S sector (Trade, Transportation and Communication, and Other Services).

A sharp decline in the A sector's share of employment took place during the 1970s. The A sector share fell from 66.3 per cent in 1971 to 55.9 per cent in 1980 ²⁾. The second major source of employment was the S sector. In 1980 around 16 million people or 31 per cent of total employed workers were engaged in this sector, whereas in 1971 this sector provided only 9 million jobs or 25 per cent of total employment. A large part of the S share originated in trade and other services (financial, public services, and other services). The share of the M sector which was largely derived from manufacturing and quarrying was still low compared to the A and S shares. Around 7 million people or 13 per cent of total employment were engaged in this sector in 1980. The percentage share increased only slightly in 1985.

The change in the composition of the sectoral share of employment is obviously affected by sectoral employment growth rates. In 1971-80, overall employment grew by 3.6 per cent per annum (Table 2.4). The lowest growth rate of employment was experienced by the A sector. This was partly due to its large initial employment and partly due to reallocation of employment from the A sector to other more productive sectors. Kuznets (1982) has viewed the decline in the A share of labour force and a corresponding rise in the M and S sectors as 'a migration', in the sense that there is a group of new-comers in the M and S sectors whereas such new-comers would be absent or scarce in the A sector. With a growth rate of 1.6 per cent per year agriculture absorbed almost 4 millions additional employment in 1971-1980. Its contribution to overall employment growth (27.9 per cent) was slightly higher than that of the M sector (25.6 per cent). This was because the sectoral contribution to the overall growth is determined not only by sectoral employment growth rates but also by the sectoral share of employment.

The S sector made the largest contribution to the total growth rate of employment (47.6 per cent) in 1971-80 which was largely in other services. The high contribution was due

2) The definition of employed people in the Indonesian Population Cencuses of 1971 and 1980, and 1985 Supas is as discussed in Chapter 1.

to its large initial share of employment together with the relatively high employment growth rate. A rapid growth in 'other services' was partly due to an increase in public services, due to the expansion of the government's budget. For example, as a result of the oil bonanza, total budget expenditures on government personnel rose by about 80 per cent in real terms between 1973/74 and 1978/79 (Gray, 1979, p. 106). The high employment growth rate of the S sector was also associated with the high growth rate of the M sector since services are needed to facilitate industrial growth. Katousian (1970) argues that the share of employment in complementary services is positively related to the rise of industry, the growth of intermediate goods, and urbanization³). In Indonesia an increase in employment in services could also be partly due to spinoffs from the increase in the government spending on construction and partly due to a rise in demand for manufacturing commodities⁴). Another factor that may be responsible for its high employment growth rate is the fact that services are, to some extent, less amenable to automation, so an increase in output of services would require more labour input. As the 'informal' S sector is highly absorptive of additional employment, it is often treated as a source of residual employment to accommodate the decline in the share of the A sector. This is especially true of small-scale trading enterprises.

The largest employment growth rate in 1971-80 took place in the M sector (8.2 per cent). Construction registered the highest employment growth rate (11.2 per cent) followed by manufacturing (7.5 per cent) and utilities (7.4 per cent). Expansion of new infrastructure and rehabilitation projects have contributed to the rapid growth of construction employment. The manufacturing sector has special characteristics because its dualistic structure : high productivity, capital intensive firms coexisting with low

3) Katousian (1970) identifies three different types of services, that is 'new services', 'old services' and 'complementary services'. New services comprises education, health, entertainment in general (including holiday resorts, hotels, restaurants, concerts, and the like). Old services comprises those activities which grew before industrialization and whose contribution has declined since. For example, as petty trading and domestic services. Complementary services which are demanded by other producing sectors, comprises transport and communications, commerce, banking and finance, professional services and government services.

4) These activities are not in the 'S' sector.

productivity, labour intensive firms (Paauw, 1984, p. 115). The capital intensive firms do not absorb much employment. The high rate of employment growth was mostly created by the small-scale firms (McCawley, 1981, pp. 68-69, Hill, 1990).

TABLE 2.4
ANNUAL GROWTH RATE OF EMPLOYMENT BY SECTOR
1971-85

	Annual Growth Rate 1971-80 (%)	Contribution to Total Labour Force Growth (%)	Annual Growth Rate 1980-85 (%)	Contribution to Total Labour Force Growth (%)
	(1)	(2)	(3)	(4)
A	1.6	27.9	3.4	48.6
M	8.2	25.6	4.3	14.5
Manufacturing and Quarrying	7.5	17.7	4.2	10.5
Utilities	7.4	0.2	1.1	0.03
Construction	11.2	7.7	4.8	4.0
S	6.1	47.6	4.6	36.9
Trade	5.6	18.8	6.9	24.7
Transportation Communication	5.6	4.1	5.9	4.5
Other Services	6.6	24.7	2.1	7.8
All Sectors (A+M+S)	3.6	100.0	3.9	100.0

Source : as for Table 2.1

note : average proportion of sectoral employment share in two years (1971 and 1980) and (1980 and 1985) is used to calculate contribution to total labour force growth.

In the second period, total additional employment was largely absorbed by the A sector as its employment growth rate was apparently faster (3.4 per cent) than the first period (1.6 per cent). This made its contribution to the overall growth of employment higher than in 1971-80 (48.6 per cent).

The contribution of other services to overall employment growth declined sharply to 7.8 per cent in 1980-85 from around 25 per cent in 1971-80 as its employment share fell from 15.1 per cent in 1980 to 13.8 per cent in 1985. The decline in the government's expenditure relative to GDP may have been responsible for this fall. On the other hand, contribution of the trade sector to overall employment growth increased to around 25 per cent in 1980-85 from 19 per cent in 1971-80, which was due to the increase in its share of employment and its employment growth. The large capacity of this sector to absorb additional employment during a period of economic downturn was, as in the A sector, attributed to the high number of unpaid family workers in this sector. We examine this in the next section.

1.4 Employment by Status

The change in the composition of employment by status may give a clearer picture of the structural change of employment over the period 1980-85. The classification of employment into four categories , employer, employee, own account worker, and unpaid family workers, in the 1971 Census was extended to five categories in the 1980 Census and in the 1985 *Supas*. The self-employed were divided into two groups that is self-employed without the assistance of other persons and self employed assisted by family members/temporary help. This categorisation has some effect on the result when comparing employment rates between the 1971 Census and 1980 Census. Hugo *et al.* (1987, p. 275) have recognized the effect of this change in categorisation on manufacturing employment, where it caused a substantial increase in the number recorded as 'self-employed' at the expense of 'employer' and 'unpaid family members'.

To make a comparison between the two different periods, employment status can be divided into two broad groups. Earning workers (defined as all employed people minus unpaid family workers) and unpaid family workers. This distinction rests mainly on the fact that the latter category is acknowledged to be less reliable (Korns, 1987).

Table 2.5 presents the share of earning workers to total employment by sector. It shows that the lowest share of earning workers and accordingly the largest share of unpaid family workers occurred in the A sector, followed by the trade component of the S sector. The largest share of earning workers occurred in utilities as it largely comprises government servants. A large share of earning workers in other sectors reflects the fact that the work relationship is, unlike in agriculture, more formal.

The share of earning workers in urban areas is higher than in rural areas (Table A2.1 in the appendix).

TABLE 2.5
PROPORTION OF EARNING WORKERS TO TOTAL EMPLOYMENT
1971-85

	1971	1980	1985
A	67.1	74.5	64.8
M	88.5	91.2	89.0
Manufacturing and Quarrying	86.2	89.0	85.5
Utilities	99.1	99.0	98.4
Construction	97.5	97.5	98.8
S	89.8	92.2	90.6
Trade	87.1	88.8	83.7
Transportation and Communication	97.7	97.9	98.9
Other Services	90.7	94.1	96.1
All Sectors (A+M+S)	74.7	82.2	76.3

Source : as for Table 2.1

In the first period (1971-80) the share of earning workers increased in all sectors reflecting an improvement in the economy. However, in the second period the share of earning workers, except in transportation and other services, declined. It has been argued by writers such as Gregory (1980, p. 677), that a rapid increase in the proportion

of unpaid family workers may be reflecting a deterioration in the quality of the labour force. However the rise in the share of unpaid family workers between 1980 and 1985 could also reflect different enumeration procedures in the Census and *Supas* data, a point to which we return in subsequent chapters.

It is worth examining the distribution of earning workers by sector. Table 2.6 shows that its distribution is not much different from that of total employment as presented in Table 2.3. This was due to the fact that a large part of total employment did in fact comprise earning workers. For example, of total employment around 75 per cent was classified as earning workers in 1971 and 76.3 per cent in 1985 (Table 2.5); the rest was unpaid family workers. Of the total numbers of unpaid family workers, more than 80.0 per cent were found in the A sector in 1971. A relative small proportion of unpaid family workers occurred in trade, other services and manufacturing. These ratios did not alter greatly in 1980 and 1985, although there was a slight fall in the share of agriculture in 1980.

Another way of examining the structural change in the labour force is in terms of the sectoral absorption of the additional employment. The percentage distribution of additional employment by sector is presented in Table 2.7. The table shows that in the first period almost all of the additional employment was absorbed as earning workers. In fact, there was a decline in unpaid family workers of 2.4 percent. This was entirely due to the decline of unpaid family workers in the A sector of 6.1 per cent. This was in turn absorbed by the M sector (1.6 per cent) and the S sector (2.1 per cent).

In the second period, a much larger part of additional employment was accounted for by unpaid family workers (51.5 per cent). Of this 51.5 per cent, around 43 per cent was absorbed by the A sector and 7 per cent by Trade. Thus it was the growth in unpaid family workers which largely explained the growth in the sector's share of total employment in 1980-85. The nature of work which is, in general, not formal but more

family oriented has made the A sector prone to be "gorged with extra labour" in times of relative economic slow down. In addition, as discussed in Chapter 1, an improved interviewing procedures in the *Supas* 1985 may also explain the higher proportion of unpaid family workers in 1985.

TABLE 2.6
PERCENTAGE BREAKDOWN OF EARNING WORKERS AND
UNPAID FAMILY WORKERS BY SECTOR (ALL WORKERS)
1971-85

	Earning Workers			Unpaid Family Workers		
	1971	1980	1985	1971	1980	1985
A	59.6	50.7	46.5	86.0	80.0	81.1
M	10.5	14.6	15.6	4.0	6.5	6.2
Manufacturing and Quarrying	8.1	10.6	11.2	3.8	6.1	6.1
Utilities	0.1	0.2	0.1	0.0	0.0	0.0
Construction	2.2	3.8	4.3	0.2	0.4	0.2
S	30.0	34.7	37.9	10.0	13.5	12.7
Trade	12.6	14.0	16.4	5.5	8.1	10.3
Transportation and Communication	3.1	3.4	4.1	0.2	0.3	0.2
Other Services	14.2	17.3	17.4	4.3	5.0	2.3
All Sectors (A+M+S)	100.0	100.0	100.0	100.0	100.0	100.0

Source : as for Table 2.1

According to *Repelita V* agriculture is still to be the major source of employment. Around 43 millions or 51 per cent of labour force is predicted to be engaged in agriculture in 1993. By that time the labour force is predicted to be 83.7 millions, which means that within five years there will be 11.5 millions additional people entering the labour market. Of this 11.5 millions, agriculture is expected to absorb 4 millions (35 per

cent). This means employment in agriculture must grow at 2 per cent a year which would be slight higher than the employment growth rate in 1980-85 (1.9 per cent).

TABLE 2.7
PERCENTAGE DISTRIBUTION OF ADDITIONAL EMPLOYMENT BY SECTOR
1971-80 AND 1980-85

	1971-80			1980-85		
	Earning Workers	Unpaid Family Workers	Total	Earning Workers	Unpaid Family Workers	Total
	(1)	(2)	(3)	(4)	(5)	(6)
A	34.1	-6.1	28.0	6.0	42.7	48.7
M	23.3	1.6	24.9	11.6	3.0	14.5
Manufacturing and Quarrying	15.9	1.4	17.3	7.4	3.1	10.5
Utilities	0.22	0.01	0.23	0.029	0.004	0.033
Construction	7.1	0.2	7.3	4.2	-0.1	4.0
S	45.1	2.1	47.1	30.9	5.9	36.8
Trade	17.1	1.6	18.7	17.4	7.1	24.5
Transportation and Communication	4.0	0.1	4.1	4.6	-0.1	4.5
Other Services	24.0	0.4	24.4	8.9	-1.1	7.8
All Sectors (A+M+S)	102.4	-2.4	100.0	48.5	51.5	100.0

Source : as for Table 2.1

note : the total values by sector (column 3) and (column 6) may not be equal to the total values by sector (column 2) and column (4) in Table 2.4 because the method used is a slightly different. Here, we are using additional values between two years, while in Table 2.4 we are using annual growth rate between two years.

Part 2 : An Overview of the Indonesian Economy

2.1 Growth Experience: 1971-80 and 1980-85

Since the government of Indonesia launched the first five-year development plan in 1969, the Indonesian economy demonstrated impressive growth performance, at least until the first years of the fourth *Repelita*. The most rapid growth of GDP of 7.52 per cent per annum occurred in the period 1973-81 (Sundrum, 1986, pp. 42). The terms of trade improved greatly, mainly due to the rise in export prices. An improvement in the terms of trade of more than 13 per cent per annum occurred in 1973-81 (Sundrum, 1986, Table 3, p. 44). The use of the oil boom receipts largely depended on the government as they very largely accrued to the government in the first instance. The increase in the government's financial resources in this period was spent in several ways. First, government consumption expenditure increased to finance the expansion of the civil service. As shown in Table 2.8, government consumption grew at 12.03 per cent per annum in real terms in 1971-80. This led to increases in the purchasing power of those groups who benefited from expansion of government consumption expenditure, notably the civil service. Second, government development expenditure increased substantially. As a percentage of the total expenditure, it rose from 35.3 per cent in 1969/70 to 50.5 per cent in 1980/81 (Sundrum, 1986, Table 7, p. 50). Third, total investment grew rapidly at 12.87 per cent per annum. Its relative share of total GDP reached a peak in 1983 at 30.5 per cent and then tended to decline. The trend of the expenditure components of GDP are depicted in Figure 2.1.

On the other hand, the improvement in the terms of trade, leading to a substantial increase in foreign exchange earnings, resulted in an increase in imports to meet domestic demand for consumption and capital goods. The average share of consumer goods to total imports was around 15 per cent in 1975-81; the rest comprised raw materials and capital goods (Sundrum, 1986, Table 9).

Figure 2.1
Expenditure Components of GDP

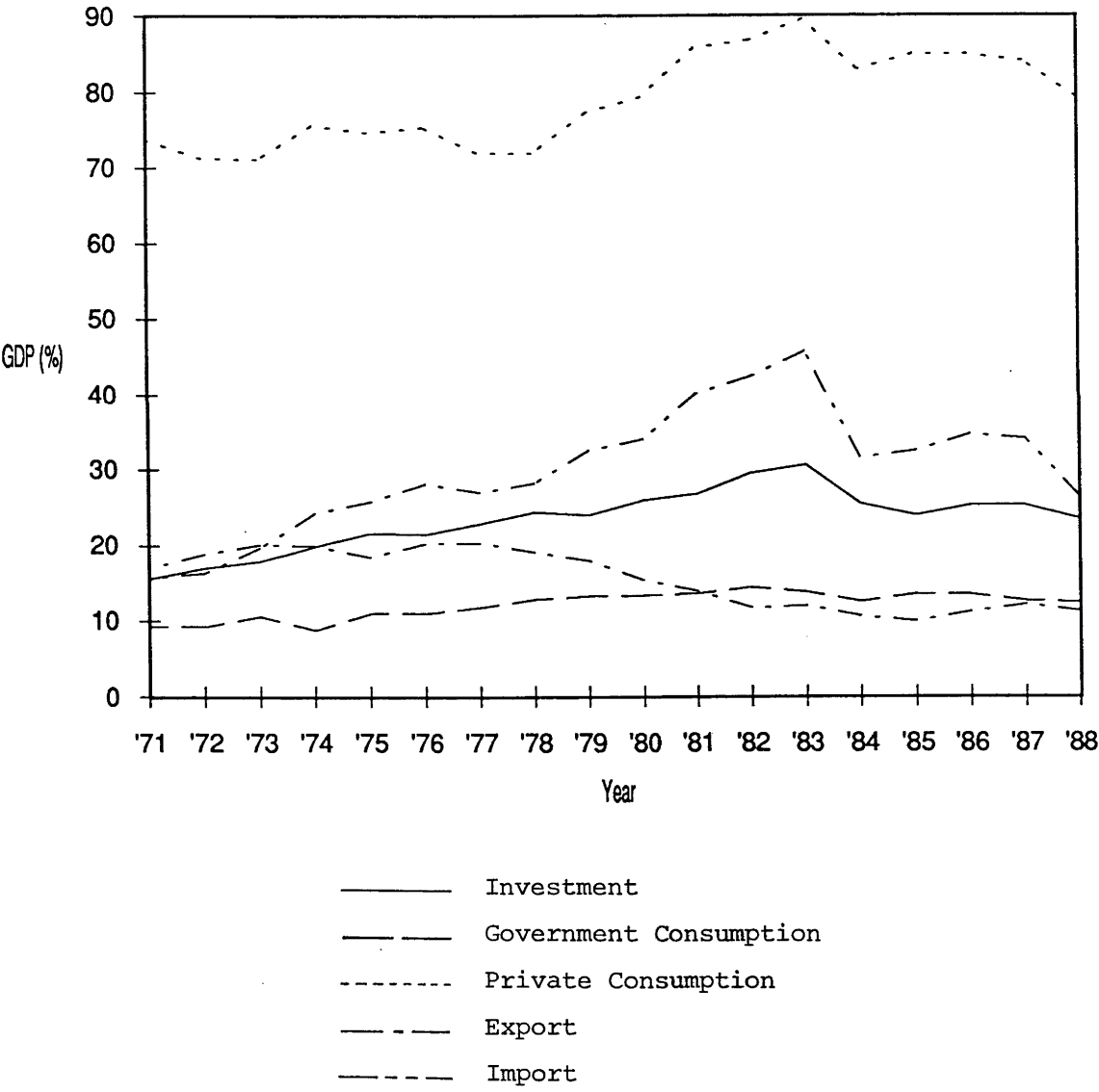


TABLE 2.8
GROWTH RATE AND PERCENTAGE DISTRIBUTION OF
EXPENDITURE COMPONENTS OF GDP,
1971-88 AT 1973 CONSTANT PRICES

Percentage Distribution of GDP						
	Investment	Government Consumption	Private Consumption	Export	Import	Total
1971	15.6	9.3	73.7	17.0	15.7	100.0
1972	17.0	9.2	71.3	18.8	16.4	100.0
1973	17.9	10.6	71.1	20.1	19.7	100.0
1974	19.8	8.8	75.7	19.9	24.2	100.0
1975	21.6	10.9	74.7	18.5	25.7	100.0
1976	21.4	11.0	75.4	20.2	28.1	100.0
1977	22.8	11.8	72.1	20.3	27.0	100.0
1978	24.4	12.8	71.9	19.1	28.2	100.0
1979	24.0	13.2	77.4	17.9	32.5	100.0
1980	25.9	13.3	79.4	15.4	34.1	100.0
1981	26.7	13.6	85.9	13.9	40.1	100.0
1982	29.5	14.4	86.8	11.7	42.4	100.0
1983	30.5	13.7	89.6	12.0	45.7	100.0
1984	25.4	12.5	82.9	10.6	31.5	100.0
1985	23.9	13.5	85.0	10.0	32.4	100.0
1986	25.2	13.4	84.9	11.1	34.6	100.0
1987	25.2	12.6	84.1	12.1	34.0	100.0
1988	23.4	12.3	79.4	11.2	26.3	100.0

<i>Growth rates of expenditure* :</i>					
1971-80	12.87	12.03	8.17	6.65	15.94
1980-85	3.99	4.76	6.25	-0.03	2.89
1971-85	10.77	10.08	8.44	2.89	13.14

* continuous growth in the form $Y=e^{rt}$

The totals may not add up exactly due to rounding

Source : *calculated from Nota Keuangan Indonesia 1990/91*

In the second period, 1980-85, the situation was reversed. GDP growth rate fell to 3.88 per cent per annum. The net barter terms of trade index dropped from 311.4 in 1981 to 298.2 in 1985 (Sundrum, 1988, Table 1, p. 38). This was due to the declining oil prices in the spot and forward market since 1983 in turn induced by the world over supply of oil after OPEC failed to enforce its quota system. This adversely affected investment, government expenditures and imports in Indonesia which in turn had an impact on aggregate demand. The growth rate of investment declined to 4.0 per cent per annum in

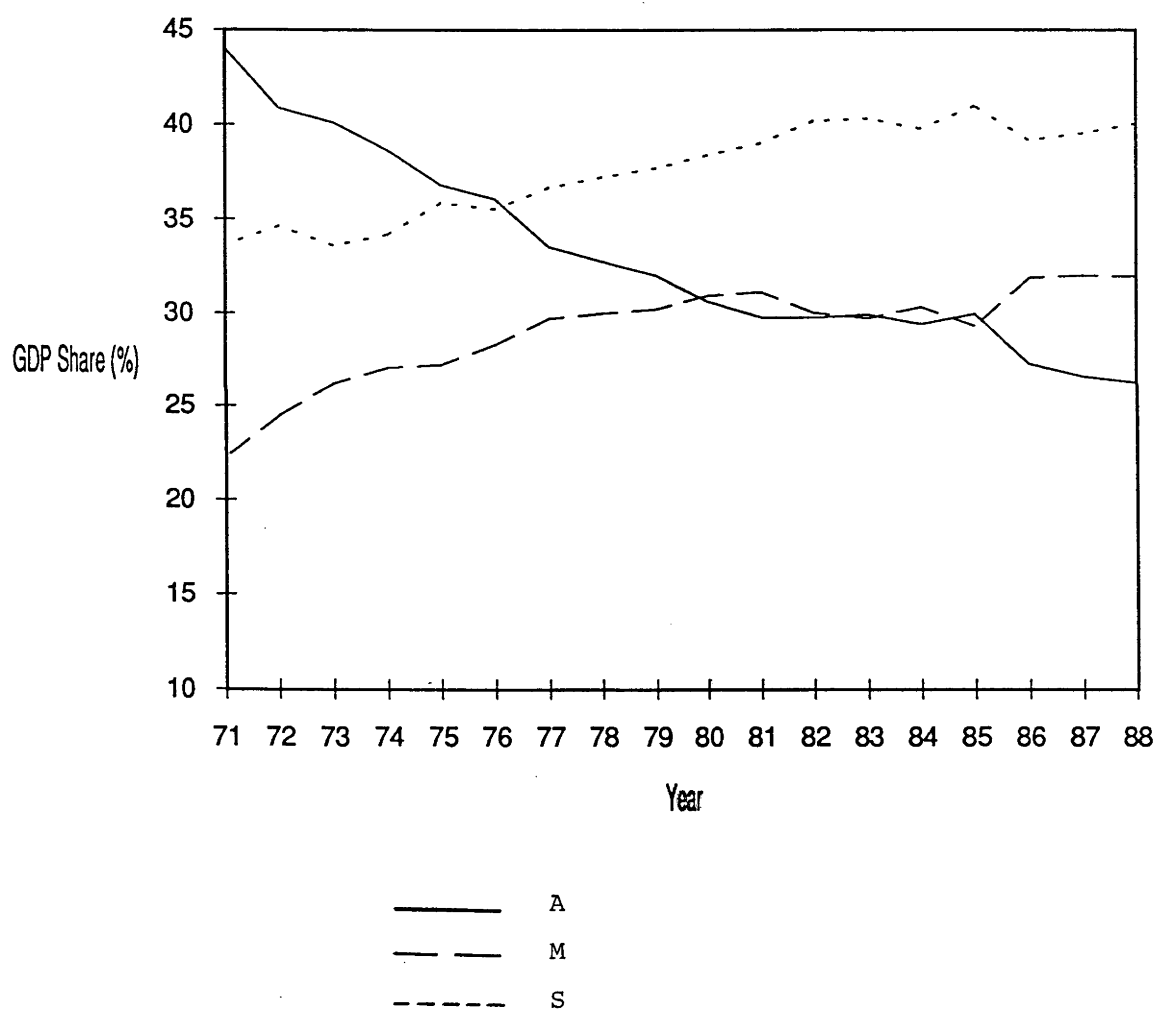
this period, government consumption expenditure growth fell around 7.0 percentage points to 5.0 per cent per annum, and the growth in imports dropped drastically by about 13.0 percentage points from 16.0 per cent in the first period to only around 3.0 per cent in the second period. The negative effect of these developments was to depress the growth of demand as a whole, especially in manufacturing and construction, and therefore to reduce the average GDP growth rate (Sundrum, 1988, p. 69).

2.2 Structural Change in GDP

In Indonesia, as in most developing countries, agriculture still plays an important role in GDP. It contributed 44.0 per cent to total GDP in 1971; and as development proceeded its contribution tended to decline to 29.5 per cent in 1985 (Table 2.9). By the end of *Repelita V* the A share of income is predicted to be 21.6 per cent. The M sector, which is expected to make a large contribution in the future, provided only 22.3 per cent of GDP in 1971. Its contribution has been increasing thereafter. The largest portion of the M sector GDP originated from manufacturing and quarrying. The S sector appears to play a dominant role in the later period. Its share in GDP in 1985 (39.6 per cent) surpassed that of the A and M sectors. A large portion of the S sector GDP originated from trade and other services. The trend of the sectoral share of income over time is depicted in Figure 2.2 (sectoral income data at 1973 constant prices are given in Table A2.2 in the appendix).

The composition of sectoral GDP is affected by the sector's growth rate. As shown in Table 2.10, in 1971-80 the M sector (especially construction) recorded the highest growth rate (15.8 per cent) followed by utilities (13.6 per cent). Transportation grew rapidly at 12.6 per cent to meet demand generated in the A and M sectors. The A sector experienced the lowest growth rate of value added (3.8 per cent). However, as discussed in Section 1.3, the growth rate itself is not a good indicator, as the sectoral contribution to the overall growth is also affected by the sector's relative size.

Figure 2.2
Sectoral Share of GDP



Taking account of the sectoral share of income, Table 2.10 shows that the largest contribution to the overall rapid growth of GDP in the first period was made by the S sector (43.1 per cent). This was mainly due to its large share in GDP in 1971. The M sector contributed almost 40 per cent of total GDP growth which was largely attributed to its rapid growth rate. The contribution of manufacturing partly reflects the growing importance of the petroleum refining sector (Warr, 1986, p.307). The A sector, due to its low growth rate coupled with its declining share of GDP, contributed only around 18 per cent to the overall growth of GDP.

TABLE 2.9
GDP BY SECTOR
AT 1973 CONSTANT PRICES (RPS.MILLION)
1971-85

	1971	(%)	1980	(%)	1985	(%)
A	2441.0	(44.0)	3424.9	(30.7)	4174.3	(29.5)
M	1236.7	(22.3)	3456.4	(30.9)	4376.9	(30.9)
Manufacturing and Quarrying	1041.0	(18.8)	2739.2	(24.5)	3460.0	(24.4)
Utilities	24.7	(0.4)	77.9	(0.7)	128.0	(0.9)
Construction	171.0	(3.1)	639.3	(5.7)	788.9	(5.6)
S	1867.0	(33.7)	4287.9	(38.4)	5604.2	(39.6)
Trade	924.0	(16.7)	1851.9	(16.6)	2306.2	(16.3)
Transportation	210.0	(3.8)	609.4	(5.5)	847.8	(6.0)
Communication						
Other Services	733.0	(13.2)	1826.6	(16.4)	2442.5	(17.3)
All Sectors (A+M+S)	5544.7	(100.0)	11169.2	100.0	14155.4	100.0

Source : Statistical Yearbook of Indonesia, *BPS* : various issues
The totals may not add up exactly due to rounding.

In 1980-85, in spite of the fact that the overall growth rate fell sharply, the growth rate of the A sector rose slightly to 4.0 per cent. A substantial decline was experienced by

the M sector. A sharp decline in the growth rate also occurred in the S sector. However, its contribution to the total growth rate increased slightly as its share in GDP went up. This increase mainly originated from other services. As discussed in the earlier section the expansion of the S sector to some extent is positively related to growth of activities in the A and M sectors. So, it appeared that the fall in world oil prices which directly affected the M sector, in turn had an adverse effect on activities in the S sector.

TABLE 2.10
ANNUAL GROWTH RATE OF GDP BY SECTOR
1971-85

	Growth Rate 1971-80 (%)	Contribution to Total Growth (%)	Growth Rate 1980-85 (%)	Contribution to Total Growth (%)
A	3.8	17.7	4.0	25.1
M	12.1	39.8	4.8	30.9
Manufacturing and Quarrying	11.3	30.4	4.8	24.2
Utilities	13.6	1.0	10.4	1.7
Construction	15.8	8.6	4.3	5.0
S	9.7	43.1	5.5	44.1
Trade	8.0	16.5	4.5	15.2
Transportation Communication	12.6	7.2	6.8	8.1
Other Services	10.7	19.5	6.0	20.8
All Sectors (A+M+S)	8.1	100.0	4.8	100.0

Source: as for Table 2.9

note : average proportion of sectoral employment share in two years (1971 and 1980) and (1980 and 1985) is used to calculate contribution to total labour force growth.

The totals may not add up exactly due to rounding.

It is interesting to note that an increase in the sectoral growth rate in 1980-85 was only experienced by the A sector. This caused its contribution to the overall growth rate to rise substantially from around 18 per cent in 1971-80 to 25 per cent in 1980-85. In addition, only the A sector experienced an increase in its employment growth rate while

other sectors underwent a contraction. Almost 50 per cent of overall growth in employment came from the A sector in 1980-85 (Table 2.4). This implies that a large addition to employment in the A sector was accompanied by a modest increase in income. We look at changes in sectoral productivity of labour in the next section.

2.3 Sectoral Productivity

Changes in employment in the A, M and S sectors in turn resulted in sectoral change in labour productivity. Labour productivity is defined as total sectoral GDP divided by total employment. This is a crude measure of labour productivity as it does not take account of the contribution of other inputs such as capital, and technology. The contribution of these variables can be examined through several production function methods. However, since this study does not apply those methods, labour productivity as defined above is used in all parts of this study.

Table 2.11 presents sectoral labour productivity and its growth rate. The first period recorded a relatively high growth rate of total labour productivity of 4.6 per cent per annum. In the second period the growth rate fell substantially to below one per cent per annum resulting from the significant fall in the GDP growth rate.

The table shows that the A sector is characterised by low labour productivity and a low growth rate compared to other sectors. Apart from the oil bonanza, the rapid growth of the M sector was made possible by the favourable environment created by the government, which involved the following policies : (1) The foreign trade regime was liberalized and simplified compared to the 1950s and 1960s; (2) The private sector was encouraged by reducing the role of state enterprises; and (3) A foreign investment law was implemented to attract more foreign investors (McCawley, 1981, p. 64). In the S sector, high labour productivity compared to the A sector occurred particularly in transport and communications.

The growth of production in 1971-80 created demand for transport and construction which led to high labour productivity and its rapid growth rate. The high capital content may also have been responsible for the high labour productivity in the transport sector.

TABLE 2.11
GDP PER WORKER 1971-85
AT 1973 CONSTANT PRICES (Rp. 000)

	1971	1980	1985	Annual Growth rate '71-80 '80-85	
A	97.9	118.8	122.3	2.2	0.6
M	371.7	509.0	522.5	3.6	0.5
Manufacturing and Quarrying	392.4	540.6	557.0	3.6	0.6
Utilities	711.7	1178.7	1835.9	5.8	9.3
Construction	267.3	385.8	376.5	4.2	-0.5
S	199.4	269.2	281.1	3.4	0.8
Trade	226.7	277.3	246.8	2.3	-2.3
Transport and Communication	233.1	415.0	432.9	6.6	0.8
Services	167.1	234.7	282.9	3.8	3.8
All Sectors (A+M+S)	147.4	216.7	226.6	4.6	0.9

Source : as for Table 2.1 and Table 2.9

Another way of examining structural change in GDP and employment is by investigating the change in the total labour productivity between two periods to see the sectoral contributions to the overall change. Total labour productivity by definition is determined by two factors, output and labour. So the change in labour productivity within a period can be affected by the change in output per worker by sector and the change in the sectoral distribution of labour force.

Consider :

q_i is output per worker by sector, that is the sector's output divided by the sector's employment,

s_i is the share of employment by sector, that is the sector's employment divided by total employment,

Q_i is the share total labour productivity by sector, that is the sector's output divided by total employment,

TQ is total labour productivity per worker for the whole economy, that is total output divided by total employment,

A prime is used to indicate final values,

Δ indicates the change of value between two periods,

Then,

$$Q_i = \sum q_i s_i, \quad (2.1)$$

$$TQ = \sum Q_i, \quad (2.2)$$

$$\Delta TQ = \Delta \sum Q_i, \quad \text{using (2.1) then,} \quad (2.3)$$

$$\Delta TQ = \Delta \sum \sum q_i s_i \quad (2.4)$$

this can be decomposed into two components that is,

$$\Delta TQ = \sum \sum [1/2(s_i' + s_i)\Delta q_i + 1/2(q_i' + q_i)\Delta s_i] \quad (2.5)$$

due to change in labour productivity in each sector+

due to change in the share of labour force in each sector

A decomposition of the change in labour productivity in the first period is presented in Table 2.12. It shows that in 1971-80 the increase in the total labour productivity (Rp. 69.4 thousands) was largely due to the increase in individual sectoral labour productivity (68.3 per cent). The rest (31.6 per cent) was due to the changing structure of the labour force resulting from a decline in the A share of labour force (16.2 per cent) and an increase in the M and S share of labour by 18.7 per cent and 20.3 per cent respectively.

The contribution of the A sector to the change in the total labour productivity was very low (2.2 per cent). Of this, 18.4 per cent was due to the increase in agricultural labour productivity and 16.2 per cent was due to the decline in the agricultural share of labour

force. The M sector provided 49.3 per cent of the change in total labour productivity. A larger part of it was attributed to an increase in the share of the M sector in the labour force. Contrary to the M sector, a greater part of the S sector's contribution to the change in total labour productivity (48.4 per cent) originated from an increase in labour productivity (28.1 per cent).

TABLE 2.12
DECOMPOSITION OF CHANGE IN TOTAL SECTORAL
LABOUR PRODUCTIVITY, 1971-80
(Rp.000)

	Due to Change in the Sectoral Labour Productivity		Due to Change in the Sectoral Share of the Labour Force		Total Effect	
	(1)	(%)	(2)	(%)	(3=1+2)	(%)
A	12.8	18.4	-11.2	-16.2	1.6	2.2
M	15.1	21.8	19.1	27.5	34.2	49.3
Manufacturing and Quarrying	12.5	18.0	13.0	18.7	25.5	36.7
Utility	0.5	0.7	0.3	0.5	0.9	1.2
Construction	2.9	4.2	4.9	7.1	7.9	11.3
S	19.5	28.1	14.1	20.3	33.6	48.4
Trade	6.0	8.7	5.3	7.7	11.4	16.4
Transport and Communication	4.8	6.9	1.5	2.1	6.2	9.0
Other Services	9.0	13.1	6.9	10.0	16.0	23.1
All Sectors (A+M+S)	47.4	68.3	22.0	31.6	69.4	100.0

Source : as for Table 2.1 and Table 2.9

The totals may not add up exactly due to rounding.

In the second period (Table 2.13), around 75 per cent of the increase in total labour productivity was accounted for by the increase in sectoral labour productivity and the rest by changes in the sectoral shares of the labour force. In this period, the contribution

of the A sector to the overall change in labour productivity was the lowest (4.0 per cent), although it increased 1.8 percentage point from the previous period. The largest contribution to the overall change was made by the S sector (65.2 per cent) which mainly originated from "Other Services" (37.2 per cent). Of this 37.2 per cent, around 71 per cent was due to the increase in labour productivity and 33 per cent was due to its decline in the share of labour force. In contrast, the trade sector accounted for 10.2 per cent of the total change in labour productivity, although its labour productivity fell. So, in 1980-85 the change in total labour productivity was due mainly to changes in labour productivity in individual sectors, rather than to changes the structure of the labour force.

TABLE 2.13
DECOMPOSITION OF CHANGE IN TOTAL SECTORAL
LABOUR PRODUCTIVITY, 1980-85 (Rp.000)

	Due to Change in the Sectoral Labour Productivity		Due to Change in the Sectoral Share of the Labour Force		Total Effect	
	(1)	(%)	(2)	(%)	(3=1+2)	(%)
A	1.9	19.5	-1.5	-15.5	0.4	4.0
M	1.8	18.2	1.2	12.6	3.0	30.8
Manufacturing and Quarrying	1.6	16.5	0.6	6.4	2.3	22.9
Utility	0.8	8.0	-0.2	-2.5	0.5	5.5
Construction	-0.3	-3.1	0.5	5.4	0.2	2.3
S	3.6	36.6	2.8	28.6	6.4	65.2
Trade	-4.3	-43.2	5.3	53.3	1.0	10.2
Transport and Communication	0.5	5.4	1.2	12.3	1.8	17.7
Other Services	7.0	70.5	-3.3	-33.3	3.7	37.2
All Sectors (A+M+S)	7.3	74.3	2.5	25.7	9.8	100.0

Source: as for Table 2.1 and Table 2.9

The totals may not add up exactly due to rounding.

2.4 The Role of Government

The movement of resources during structural change may be explained by the theory of the booming sector. The argument that the labour force moves out of agriculture due to the oil boom is based on the so called Dutch-disease effect: the coexistence within the traded goods sector of progressing and declining, or booming and lagging, subsectors (Corden and Neary, 1982). The mechanism of the "Dutch-disease" works through the spending effect and resource movement effect ⁵⁾. If the booming sector uses relatively few resources that can be drawn from other sectors then the resource movement effect is negligible, and the major impact of the boom is through the spending effect. The higher real income due to the boom leads to increased demand for non-tradable goods. This gives rise to an increase in the price of non-tradable goods relative to tradable goods (a real appreciation). This draws resources out of the tradable sector into the non-tradable sector, so that non-tradable output increases and tradable output falls. This leads to a reallocation of resources in the non-oil economy.

The boom in the energy sector in Indonesia should have encouraged resources in other sectors to move into the booming sector. According to the theory this occurs as the boom increases the marginal productivity of labour in that sector, so that at a constant wage in terms of tradables the demand for labour in the booming sector increases and induces resources to move out of the other traded goods sectors. The movement of labour out of traded goods sectors into the booming sector lowers output in those sectors which is called the 'de-industrialization' effect in advanced economies. However, because non-boom tradable goods consist not only of manufacturing industry but also of tradable agricultural products, the boom does not only lead to de-industrialization but also to de-agriculturalization (Corden, 1984). However, as argued by Sundrum (1986, p. 45), "the actual outcome in Indonesia has not been entirely consistent with this theory". He argues that, as discussed in Section 2.1, this theory neglects the fact that the effect of the oil boom in Indonesia depended very much on the

5) An analysis of the "Dutch-disease" effect on the Indonesian economy is given by Warr (1986).

way the government spent its extra revenue, because most of the benefit of the terms of trade improvement accrued in the first instance to government through the oil company tax.

Sundrum's point can be illustrated by the different experience Indonesia and Nigeria, which both were affected by the oil boom; however, there were different effects on their economies (Pinto, 1987). Indonesia successfully avoided an adverse effect on the agricultural sector. Agricultural output did not decline, but increased by 3.8 per cent a year in 1971-80. Growth in rice production, mainly due to growth in yields, has been very rapid (Booth, 1987). This was because the government used part of the oil revenue to subsidise inputs such as fertilizer and to invest in infrastructure that enhanced rural economic activities such as irrigation, rural public transport, improvement of rural roads, etc. The Indonesian government maintained a relatively balanced expenditure strategy between physical infrastructure, education, agricultural development, and capital intensive industry, whereas Nigeria devoted more resources to capital intensive investment in urban areas.

Real development expenditure in agriculture (at 1973 constant prices) grew at almost 10.0 per cent a year in 1971-80 (Table 2.14). This was a lower growth rate compared to total development expenditure (19.18 per cent per annum), due to the fact that the agriculture share of development expenditure was already relatively high in the early 1970s. But the increase was still considerable.

The share of expenditure on education in total expenditure increased over time from 6.9 per cent in 1971 to 10.4 per cent in 1985 (see also Figure 2.3). Real expenditure on education increased rapidly at a rate about 24.0 per cent in 1971-80. In 1980-85, its real growth rate declined to around 21.0 per cent.

Figure 2.3
Share of Development Expenditure

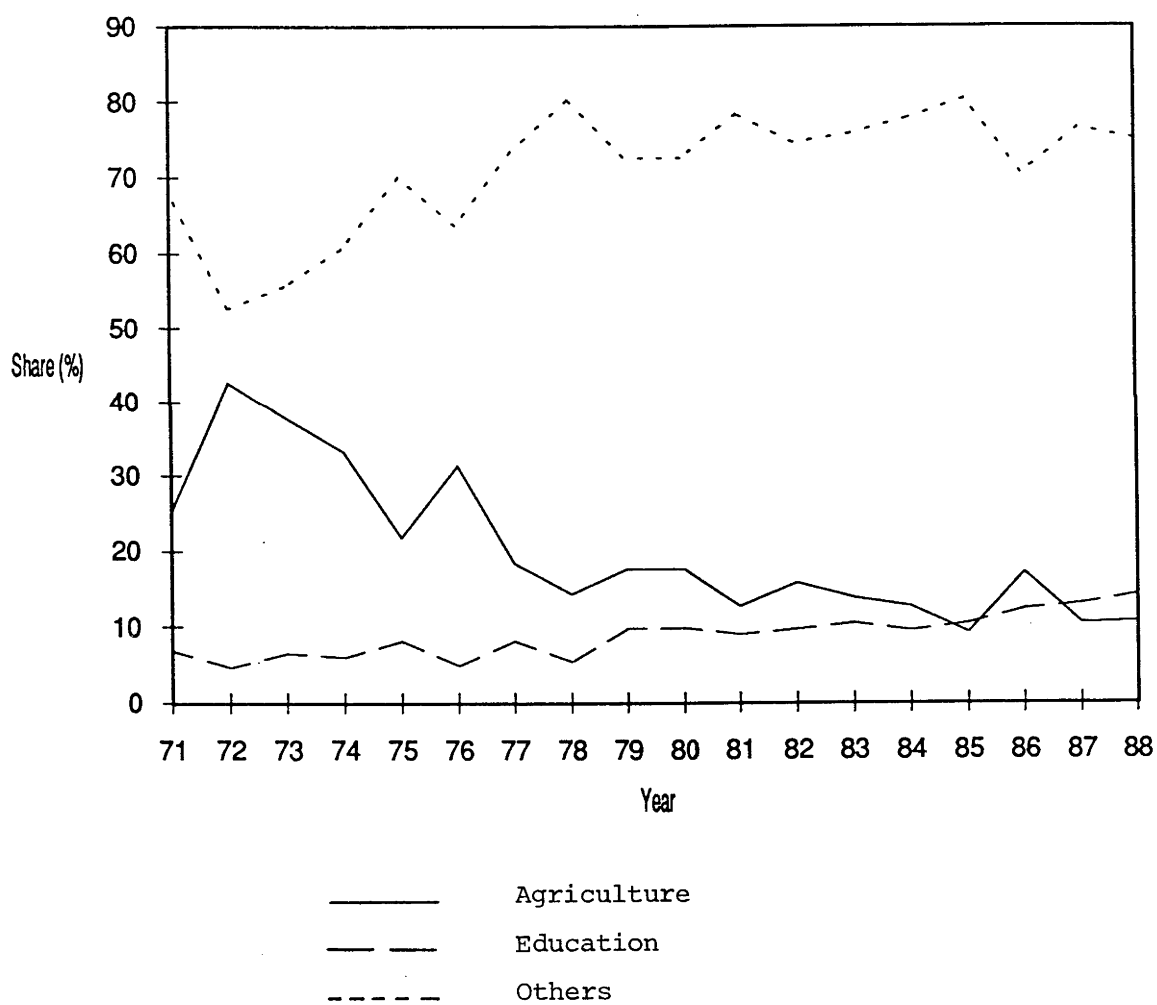


TABLE 2.14
THE SHARE OF DEVELOPMENT EXPENDITURE, 1971-88
AT 1973 CONSTANT PRICES

	Agriculture	Education	Others***	Total
1971	25.2	6.9	67.9	100.0
1972	42.6	4.7	52.9	100.0
1973	37.8	6.5	55.6	100.0
1974	33.3	6.0	60.7	100.0
1975	21.8	8.2	70.1	100.0
1976	31.4	4.9	63.7	100.0
1977	18.4	8.1	73.5	100.0
1978	14.3	5.4	80.3	100.0
1979	17.6	9.8	72.6	100.0
1980	17.6	9.8	72.5	100.0
1981	12.7	9.0	78.3	100.0
1982	15.7	9.7	74.6	100.0
1983	13.7	10.5	75.8	100.0
1984	12.7	9.6	77.8	100.0
1985	9.2	10.4	80.3	100.0
1986	17.1	12.4	70.5	100.0
1987	10.5	13.0	76.5	100.0
1988	10.7	14.2	75.1	100.0

Growth rates of development expenditure * :

	Agriculture	Education	Others	Total Development Expenditure
1971-80	9.67	23.92	22.30	19.18
1980-85	6.10**	11.93	10.08	9.15
1971-85	7.01	20.77	18.32	16.01

Source : *Lampiran Pidato Kenegaraan Pidato Presiden RI*: various issues

note: The totals may not add up exactly due to rounding.

* continuous growth rate in the form $Y=e^{rt}$

** refers to 1980-84. The 1985 figure is excluded due to an extremity fall.

*** Others consist of Industry and Mining; Transport and Tourism; Trade and Cooperative; Labour Force and Transmigration; Regional Development; Religion; Health, Social security, Women role, Population and Family planning; Housing, Law; Defence and Security; Information and Social communication; Science, technology and research; Government apparatus; Enterprise development; Natural resources and environment.

Chapter 3

The Decline in the Agricultural Share of the Labour Force : An International Perspective

This chapter presents a literature review on the relationship between the agricultural and non-agricultural sectors, as analysed in a long term development perspective. Section one discusses the role of agriculture in economic development. Section two elucidates the dual economy model of Lewis. Section three discusses critiques of the dual economy model. Section four presents a general pattern of structural change in the long term process of development. Section five examines the general pattern in selected Asian countries. Section six investigates whether Indonesia follows the pattern as predicted by the cross country sample; followed by some a summary and conclusions in the seventh section.

3.1 The Role of Agriculture in Economic Development

It has been widely recognized that the agricultural sector plays a key role in the process of economic development. Johnston and Mellor (1961, pp. 567-581) summarized the contribution of agriculture in five propositions. Firstly, it provides food supplies to non-agricultural sectors. Demand for food is determined by population growth and by per capita incomes. In developing countries the growth rate of the population since 1950 has been very rapid by historical standards, as a result of better health conditions leading to declining mortality rates. This has caused the demand for food to grow rapidly. On the other hand, low per capita income means that the proportion of additional income spent on food is much higher than in developed countries. This has accelerated the growth rate of demand for food. Food production is thus a prerequisite for expansion of non-agricultural activities. An increase in food supplies keeps inflation and wage costs down (Ghatak, 1987, p. 342). The failure of food supplies to expand

sufficiently will increase food prices and this has a negative effect on industrial expansion (Johnston and Nielsen, 1966, p. 281).

Secondly, agricultural output augments foreign exchange earnings by expanding the export of agricultural products. By raising the production of export crops, a country can augment foreign exchange earnings to pay for more imports of capital goods. However, it must be borne in mind that heavy reliance on agricultural exports may be a disadvantage for a country because the prices fluctuate considerably over time. Agricultural supplies cannot be adjusted immediately to respond to prices changes. Diversification of production combined with improvements in technology are two measures which can overcome these disadvantages.

Thirdly, providing labour to other sectors is another major contribution of agriculture to economic development. The agricultural sector can provide cheap labour to the industrial sector, enabling it to enlarge its profit margin for capital accumulation. The sectoral interdependence that characterizes modern economic growth provides a net flow of labour from agriculture to other more rapidly expanding sectors (Johnston and Kilby, 1974, p. 43).

Fourthly, agricultural development contributes to the capital required for investment in overheads for the industrial sector. An improvement in agricultural technology contributes to capital formation in two ways : (1) It makes agriculture more efficient, enabling it to reduce costs thereby enhancing the profit margins necessary for capital accumulation. (2) The capital utilised to improve agricultural technology is usually quite modest so it is possible for the agricultural sector to make a net contribution to the capital requirements of industrial expansion without reducing the already low levels of consumption of the farm population.

Fifthly, agricultural development stimulates expansion of the industrial sector through an increase in incomes of the farm population. An increase in farm incomes due to improvements agricultural technology will raise aggregate demand. The increase in purchasing power of the farm population leads to increased demand for industrial products, thus aiding the process of industrialization. This is especially true in the early stages of industrialisation when the agricultural population is still a large proportion of the total population.

3.2 A Dual Economy Model

Jorgenson (1970, p. 323) proposes that the process of economic development may be studied as an increase in income per capita when a high proportion of employment is in agriculture. Alternatively, the process may be studied as an increase in the role of industrial activity compared to agriculture. These two developments are intimately related in the theory of the dual economy.

Lewis (1954) analyses the process of economic development in a dual economy that consists of a capitalist sector and a subsistence sector. The capitalist sector is defined as "that part of the economy which uses reproducible capital, and pays capitalists for the use thereof" and the subsistence sector as "all that part of the economy which is not using reproducible capital" (Lewis, 1954, p. 146)¹). The two sectors are related in the process of economic development : when the capitalist sector expands, it draws people out of the subsistence sector into capitalist employment. The supply of labour in the subsistence sector is assumed to be unlimited in the sense that the supply of labour at the prevailing wage in the capitalist sector is unlimited : the marginal product of labour

1) Lewis in his later essay (1972, p. 76) stresses that the division he made was between capitalist and non-capitalist, and not between agriculture and industry which is now a popular division made by other writers. His version of division of sectors was later changed and called 'modern' and 'traditional' (1979, pp. 211-215). The modern sector depends on the traditional sector for its inputs (such as, food, raw materials) and expansion of the traditional commodities. On the other hand, expansion of the modern sector may benefit the traditional sector through four ways: (1) provision of employment, (2) sharing physical facilities, (3) modernisation of ideas and institutions, and (4) trade.

in the subsistence sector is negligible, or zero²⁾. The unlimited supply of labour from the subsistence sector consists of those in domestic service and the self-employed workers in family enterprises, which includes handicrafts and petty retailing as well as farms. Another source of increased labour is through the increased participation of women, as well as through natural increase and through immigration.

The wages paid in the capitalist sector are determined by what people earn in the subsistence sector. In other words, they are determined by what is required for subsistence consumption, so the minimum wage in the capitalist sector is set higher than the average product of the farmer. This gap prevails in order to offset the higher cost of living in the capitalist sector, and the psychological cost of transferring labourers from the traditional life of the subsistence sector. The gap in wages between two sectors is usually around 30.0 per cent.

The key to the process of economic expansion in Lewis' model is the use of the capitalist surplus and its rising share in national income. The surplus is increased by its reinvestment to create new capital. As the capitalist sector grows, and the wage-price ratio remains constant, the share of profits in national income increases and therefore capital formation is also increased. Labour is continually withdrawn from the subsistence sector into the capitalist sector. The surplus is then even larger, the accumulation of capital grows, and the process continues until the labour surplus in the subsistence sector disappears.

The capitalist sector can grow until the transfer of surplus labour is finished and the supply of labour is less than perfectly elastic. So, as investment contributed a rising proportion of national income, a backward economy develops into an advanced economy characterised by disappearance of disguised unemployment. However, the capitalist sector will be adversely affected when capital accumulation catches up with

2) Zero marginal product as used by Lewis is the marginal product of a person, not marginal product of a personhour as has been meant by other writers (Lewis, 1972, pp. 77-78).

labour supply and wages begin to rise above the subsistence level, and investment will no longer necessarily grow relative to the national income.

Lewis' approach was first applied to the development of a backward Asian economy by Fei and Ranis (1964). They retain the fundamental postulate of Lewis' theory; but divide the sectors of the economy into industrial and agricultural sectors. This classification is different from Lewis's. The process of development is divided into three phases. Phase one is marked by the existence of labour redundancy, which reflects the disguised unemployment. Labour is considered redundant when marginal productivity is equal to zero. Wages are institutionally determined at the average product of labour. Therefore, the "disguised unemployed" in agriculture include all those with zero marginal productivity and those with a low (if positive) marginal productivity which is below the constant institutional wage (average product of labour).

Phase two is the range for which the positive marginal product is less than the institutional wage. Hence, disguised unemployment exists. Once phase two is entered, the marginal productivity of the released agricultural workers is positive. Their transfer will thus result in a loss of agricultural output, and cause a decline in the surplus of agricultural goods. The impact of the surplus depends on the economy's ability to harness it by preventing its use in conspicuous consumption. The surplus can be siphoned off by means of government investment activities. A relative shortage of surplus agricultural goods to be exchanged for industrial goods raises the prices of the former and worsens the terms of trade for the industrial sector. In phase two, as the labour reallocation process continues, a shortage of agricultural output emerges. This leads to a deterioration in the terms of trade of the industrial sector and a rise in the industrial real wage in terms of industrial goods.

Phase three of the development process occurs when the marginal productivity of labour in the agricultural sector equals the prevailing industrial wage. As the disguised

unemployed disappeared, the agricultural sector becomes competitive, and in phase three agriculture becomes commercialized. This stage is regarded as a "turning point" of major significance in the development process. At this stage all factors of production are scarce, and wages are no longer constant as accumulation proceeds to the commercialization point. So, development towards an advanced economy begins after the third phase of development has been reached. The disappearance of disguised unemployment in the agricultural labour force and the commercialization of the agricultural sector imply that the agricultural real wage itself begins to rise along with the marginal productivity of labour. So the consequence is that the industrial real wage also increases. Such an increase is required if the industrial employer is to be able to compete successfully with the landlord for the supply of labour. Fei and Ranis described the third phase as a major landmark in the development process.

3.3 Critiques of Dual Economy

3.3.1 The Neoclassical Model

In the view of the neoclassicals, the classical model of a dual economy proposed by Lewis, and Fei and Ranis is not supported by evidence (Jorgenson, 1969). Firstly, the neoclassicals argue that disguised unemployment is always overestimated. Secondly, the assumption of a constant real wage rate in the agricultural sector is inconsistent with the evidence. The experience of the Japanese economy, between 1878 and 1917, saw production grow at a considerable rate in terms of both output and productivity; technological progress had taken place; and the standard of living and the wage rate increased to a certain extent. So, based on the historical development of the Japanese economy, Jorgenson concludes that the neo-classical theory of the development of a dual economy is strongly supported by empirical evidence and therefore the classical approach should be rejected.

The principal difference between the two models of the theory of a dual economy lies in the conditions governing the supply of labour to the advanced sector and the

assumptions made about the technology of the agricultural sector. In the neo-classical theory of a dual economy, a description of technology and the labour market is combined with a demographic theory in which population growth depends on the per capita supply of agricultural output and on birth rates. The birth rate is assumed to be constant and may be changed only by an alteration in medical techniques or in social institutions. The mortality rate depends on the supply of food per capita; however, it may attain a minimum that depends on the state of medical knowledge, provided that the supply of food is sufficient.

Disguised unemployment is assumed to be non-existent. Labour may be withdrawn from the backward sector only by reducing the output of that sector. Labour always has a positive marginal productivity in agriculture, so that labour is never available to the industrial sector without sacrificing agricultural output. The real wage depends on the marginal productivity of labour in manufacturing which bears a certain fixed relation to the average level of agricultural income. From the point of view of the industrial sector, the real wage rate rises steadily over time, depending on the rates of technological progress in both sectors and the rate of capital accumulation.

Jorgenson argues that a backward and an advanced sector exist side by side in most developing economies and applies this to the theory of the dual economy. The two most important characteristics of a backward or underdeveloped economic system are low income per head and a relatively large proportion of the total population engaged in agriculture.

3.3.2 Rural-Urban Migration: The Todaro Model

The massive migration of rural populations into urban areas experienced by LDCs in the 1960s and '70s in spite of rising levels of urban unemployment and underemployment would appear to lessen the validity of the Lewis two-sector model of development (Todaro, 1981, pp. 238-239). Godfrey (1979, p. 230) argues that "the

Lewis model (1954) does not deal explicitly with rural-urban migration since its two sectors are defined not as rural and urban but as 'subsistence' and 'capitalist'. Thus movement from the subsistence to the capitalist sector does not necessarily involve rural-urban migration". Todaro (1969) develops a theory of rural-urban migration to explain the paradoxical relationship of accelerated rural-urban migration in the context of rising urban unemployment. His model is an extension and modification of the simple-wage differential approach put forward by Lewis (1954), Jorgenson (1961) and Ranis and Fei (1961). It is assumed that migration is primarily an economic phenomenon. The model is based on the fact that the existence of a large pool of unemployed and underemployed urban workers affects the "probability" of a migrant finding a job in the urban sector. For the individual, migrating can be a quite rational decision despite the existence of urban unemployment. Therefore, urban labour supply is not determined by the prevailing income differential, but by the 'expected' rural-urban income differential, namely the income differential adjusted for the probability of finding an urban job. This probability acts as an equilibrating force on the urban unemployment rate. Migration in developing countries proceeds in two stages, viz : in the first stage, the unskilled rural worker migrates to an urban area and initially spends a certain period of time in the so-called 'urban traditional' sector, and in the second stage, a more permanent modern sector job is attained.

It is also assumed that the rural-urban income differential and the rate of job creation in the urban sector are constant. The decision to migrate will proceed if the "expected" income in the urban sector exceeds the prevailing average rural income. So, "as long as the urban-rural real income differential continues to rise sufficiently fast to offset any sustained increase in the rate of job creation, then even in spite of the long run stabilizing effect of a lower probability of successfully finding modern sector employment, the lure of relatively higher permanent incomes will continue to attract a steady stream of rural migrants into congested urban slums" (Todaro, 1969, p. 147).

The original Todaro migration model was extended by Harris-Todaro (1970). They constructed a two-sector internal trade model with unemployment. The sectors are distinguished from the point of view of production and income. It is assumed that the urban sector specializes in the production of manufactured goods and the rural sector specializes in the production of agricultural goods. Part of their products are traded between the two sectors. It is also assumed that the rural sector has a choice of either using all available labour to produce agricultural goods, or using only part of its labour to produce these goods while "exporting" the remaining labour to the urban sector. This model assumes that the rural migrant retains his or her ties with the rural sector. From the pool of urban labour, permanent urban workers plus rural migrants, it is assumed that a periodic random job selection process exists whenever the number of available jobs is exceeded by the number of job seekers. As a result, the expected urban wage will be defined as equal to the fixed minimum wage times the proportion of the urban labour force actually employed. It is also assumed that the behaviour of producers in both sectors is perfectly competitive, and the price of the agricultural good is determined directly by the relative quantities of the two goods produced. The crucial assumption of this model is that rural-urban migration will continue so long as the "expected" urban real income at the margin exceeds real agricultural product.

Mathematically, the Harris-Todaro model can be written as follows :

$$(1) E(W_u) = W_u[E_u/L_u]$$

$$(2) E(W_r) = W_r$$

The amount of rural-urban migration is a function of the urban-rural expected income, that is,

$$(3) M = f\{E(W_u) - E(W_r)\}$$

The equilibrium condition is,

$$(4) E(W_u) = E(W_r), \text{ or}$$

$$(5) W_u[E_u/L_u] = W_r$$

The urban unemployment rate is,

$$(6) UR = 1 - [E_u/L_u]$$

So, from (5), an equilibrium with unemployment rate is given,

$$(7) 1 - [E_u/L_u] = 1 - [W_r/W_u]$$

or, an employment rate is,

$$(8) [E_u/L_u] = [W_r/W_u]$$

where:

W_i is nominal wage rates,

E_u is the number of urban jobs,

L_u is the urban labour force,

$E(W_u)$ is expected urban income,

$E(W_r)$ is expected rural income,

M is the amount of rural-urban migration,

UR is unemployment rate.

An extension of the Harris-Todaro model was made by Corden and Findlay (1975, pp. 59-78) to permit capital mobility between the urban and rural sectors in response to any differential in the return on capital. A geometric exposition of the Harris-Todaro model is presented in Figure 3.1.

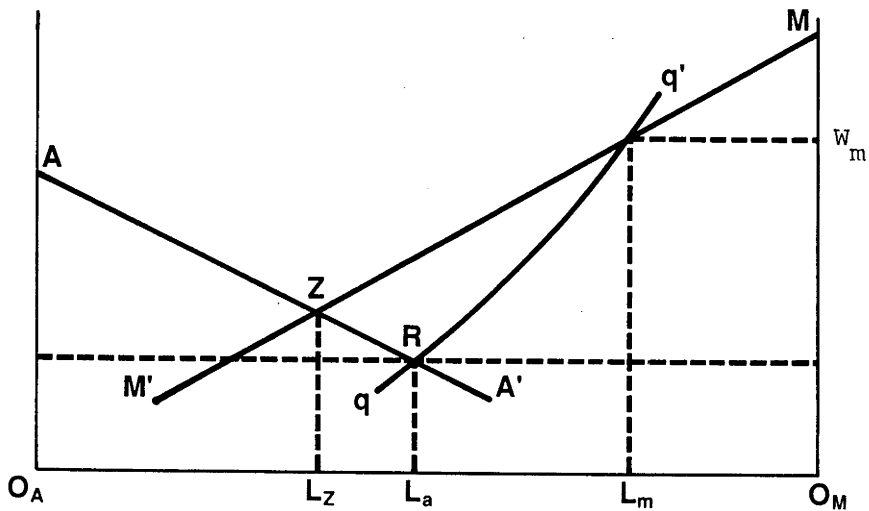


Figure 3.1 Adapted from Corden and Findlay

The horizontal axis measures the total labour force, with Oa as the origin for the labour force in agriculture and Om for manufacturing. MM' is the value of the marginal product curve for manufacturing, and AA' for agriculture both measured at world prices. Under the assumption of a competitive labour market, the equilibrium wage level is achieved at Z at the intersection of MM' and AA' curve. OaLZ employed in agriculture and OmLZ in non-agriculture, meant there is no unemployment. However, this equilibrium level is never achieved. The wage level in manufacturing is fixed institutionally at W_m which determines manufacturing employment at OmLm. According to Harris-Todaro, rural-urban migration takes place until the wage in agriculture (which is equal to value of marginal product in agriculture) is equal to the expected manufacturing urban wage, which is the actual wage times the probability of being employed in the urban sector. If the probability of finding an urban job is equal to the ratio of employment in manufacturing (L_m) to the total urban labour pool (L_u) then, rural-urban migration will cease if the following condition fulfilled,

$$W_a = W_m[L_m/L_u]$$

$$W_a L_u = W_m L_m$$

This is in fact represented by qq' curve (Harris-Todaro curve), and at point R the condition above is fulfilled and rural urban migration ceases. At this level the agricultural employment is $O_a L_a$, the total urban labour force is $O_m L_a$ that comprises $O_m L_m$ employed in manufacturing and $L_m L_a$ is urban unemployment.

One of the most extensive and useful modifications of the Harris-Todaro model was given by Fields (Todaro, 1976, p. 41). Fields (1975) accepts the basic approach of the Harris-Todaro model that the primary equilibrating force is to be the movement of workers between labour markets, not changes in wages, and shows the implication of the model with respect to the equilibrium urban unemployment rate. He extended the analysis by taking into account a number of important factors, i.e., the job-search process, the urban 'murky' sector, preferential treatment of the better educated workers by employers, and labour turnover.

By introducing the relative rural-urban job-search parameter, that is the relative chance of any given rural worker obtaining a job relative to any given urban worker in the Harris-Todaro model, he found that there is a lower equilibrium unemployment rate in general than would be predicted by the Harris-Todaro model. The same result was also found when he introduces the "murky" sector in his analysis ³⁾. Migrants who have encountered limited success are engaged in some sort of "murky-sector" employment. The inclusion of the murky-modern relative job search parameter resulted in a lower equilibrium unemployment rate than the Harris-Todaro result. The use of educational attainment as a criterion for hiring employment, in which an educated worker is hired preferentially, means that fewer urban jobs are available to uneducated workers. Hence, in equilibrium there would be fewer job seekers and the total number of urban unemployed would decline. These workers will return to agriculture and add to national output there. He derives the conclusion that overeducation might have the beneficial effect of both lessening urban unemployment and increasing national income in both the rural and urban sectors.

Despite the fact that the Todaro and the Harris-Todaro models are still the leading models of rural-urban migration, they are subject to a number criticisms, namely :

First, Godfrey (1973) argues that rural-urban migration can not be explained solely by economic variables as dictated by the Todaro model. His study of the rural-urban migration process in Ghana (1955-65) shows that even though the income differential (a relative index of the real value of the statutory minimum wage to an index of real farm income per rural household) fell and the difficulty of getting a modern-sector job increased, migration does not seem to have fallen. Thus, several other variables (such as the gap in social and infrastructural assets, changes in attitudes in sociological and/or political terms, and education) have to be taken into consideration, especially the

3) The characteristics of the "murky" sector are ease of entry and the lack of a stable employer-employee relationship. Workers in the murky sector are ordinarily classified as employed. Activities with low productivity are named petty capitalism, the traditional sector, the service sector, the grey area (Fields, 1975, p. 172), and also the informal sector.

educational factor. According to him, education has to be taken as a separate variable because the effect of education on migration differs from its effect on expected income 4).

Second, Kannappan (1985, pp. 705-712) argues that data on economic activity and the labour force distribution do not support the proposition that urban economies can be clearly classified into "capitalistic" or "modern" and "traditional" sectors. The dualism of labour markets which depends on such a classification of economic sectors raise doubts about the resultant groupings. It oversimplifies both *intra-urban* and *urban-rural* labour market relationships, and thereby fails to identify the nature of labour market flows with sufficient precision (see also Manning, 1979, p. 16).

Third, wages in the modern sector are not always well above those in the informal sector. Thus this evidence does not support the validity of the dualist approach (Kannappan, 1985). Urban-rural wage differences are narrow when specific comparisons are made, standardising for education, occupation, size of a firm and status. Wide variations are found within a sector.

Fourth, urban unemployment is not always high and rising as often perceived. A survey conducted in 14 countries showed that open unemployment rates have not been increasing at least in the period 1960-70 (Gregory, 1980, pp. 696-697). Thus, it does not support the proposition that employment conditions in developing countries have deteriorated. Berry and Sabot (1984, p. 109) argue that the incompleteness and inaccuracy of labour force data and the lack of conceptual clarity in the definitions of labour force categories have tended to overestimate the magnitude of urban "surplus labour".

4) Todaro (in Godfrey, 1973, p. 71) argues "that education can be incorporated into his framework without defining it as a separate variable on the grounds that the propensity to migrate, the average urban income earned by a migrant and the probability of securing a salaried urban job are all higher, the higher is the level of educational achievement".

Fifth, the duration of job search seems to be low for city immigrants, especially among the unskilled; hence, Todaro's "job-lottery" and "high-unemployment" view of urban labour markets in the Third World simply fails to pass the test of evidence (Williamson, 1988, p. 447). In Indonesia, for example, the lowest income families cannot afford to be unemployed for long because neither they nor their families have financial reserves for prolonged unemployment; hence they are forced to take up any available work even though it may not be commensurate with their abilities or expectations (Jones and Manning as cited in Hugo, 1987, p. 157). Mazumdar (1989, pp. 58-59) argues that rural migrants can find an urban jobs directly without stopping in the informal sector. Thus, the argument that the path to a formal sector job is predominantly through the informal sector is not always supported by evidence. Mazumdar also argues that the assumption that the informal sector, as stated by the model, acts as a transition stop for rural migrants is not valid because of the nature of the informal sector itself. It is very heterogeneous in that it can perform many specialized tasks not undertaken by the formal sector. In addition, the informal sector contains small-scale enterprises that produce the same product as do large firms but with different technology, factor proportions and quality. Mazumdar also argues that the assumption that the ordinary migrant plays a "lottery" to take advantage of an expected high wage in the urban labour market is not fully true. The support of relatives or friends for new rural migrants is not without a time limit. The cost of migration itself is significant and distance is often a deterrent to migration. So, migrants typically do not come from the poorest villages or the poorest households, but rather from more prosperous villages or from households with some assets.

Sixth, the evidence does not support the view that migrants earn less than non-migrants. Also the earnings of 'new' city immigrants are not less than their rural counterparts. In fact the new migrants are not slow to assimilate into city labour markets (Yap as cited in Williamson, 1988, p. 448). According to the World Bank Report (1984, p. 98) evidence from Brazil, Colombia, Kenya, Korea, India and Malaysia shows that migrants with

long urban residence compare favourably with urban-born people in terms of employment and income, and a study of Bogota shows that migrants earned more than non-migrants at all educational levels.

Seventh, it appears that the Todaro model neglects the fact that the transfer of people during the course of economic development is not merely from rural to urban areas, but to a large extent it can be *intra-rural*. This finding will be discussed in detail in the Indonesian context in Chapter 8.

3.4 General Patterns of Structural Change in the Course of Development

The relationship between agriculture and non-agriculture can be examined in the context of a long term process of development. Kuznets (1964) denotes this process as "modern economic growth" which is characterised by three aspects. Firstly, 'economic growth', which is defined as a sustained increase in total and per capita output, and is often accompanied by a significant rise in population. Secondly, 'the process of structural change', that is the process of development, where large and rapid shifts occur in the relative significance of different economic sectors in output and employment. Thirdly, 'international interdependence', that is all nations which are participating in modern economic growth are interdependent through international trade, finance and communication.

One common feature of structural change during the process of development is that, as countries progress, the proportion of income and employment contributed by agriculture declines. One reason frequently given for this is in terms of income elasticities of demand. The income elasticity of demand for food is generally regarded as less than unity so its production within a closed economy is limited by demand satiation. Often this limitation outweighs the increase in demand for food due to

population increase. Furthermore, as income increases the demand for food shifts to more highly processed food.

Table 3.1 shows that all group of countries underwent a rise in income per capita, accompanied by an increase in population. It also shows that all group of countries have experienced some degree of structural transformation between the 1960 and 1980s.

TABLE 3.1
THE AGRICULTURAL SHARE OF GDP AND LABOUR FORCE, GROWTH RATE OF INCOME AND POPULATION

	The Share of Agriculture in Labor Force		GDP	
	1965	1980	1965	1986
Low Income Economies	77	72	52	32
Middle Income Economies	56	43	22	15
Industrial Market Economies	14	7	5	3
	Annual Growth Rate of Income per Capita		Population	
	1965-86		'65-80	'80-86
Low Income Economies	3.1		2.3	1.9
Middle Income Economies	2.6		2.4	2.3
Industrial Market Economies	2.3		0.8	0.6

Source : World Bank (1988), *World Development Report*.

In all groups of countries, the agricultural share of the labour force and GDP has declined. In developed countries agriculture accounted for only 3.0 per cent of GDP in 1986 and 7.0 per cent of the labor force in 1980. In contrast, agriculture still plays an important role in low income economies. Its contributions to the labor force and to GDP were 72.0 per cent and 32.0 per cent respectively in the same period. In short, a positive

association between the decline in the agricultural share of the labourforce and rising GDP characterises structural transformation during the course of economic growth.

The pattern of the decline in the share of the labor force in agriculture was quite uniform between 1950 and 1970 (Kuznets, 1982). In a cross-sectional study using 131 countries Kuznets demonstrated a negative association between the absolute magnitude decline in the share of the male labour force in agriculture and the initial share of the agriculture in labour force ⁵⁾. The magnitude decline in the agricultural share of the labour force was low for the countries with a high initial share but high for the countries with low initial share.

Within the developing countries (east and Southeast Asia) the absolute magnitude decline between 1950 and 1970 was 5.2 percentage points in the countries with initial high share (85.2 per cent) and increases to 8.9 percentage points in the countries with low initial share (66 per cent). However, within developed countries, the range of the A share of the labor force varied from 52.3 per cent to 13.0 per cent, while the absolute decline fell from 20.4 percentage points to 7.9 percentage points for the same period.

Kuznets (1959, pp. 43-57), in his study of the changing structure of the labour force and national product, classified countries into seven groups by per capita product in 1949 (seventy countries) and in 1952-54 (fifty countries) ⁶⁾. He found a negative association between the share of the A sector in the labour force and income per capita. In other words the share of the A sector increases as we move from group of countries

5) The female labor force is not used as its patterns varies widely among regions and countries. Those of 131 countries includes less and more developed countries, market economies and communist countries (Kuznets, 1982, pp. 43-44).

6) The data is based on his early study 'Quantitative Aspects of the Economic Growth of Nations : II. Industrial Distribution of National Product and Labor Force' (Kuznets, 1957, pp. 5-32)

with high income per capita to group of countries with low income per capita ⁷⁾. A negative association also occurred between the share of the A sector in national product and income per capita. The share is low in countries with high income per capita but high in countries with a low income per capita.

The same trend was also found in his later study (Kuznets, 1971). Fifty nine countries are classified into 8 groups in increasing order of per capita GDP in 1958 and the agricultural share of the labour force about 1960. The study shows that the agricultural share of the labour force declined from 79.7 per cent in the lowest income group (\$ 72.3 per capita) to 11.6 per cent in the highest income group at \$ 1,501 per capita (Kuznets, 1971, Table 28, p. 200).

A study on patterns of development by Chenery and Syrquin (1975) covering the years 1950-70 discussed the sectoral allocation of labor during the process of development. Using 165 observations from 72 countries they fitted regression equations to estimate the predicted value of labor allocation. The dependent variable is the share of primary labour in the total labour force and independent variables are income per capita in 1964 \$US, and population ⁸⁾. A negative and significant correlation was found between the share of primary labour and income per capita. Their result revealed a rapidly declining primary share with a rising per capita income. The primary share at mean income levels under \$100 (approximately \$70) was 71.2 per cent and declined to 15.9 per cent at mean income levels over \$1000 (approximately \$1500).

7) Kuznets (1959) classified the economy into three major sectors : the A sector includes agriculture and related industries as fisheries and forestry; the M sector includes mining, manufacturing, and construction; and the S sector includes all the service industries as transportation and communication, trade, finance, professional, personal, and business services, and government.

8) Times trends are omitted as the samples used are mainly for the 1960's. Primary labor force includes all persons economically active in agriculture, forestry, logging, fishing, hunting, mining, and quarrying divided by the total labor force including employed and unemployed.

The study of structural transformation using Chenery cross-section methods was further developed by Adelman and Morris (1984). Using econometric methods some regressions were fitted based on 23 countries whose GNP increased substantially within span 1850-1914. This period was divided into three phases. The first period, 1850-70, was characterised by rapid industrialisation involving mainly the introduction of factory production of consumer goods. The average growth rate of per capita income was between 0.5 per cent and 1.0 per cent. The second phase, 1870 to 1889, was characterised by a rapid increase in urbanisation, and transportation was an important catalyst of development. The growth rate of income per capita remained at the earlier average growth rate levels, but industrialisation was proceeding rapidly. The third phase, between 1890 and 1914, was characterised by more rapid industrialisation. Per capita income increased between 1.0 and 2.0 per cent per annum and productivity in agriculture increased through the mechanisation of large holdings.

During the development process the percentage of the labour force in agriculture declined from 71.0 per cent in 1850-70 to 61 per cent in 1870-90 and to 55.0 per cent in 1890-14. Income levels at these periods were \$275, \$365 and \$550 respectively. The regression results show that there is a negative and significant correlation between the A share of labour force and income per capita. During the process of transformation from one period to the next, it was the share of agricultural labour force which declined while the level of technology in industry, in agriculture, and urbanisation increased.

The above studies of structural change by Kuznets and others have thus come to the same conclusion that the decline in the share of labour force in agriculture is negatively correlated with income per capita.

Cross-sectional data over the period 1960-80 will be examined to see if there is a result consistent with those of the above studies. In addition, the relationship between the decline in the share of labour force in agriculture and the growth rate of income (corrected for differences in purchasing power) per capita will be investigated. We utilize the World Bank data for the labour force which provides a sample of 39

countries over the period 1960-80, while data for income (in *international* prices) is taken from Summers and Heston (1984). Small countries are excluded from calculation since they tend to exhibit different patterns from large countries ⁹⁾. Of the total observations, 9 countries are classified as Industrial Market Economies ¹⁰⁾. The data on the agricultural share of the labour force and on income per capita is given in Table A3.1 in the appendix.

The dependent variables in the regression equations are : (1) The share of the labour force in agriculture; and (2) The magnitude percentage point decline in the share of labour force in agriculture in the two years. The explanatory variables are : (1) Income per capita in *international prices*; and (2) Growth rate of income per capita. Applying the OLS method, we estimate the following equations by a simple linear model :

$$ASLF = \alpha + \beta \text{Ln}[YCAP] + \epsilon, \quad (3.1)$$

$$\Delta(ASLF) = \alpha + \beta(RYCAP) + D + \epsilon, \quad (3.2)$$

where :

ASLF is the agricultural share of labour force,

Δ indicates the magnitude change between two years,

RYCAP is growth rate of income per capita= $\text{Ln}\{[YCAP]'/[YCAP]\}$,

YCAP is income per capita in \$ US,

α, β are coefficient parameters,

ϵ is residual term,

D is a dummy variable for an outlier,

Ln is natural logarithmic,

9) Chenery and Taylor (1968, p. 395) consider a country with population below 15 million as a small country.

10) World Bank classifies countries into seven principal groups that is Developing Countries, Middle-income oil exporters, Middle-income oil importers, High-income oil exporters, Least developed countries, Industrial Market economies, and East European nonmarket economies.

Ln is natural logarithmic,

a prime refers to final values.

The first equation is that used by Chenery and Syrquin (1975), and by Adelman and Morris (1984). The second equation is set up to quantify Kuznets' hypothesis, regarding the negative association between the magnitude decline in the agricultural share of labour force and the growth rate of income per capita. This is, we test the hypothesis that countries with a higher growth rate of income per capita experience a more rapid decline in the agricultural share of labour force. The first estimate uses all observations (39 countries). In the second estimate, the number of observation is reduced to 29 countries by excluding the industrial market economies to see if the results are affected by inclusion of these rich countries.

The regression results of the first equation are shown in Table 3.2. The table shows that all coefficients have correct signs and are statistically significant. Income per capita is negatively correlated with the share of the labour force in agriculture in the two periods. The exclusion of the developed countries (29 observations) gives the same results in that income per capita has significantly explained the variations of the ASLF. The explanatory variable (income per capita) is in the form of the natural logarithm since this form best meets the statistical requirements of diagnostic tests.

The regression results of the second equation are presented in Table 3.3. A dummy variable is used to neutralise the effect of an outlier. In the second period, the outlier is Algeria for the enormous fall in the agricultural share of labour compared to other countries (35.3 percentage points). The results show that the growth rate of income per capita significantly affects the magnitude decline in the agricultural share of the labour force, in that the higher the growth rate of income per capita the larger the decline in the agricultural share of the labour force.

These results support Kuznets' hypothesis that there is a uniform pattern in the structural change of employment across countries during the process of development, and that the share of labour force declines as countries develop.

TABLE 3.2
OLS ESTIMATES OF ASLF ON INCOME PER CAPITA
1960-1980

	Dependent Variable: ASLF					
	(1960)	(1970)	(1980)	(1960)	(1970)	(1980)
	Sample 1 (39 countries) Including developed countries			Sample 2 (29 countries) Excluding developed countries		
Constant	2.4548 (18.6328)*	2.3975 (21.5603)*	2.3118 (21.5533)*	2.0741 (9.9992)*	2.2009 (11.5535)*	2.2440 (2.5393)*
Ln[YCAP ₁₉₆₀]	-0.2771 (-14.5626)*			-0.2160 (-6.7651)*		
Ln[YCAP ₁₉₇₀]		-0.2668 (-17.3145)*			-0.2363 (-8.3503)*	
Ln[YCAP ₁₉₈₀]			-0.2561 (-17.7808)*			-0.2457 (-9.5532)*
R-squared	0.8514	0.8901	0.8952	0.6289	0.7209	0.772
R-bar-squared	0.8474	0.8872	0.8924	0.6152	0.7105	0.763
F	212.0701	299.7912	316.1560	45.7662	69.7276	91.2640
Sample Size	39	39	39	29	29	29
Diagnostic Tests						
A.Functional Form($\chi^2,1$)	6.5346	2.6164	1.2230	1.8453	0.6068	2.6547
B.Normality($\chi^2,2$)	0.9439	0.8597	5.7438	0.0283	1.0201	2.8526
C.Heteroscedasticity($\chi^2,1$)	0.4480	1.2645	0.4514	0.1887	0.0360	0.3661

Figures in brackets are t values

* significant at 0.01

A. Ramsey's RESET test using the square of the fitted values

B. Based on a test of skewness and kurtosis of residuals

C. Based on the regression of squared residuals on squared fitted values

TABLE 3.3
REGRESSION RESULTS OF THE CHANGE IN THE ASLF ON
THE CHANGE IN INCOME PER CAPITA

	Dependent Variable: $\Delta[ASLF]$			
	(1960-70)	(1970-80)	(1960-70)	(1970-80)
	Sample 1 (39 countries) Including developed countries		Sample 2 (29 countries) Excluding developed countries	
Constant	-0.0337 (-3.3134)*	-0.0348 (-3.5331)*	-0.0416 (-3.6561)*	-0.0409 (3.6521)*
$RYCAP_{[1960-70]}$	-0.1013 (-3.4813)*		-0.0768 (-1.9701)**	
$R[YCAP_{[1960-70]}$		-0.1113 (-3.3788)*		-0.1074 (-3.0182)*
Dummy		-0.2763 (-6.6090)*		-0.2717 (-6.0773)*
R-squared	0.2467	0.6306	0.1257	0.6652
R-bar-squared	0.2264	0.6101	0.0933	0.6394
F	12.1198	30.7256	3.8812	25.8294
Sample Size	39	39	29	29
Diagnostic Tests				
A.Functional Form($\chi^2,1$)	0.7619	4.4294	0.0017	2.5231
B.Normality($\chi^2,2$)	1.3644	0.5393	0.6752	0.4678
C.Heteroscedasticity($\chi^2,1$)	0.0852	0.5794	0.7897	0.5295

Dummy (outlier): Algeria

Figures in brackets are t values

* significant at 0.01

** significant at 0.10

A. Ramsey's RESET test using the square of the fitted values

B. Based on a test of skewness and kurtosis of residuals

C. Based on the regression of squared residuals on squared fitted values

3.5 The Decline in the Agricultural Share of Labour Force: International Comparisons

Between 1970 and 1980 the Indonesian economy was characterised by two big changes. First, the share of agricultural labour force declined from 66.3 per cent to 55.9 per cent and second, the growth rate of real GDP increased rapidly from 1.7 per cent in the period 1960-67 to 8.0 per cent in the period 1967-81 (Sundrum, 1986, Table 1).

To see how large was the decline in the share of agricultural labour force we compare Indonesia with some other selected Asian (South and Southeast) countries in the period 1970-80. Those countries where the agricultural share of labour force exceeded 80 per cent in 1980 are excluded from the study. Nigeria is included since it is similar to Indonesia in being a large oil exporting country. Table 3.4 presents characteristics of the countries under consideration. Korea experienced the largest absolute decline in the share of agricultural labour force (16 percentage points) followed by Indonesia (11 percentage points). Rapid rates of economic growth in Korea were achieved through the strategy of promoting exports of manufactures (Naya, 1983). A rapid increase in industrialisation has placed the country in the category of the Newly Industrialising Countries. The share of manufacturing increased from 20.9 per cent to 28 per cent, the highest share among the countries under study, which led to the decline in the agricultural share of labour force.

The relationship between growth in income per capita and growth in agricultural output is presented in Table 3.5. As observed by the World Bank (1982), in the 1970's most countries with GDP growth above 5 per cent experienced agricultural growth above 3 per cent, while countries with GDP growth below 3 per cent mostly experienced agricultural growth below 1 per cent.

Thailand, compared to Philippines, only underwent a small decline in the agricultural share of labour force (4 percentage points). Government efforts in accelerating agricultural development and in alleviating poverty through various government-

assisted programmes that have helped to expand labour demand in the rural areas (Pitayanon, 1988) may be one of factors preventing people from moving out from agriculture. Also labour force measurement procedures which enumerate a high proportion of rural women as family workers in the agricultural sector.

TABLE 3.4
ECONOMIC INDICATORS OF SELECTED COUNTRIES

	Share of agriculture in Labour Force (a)		GDP (b)		Income per capita (c)		Growth Rate of Agricultural Output (d)
	1970	1980	1970	1980	1970	1980	1970-80
Nigeria	62.0	54.0	44.0**	20.0**	936	1476	0.8
Thailand	80.0	76.0	32.2	25.1	791	1181	4.7
Burma	69.9	67.1	37.2	36.4	320	359	4.3
India	74.0	66.3	48.2	39.6	450	498	1.9
Pakistan	59.0	57.0	38.9	31.6	564	663	2.3
The Philippines	53.0	46.0	28.9	25.7	781	1022	4.9
Sri Lanka	55.0	54.0	33.3	24.3	765	838	2.8
Malaysia	56.0	50.0	29.6*	22.2	1242	2204	5.1
Indonesia	66.0	55.0	47.4	31.7	391	734	3.8
Korea, Rep.of	50.0	34.0	33.1	21.2	1112	2007	3.2

Source : (a) World Bank (1983), 'World Tables', Vol.II.

(b) ADB (1981), 'Key Indicators of Developing Member Countries of ADB', Vol. XII, No. 1: Table 7. note : base year of GDP are as follows : Thailand (1972), Burma (1970), India (1970/71), Pakistan (1959/60), Philippines (1972), Sri Lanka (1970), Malaysia (1970), Indonesia (1973), Korea (1975).

* refers to 1971; ** GDP in current producers' value (Statistical Yearbook 1982 : p. 140, United Nations, 1985)

(c) Summers and Heston (1984), 'Improved International Comparisons of Real Product and Its Composition: 1950-80'. Note : the figures are expressed in 1975 international prices (international dollars).

(d) World Bank (1982), 'World Development Report': Table 2.

In the Philippines a massive government infrastructure development programme combined with a labour placement overseas (Tidalgo, 1988) may have pushed people out from agriculture.

TABLE 3.5
GROWTH OF AGRICULTURE, INCOME PER CAPITA AND
THE DECLINE IN THE AGRICULTURAL SHARE OF LABOUR FORCE
1970-80

Agricultural Growth (% per annum)	Income per Capita Growth (% per annum)		
	>5%	3-5%	3%<
>3%	1.Indonesia (11%) 2.Korea,(16%) 3.Malaysia (6%)	4.Thailand (4%) 5.Philippines (7%)	
1-3%			6.Pakistan(2%) 7.Burma (2.8%) 8.India (4.7%) 9.Sri Lanka(1%)
1%<	10. Nigeria (8%)		

note: The data are for sample of countries in Table 3.4.

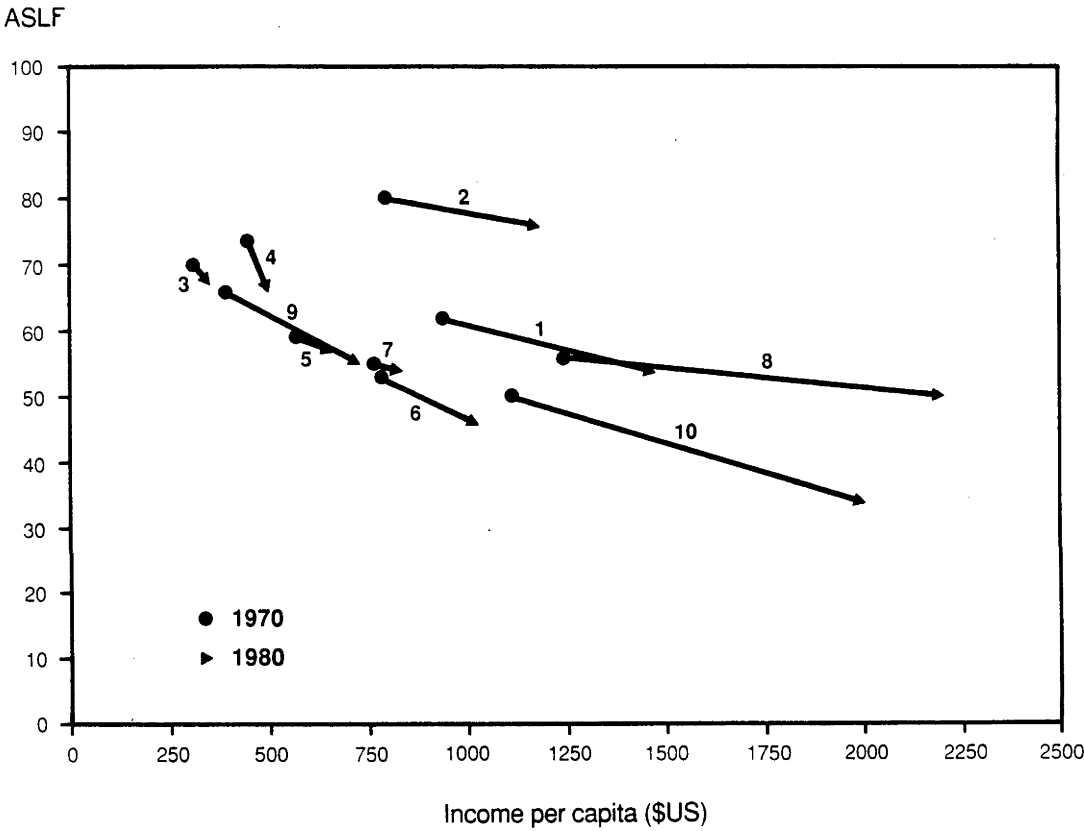
Figures in brackets are magnitude decline in the agricultural share of the labour force.

Countries are ordered from the highest growth rate of income to the lowest.

As discussed in Chapter 2 Nigeria and Indonesia experienced very different effects on their economies as a result of oil bonanza. In Nigeria the oil boom led to a severe disruption of the agricultural economy and to a large exodus of labour to the cities. The agriculture share of GDP declined due to the reallocation of resources away from agriculture. Public expenditure was heavily skewed to transport, primary education, construction, and industry such as auto assembly, while only a little revenue was spent on agriculture. According to the World Bank, Nigeria and some of the other oil-based economies were exceptional, in that fast GDP growth and sluggish agricultural performance characterised their economies.

An association between the change in the agricultural share of labour force and the change in income per capita in the countries under study is depicted in Figure 3.2.

Figure 3.2
Relationship between ASLF and Income per Capita



- | | |
|------------|-------------------|
| 1 Nigeria | 6 The Philippines |
| 2 Thailand | 7 Sri Lanka |
| 3 Burma | 8 Malaysia |
| 4 India | 9 Indonesia |
| 5 Pakistan | 10 Korea, Rep of |

To test whether the change in the agricultural share of labour force is affected by the growth rate of income per capita in the countries under consideration we fit some regressions based on Equations 3.2 above. The first regression uses 8 observations excluding Indonesia and Korea. The second regression uses 9 observations including Indonesia but excludes Korea. And the third regression use all observations. This is to see if the inclusion of Indonesia and a NIC (Newly Industrializing Country) country may affect the result.

TABLE 3.6
OLS ESTIMATES ON GROWTH RATE OF
INCOME PER CAPITA

	Dependent Variable: $\Delta[\text{ASLF}]$		
	(i)	(ii)	(iii)
Constant	-0.0174 (-1.6180)	-0.0136 (-0.9957)	-0.0037 (-0.2076)
R[YCAP]	-0.0904 (-2.7053)*	-0.1225 (-3.9607)*	-0.1677 (-3.7645)*
R-squared	0.5495	0.6915	0.6392
R-bar-squared	0.4744	0.6474	0.5941
F	7.3188	15.6871	14.1716
Sample Size	8	9	10
Diagnostic Tests			
A. Functional Form($\chi^2,1$)	0.2240	0.6869	1.1092
B. Normality($\chi^2,2$)	0.9263	0.8014	0.6994
C. Heteroscedasticity($\chi^2,1$)	0.0023	2.3932	2.7192

Figures in brackets are t values

* significant at 0.05

A. Ramsey's RESET test using the square of the fitted values

B. Based on a test of skewness and kurtosis of residuals

C. Based on the regression of squared residuals on squared fitted values

note :

(i) excluding Indonesia and Korea, Rep of

(ii) excluding Korea, Rep of

(iii) all observations

The results are presented in Table 3.6. The table shows that growth rate of income per capita significantly explains the variations in the change of the agricultural share of the labour force. The first regression result (8 observations-excluding Indonesia and Korea) shows that 55 per cent of variations in the change of the agricultural share of the labour force is explained by growth rate of income per capita. The association is negative and significant. An inclusion of Indonesia (9 observations) has increased the adjusted coefficient of determination ($R\text{-bar-squared}$) from 0.47 to 0.65 reflecting that Indonesia is a significant observation. The inclusion of Korea (10 observation) has reduced the $R\text{-bar-squared}$ from 0.65 to 0.59 but this is still higher than that in the first regression. In all cases, all statistical requirements are met satisfactorily even though sample size is small. In short, the structural change shown by the decline in the agricultural share of labour force is negatively associated with the income growth.

3.6 The Association between the ASLF and Income per Capita : the Case of Indonesia

Having examined the general pattern of structural change and association between the agricultural share of the labour force and income per capita, which shows that there is a uniform pattern in each period under study, next we will consider if the same pattern also take place in Indonesia, using both time-series and cross-sectional data.

A Time-series study: National Level

Table 3.7 presents the agricultural share of the labour force and income per capita at 1975 constant prices (with and without mining) over the period 1971-1987. The agricultural share of the labour force declined from 66.3 per cent in 1971 to 55 per cent in 1987. However, it was constant between 1982 and 1985, and slightly increased in 1986. This may be attributed to the different sampling methods used in those surveys as discussed in Chapter 1.

On the other hand, income per capita (with and without mining) increased over time. Over this period, income per capita grew at 4.01 per cent (with mining) and 4.41 per

cent (without mining) annually, and the agricultural share of the labour force fell at 1.40 per cent per annum.

TABLE 3.7
THE AGRICULTURAL SHARE OF THE LABOUR FORCE AND
INCOME PER CAPITA, 1971-87
BOTH SEXES IN URBAN+RURAL AREAS

	Agricultural share of the labour force (%)	Income per capita at 1975 constant prices (Rp.thousand)	
		With Mining	Without Mining
1971	66.30	46.51	41.89
1976	61.58	61.01	53.88
1977	61.47	64.93	57.11
1978	61.38	68.35	60.85
1980	55.90	75.73	68.71
1982	54.66	80.12	74.01
1985	54.72	85.71	80.10
1986	55.19	88.54	82.78
1987	55.00	90.85	85.19

Source: The agricultural share of the labour force is calculated from:

1971: Indonesian Population Census of 1971, Seri D: Table 43 and 43a.

1976: *Sakernas* 1976, VUS79-27: Table 09.9.

1977: *Sakernas* 1977, VUS79-28: Table 07.9.

1978: *Sakernas* 1978, VP.KK-0062.8101: Table XI.9.

1980: Indonesian Population Census of 1980, Seri S, No.2: Table 45.9.

1982: *Susenas* 1982, 04320.8406: Table 19.7.

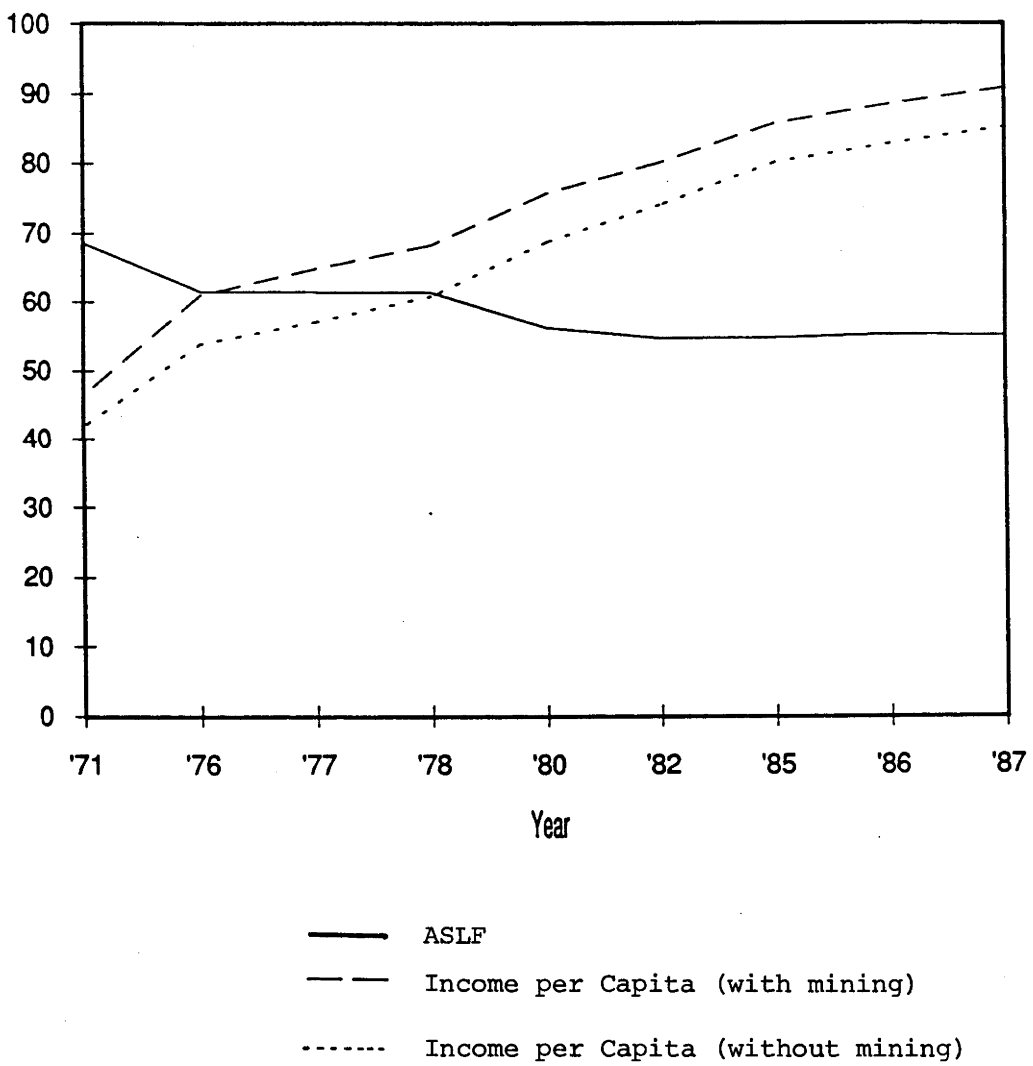
1985: *Supas* 1985, Seri No.5: Table 45.9.

1986: *Sakernas* 1986, 04320-8801: Table 18.9.

1987: *Sakernas* 1987, 04320-8806: Table 19.9.

Income per capita (GDP/Population) is calculated from: (a) for GDP: *Nota Keuangan* 1990/91: Table V.96 and Table V.98; and (b) for Population: Indonesian Population Census of 1971 (seri D) and 1980 (Seri S, No.2), *Supas* 1985 (Seri No.5), *Supas* 1985 (Seri *Supas* No.33 for population in 1986 and 1987). Population in 1976, 1977, 1978 and 1982 are estimated using growth rate of population estimates by BPS: 1971-80 = 2.32 per cent, and 1980-85 = 2.13 per cent (*Supas* 1985, Seri *Supas* No.3: Table 1).

Figure 3.3
ASLF and Income per Capita



A strong negative correlation is found between the agricultural share of the labour force and income per capita (with mining -0.9570, and without mining -0.9468). Thus, at the national level the data over the period 1971-87 suggest that Indonesia has the same association between the agricultural share of the labour force and income per capita as is found in the general pattern of the development process. Figure 3.3 shows the trends of the agricultural share of the labour force and income per capita.

A cross-sectional study: provincial level

For this purpose we examine the association between the agricultural share of the labour force and income per capita at the provincial level in 1971, 1977, 1980, 1982, 1985, and 1987. The data on the agricultural share of the labour force and income per capita are given in Table A3.2 to A3.6 in the appendix. To test if the same pattern occurs in Indonesia, some further regressions are run using the same model as that applied above (Equations 3.1 and 3.2). First, for each period, the dependent variable is the agricultural share of the labour force, and the explanatory variable is income per capita at current prices (with and without mining). Second, for the changes between two years, the dependent variable is the magnitude change in the agricultural share of the labour force, and the explanatory variable is the growth rate of income per capita at 1975 constant prices (with and without mining).

The results for each year are presented in Table 3.8 (with mining) and Table 3.9 (without mining). The results show that income per capita, in general, does not significantly explain variations in the agricultural share of the labour force by province. The coefficients of determination are relatively very low, and the F test is not significant, implying the regressions fail. Others statistical requirements for diagnostic tests are met satisfactorily, implying that the functional form is correct, there is no heteroscedasticity, and regression residuals are normally distributed. It was only in 1985, that income per capita (without mining) significantly influenced variations in the agricultural share of the labour force.

The results as given in Table 3.10 (with mining) and Table 3.11 (without mining) also show that the changes in the agricultural share of the labour force are not significantly explained by the growth rate of income per capita. The changes estimated for 1971-80, 1980-85 and also 1977-82, 1982-87 as the data are more comparable between those periods (the comparison of data is between Censuses and other surveys is discussed in Chapter 1). The regressions fail even though the diagnostic tests are statistically fulfilled.

Therefore, the results from provincial level over the period 1971-87 suggest that Indonesia, to a large extent, has a different pattern in the association between the agricultural share of the labour force and income per capita from that found in the general pattern of the development process. In other words, variations in the agricultural share of the labour force across provinces in Indonesia must be explained by other factors. We examine what these factors may be in subsequent chapters.

3.7 Summary and Conclusion

- (1) Agriculture plays an important role in economic development through its contributions to other sectors: (1) it provides food and other raw materials, and manpower, (2) it contributes towards capital accumulation, and (3) it stimulates expansion of other sectors through an increase in purchasing power. The interaction of agriculture and other sectors is analysed in a two sector model by Lewis and extended by Todaro and other scholars.
- (2) Studies of the general pattern of the development process show that the role of agriculture in terms of its contribution to the share of the labour force declines as countries progress. The change in the agricultural share of the labour force is negatively associated with the change in income per capita. As income per capita increases over time, the agricultural share of the labour force falls.
- (3) Cross-sectional country studies also reveal that an inverse relationship between the agricultural share of the labour force and income per capita exists. The agricultural

share of the labour force tends to be lower in a country with higher income per capita.

- (4) An examination of the time series data at the national level in Indonesia over the period 1971-87 shows that Indonesia follows the general pattern of the development process, in that as real income per capita has increased (with and without mining), the agricultural share of the labour force has declined.
- (5) However, a cross-sectional study at the provincial level in Indonesia over the same period reveals that Indonesia has a different pattern from the general pattern of the development process. Income per capita, in general, does not explain significantly variations in the agricultural share of the labour force by province. And hence, we investigate what other factors may be important in the following chapters.

TABLE 3.8
OLS ESTIMATES OF THE ASLF ON INCOME PER CAPITA
INDONESIA, 1971-87
(INCLUDING MINING)

	Dependent Variable: ASLF					
	(1971)	(1977)	(1980)	(1982)	(1985)	(1987)
Constant	0.7998 (7.0835)*	0.9047 (6.2849)*	0.7032 (5.1856)*	0.8855 (5.3034)*	0.9051 (5.4230)*	0.8697 (3.9102)*
Ln[YCAP]	-0.0173 (-0.5329)	-0.0458 (-1.5508)	-0.0099 (-0.4175)	-0.0438 (-1.5519)	-0.0435 (-1.6268)	-0.0354 (-1.0298)
R-squared	0.0127	0.1028	0.0075	0.0948	0.1032	0.0441
R-bar-squared	-0.0321	0.0600	-0.0356	0.0554	0.0642	0.0025
F	0.2840	2.4049	0.1743	2.4083	2.6465	1.0604
Sample Size	24 ^a	23 ^b	25	25	25	25
Diagnostic Test						
A.Functional Form($\chi^2, 1$)	0.2983	0.0030	3.8650	0.0131	0.0387	0.1043
B.Normality($\chi^2, 2$)	0.6538	1.0184	1.8504	1.2513	1.4118	1.3271
C.Heteroscedasticity($\chi^2, 1$)	2.4745	0.2808	0.5830	2.3255	1.0653	0.5824

Figures in brackets are t values

* significant at 0.01

^a excluding Irian Jaya

^b excluding Maluku and Irian Jaya

A. Ramsey's RESET test using the square of the fitted values

B. Based on a test of skewness and kurtosis of residuals

C. Based on the regression of squared residuals on squared fitted values

TABLE 3.9
OLS ESTIMATES OF THE ASLF ON INCOME PER CAPITA
INDONESIA, 1971-87
(EXCLUDING MINING)

	Dependent Variable: ASLF					
	(1971)	(1977)	(1980)	(1982)	(1985)	(1987)
Constant	0.6428 (3.9378)*	1.1461 (4.4749)*	0.6281 (8.9147)*	1.1041 (3.5389)*	0.5269 (11.0220)*	1.1575 (3.6359)*
YCAP	-0.0273 (-0.6012)	-0.0996 (-1.8015)	-0.0126 (-0.2848)	-0.0843 (-1.5280)	-0.1192 (-2.4424)*	-0.0821 (-1.6237)
R-squared	0.0162	0.1350	0.0035	0.0922	0.2059	0.1028
R-bar-squared	-0.0286	0.0938	-0.0398	0.0527	0.1714	0.0638
F	0.3614	3.2778	0.0811	2.3348	5.9654*	2.6363
Sample Size	24 ^a	23 ^b	25	25	25	25
Diagnostic Test						
A.Functional Form($\chi^2,1$)	0.0973	0.1715	2.6835	0.1750	0.0048	0.1138
B.Normality($\chi^2,2$)	0.6446	0.7752	1.8014	1.1304	1.5527	1.2383
C.Heteroscedasticity($\chi^2,1$)	2.1947	0.0593	0.1621	5.3149	2.1144	0.6709

Figures in brackets are t values

* significant at 0.01

^a excluding Irian Jaya

^b excluding Maluku and Irian Jaya

A. Ramsey's RESET test using the square of the fitted values

B. Based on a test of skewness and kurtosis of residuals

C. Based on the regression of squared residuals on squared fitted values

TABLE 3.10
OLS ESTIMATES OF THE CHANGE IN THE ASLF ON
THE GROWTH RATE OF INCOME PER CAPITA
INDONESIA
(INCLUDING MINING)

	Dependent Variable: $\Delta[\text{ASLF}]$			
	(1971-80)	(1977-82)	(1980-85)	(1982-87)
Constant	-0.1050 (-7.3670)*	-0.0434 (-1.8393)**	-0.0131 (-2.2776)*	0.0084 (0.7748)
Ln[YCAP]	0.0144 (0.6274)	-0.0261 (-0.4245)	0.0135 (0.5167)	-0.0606 (-1.3835)
R-squared	0.0176	0.0085	0.0115	0.0800
R-bar-squared	-0.0144	-0.0387	-0.0315	0.0382
F	0.3936	0.1802	0.2670	1.9140
Sample Size	24 ^a	23 ^b	25	24 ^a
Diagnostic Test				
A.Functional Form($\chi^2,1$)	0.9417	0.1201	0.8261	1.2809
B.Normality($\chi^2,2$)	3.2135	0.0200	0.3953	0.2981
C.Heteroscedasticity($\chi^2,1$)	0.9694	0.0656	0.3944	2.1172

Figures in brackets are t values

* significant at 0.05

** significant at 0.10

^a excluding Irian Jaya

^b excluding Maluku and Irian Jaya

A. Ramsey's RESET test using the square of the fitted values

B. Based on a test of skewness and kurtosis of residuals

C. Based on the regression of squared residuals on squared fitted values

TABLE 3.11
OLS ESTIMATES OF THE CHANGE IN THE ASLF ON
THE GROWTH RATE OF INCOME PER CAPITA
INDONESIA,
(EXCLUDING MINING)

	Dependent Variable: $\Delta[\text{ASLF}]$			
	(1971-80)	(1977-82)	(1980-85)	(1982-87)
Constant	-0.1201 (-7.9320)*	-0.0130 (-0.3658)	-0.0150 (-2.3609)*	0.0052 (0.4756)
Ln[YCAP]	0.0518 (1.6964)	-0.1182 (-1.1747)	0.0214 (0.8604)	-0.0365 (-0.9349)
R-squared	0.1157	0.0617	0.0312	0.0382
R-bar-squared	0.0755	0.0170	-0.0109	-0.0055
F	2.8778	1.3799	0.7403	0.8741
Sample Size	24 ^a	23 ^b	25	24 ^a
Diagnostic Test				
A.Functional Form($\chi^2, 1$)	1.7087	0.0543	0.1001	0.0945
B.Normality($\chi^2, 2$)	2.4048	0.3024	0.3585	0.3266
C.Heteroscedasticity($\chi^2, 1$)	1.1576	0.1961	0.6986	0.2860

Figures in brackets are t values

* significant at 0.05

^a excluding Irian Jaya

^b excluding Maluku and Irian Jaya

A. Ramsey's RESET test using the square of the fitted values

B. Based on a test of skewness and kurtosis of residuals

C. Based on the regression of squared residuals on squared fitted values

Chapter 4

Demand and Supply Factors in the Decline of the Agricultural Share of the Labour Force

This chapter examines the contribution of both demand and supply factors to the change in the agricultural share of labour force. The first section of the chapter elucidates the theoretical background concerning the contribution of demand and supply factors to the change in the agricultural share of labour force. The second section examines the demand and supply model proposed by Booth and Sundrum (1984). The third section presents an estimate of the effect of demand and supply on the change in the agricultural share of labour force in Indonesian context; followed by conclusion in the fourth section.

4.1 The Role of Demand and Supply in the Change of the Agricultural Share of the Labour Force.

Structural change in output and employment is one of the key characteristics of modern economic growth. Clark (1957, p. 492) argues that "as time goes on and communities become more economically advanced, the numbers engaged in agriculture tend to decline relative to the numbers in manufacture, which in their turn decline relative to the numbers engaged in services". However, as argued by Booth and Sundrum (1984), the historical experience of the developed countries may not be applied automatically to the developing countries. Hence, the theoretical explanation for the historical experience of the now developed countries needs to be investigated. The explanation of the decline in the agricultural share of labour force falls into two parts viz, demand and supply factors.

The demand explanation is based on the association between income per capita and the quantity of agricultural products consumed. It was pointed out by Clark (1957, p.493) that, "as real income per capita per head increases, it is quite clear that the relative demand for agricultural products falls all the time, and that the *relative* demand for manufactures first rises, and then falls in favour of services". This is in fact known as Engel's law : that the income elasticity of demand for food is less than unity. Therefore there is a fall in the agricultural share of national output which causes the decline in the share of agricultural labour force, as per capita incomes grow.

The supply explanation examines the changes in the relative efficiency of the agricultural sector. During the course of development there has been a steady tendency towards increasing output per worker in agriculture. As the productivity of the agricultural labour force increases, owing to technological progress, less labour is needed to produce a given amount of food, and labour will be released from agriculture to non-agricultural occupations. As a result, the proportion of the labour force engaged in agriculture to the total labour force declines. Thus, both demand and supply factors have contributed to the historical decline in the agricultural share of labour force.

4.2 The Booth-Sundrum Model

The use of demand and supply factors in explaining the decline in the share of agricultural labour force is demonstrated in a model by Booth and Sundrum (1984, pp. 35-59). The demand side is based on the well-known Engel's law proposition that the income elasticity of demand for food is less than one while the supply side is based on the growth of labour productivity in the agricultural sector ¹⁾. The model assumes a closed economy with full employment. The economy consist of two main sectors, viz : agriculture and the rest of the economy. It is assumed that the relative price of agricultural and non-agricultural output is constant.

Mathematically the model is derived as follows :

1) The relationship between the income elasticity of demand for food and the decline in the agricultural share of labour force is also elucidated in detail by Johnson (1973, pp. 83-126).

Consider :

q_i is output per worker,

λ_i is the share of the labour force,

k_i is the share of total output or income,

ε_i is income elasticity of demand,

R_i is the rate of growth of labour productivity,

i : a for agriculture, b for industry, and e for the whole economy

A prime refers to final values.

From the definition income elasticity of demand:

$$\varepsilon_i = \frac{\lambda_i'(1+R_i) - \lambda_i}{\lambda_i R_e} \quad (4.1)$$

These income elasticities must satisfy the equation,

$$k_a \varepsilon_a + k_b \varepsilon_b = 1 \quad (4.2)$$

From the definition growth rate of labour productivity is :

$$R_i = \left\{ \left(\frac{q_i'}{q_i} \right) - 1 \right\} \quad (4.3)$$

Labour required to produce *initial quantities of output* (LIO) will decline because of productivity growth at amount :

$$LIO = \lambda_i - \frac{\lambda_i q_i}{q_i}, \quad \text{using (4.3), then}$$

$$LIO = \frac{\lambda_i R_i}{(1+R_i)} \quad (4.4)$$

The *extra quantity of output* (EO) that must be produced due to an increase in labour productivity is :

$$EO = \lambda_i' q_i' - \lambda_i q_i, \quad \text{using (4.3), then}$$

$$EO = \lambda_i' q_i' (1+R_i) - \lambda_i q_i,$$

$$EO = q_i [\lambda_i' (1+R_i) - \lambda_i], \quad \text{multiplied by } \lambda_i R_e / \lambda_i R_e$$

$$EO = \frac{q_i \lambda_i R_e [\lambda_i' (1+R_i) - \lambda_i]}{\lambda_i R_e}, \quad \text{or}$$

$$EO = q_i \lambda_i R_e \varepsilon_i \quad (4.5)$$

Labour required to produce an *extra quantity of output* (LEO) is defined by dividing Equation (4.5) with labour productivity in the final period, that is

$$LEO = \frac{q_i \lambda_i R_e \varepsilon_i}{q_i'}, \quad \text{using (4.3) then}$$

$$LEO = \frac{\lambda_i R_e \varepsilon_i}{(1+R_i)} \quad (4.6)$$

It is assumed that the labour force is fully employed before and after the change in the labour use. By equating Equation (4.4) and Equation (4.6) for the whole economy, then:

$$\frac{\lambda_a R_a}{(1+R_a)} + \frac{\lambda_b R_b}{(1+R_b)} = \frac{\lambda_a R_e \varepsilon_a}{(1+R_a)} + \frac{\lambda_b R_e \varepsilon_b}{(1+R_b)}$$

$$\frac{\lambda_a R_a}{(1+R_a)} + \frac{\lambda_b R_b}{(1+R_b)} = R_e \left[\frac{\lambda_a \varepsilon_a}{(1+R_a)} + \frac{\lambda_b \varepsilon_b}{(1+R_b)} \right]$$

So, the growth rate of labour productivity for the whole economy is :

$$R_e = \frac{(\lambda_a R_a)/(1+R_a)}{(\lambda_a \varepsilon_a)/(1+R_a)} + \frac{(\lambda_b R_b)/(1+R_b)}{(\lambda_b \varepsilon_b)/(1+R_b)} \quad (4.7)$$

Next, for convenience, we consider the change in the agricultural share of labour force alone (the procedure for the non-agricultural share of labour force is the same). The agricultural share of labour force in the final period (λ_a') is equal to the share in the

initial period (λ_a) plus labour required to produce an extra quantity of output (Equation 4.6) minus the decline of labour force due to productivity increases (Equation 4.4), or :

$$\lambda_a' = \lambda_a + \frac{\lambda_a R_e \epsilon_a}{(1+R_a)} - \frac{\lambda_a R_a}{(1+R_a)}$$

by substituting R_e with (4.7) the change in the agricultural share of labour force is :

$$\lambda_a' - \lambda_a = \frac{\lambda_a \lambda_b [\epsilon_a R_b - \epsilon_b R_a]}{\lambda_a \epsilon_a (1+R_b) + \lambda_b \epsilon_b (1+R_a)} \quad (4.8)$$

by putting $\epsilon_i=1$, the contribution of supply factors to the change in the agricultural share of labour force is :

$$\lambda_a^* - \lambda_a = \frac{\lambda_a \lambda_b [R_b - R_a]}{\lambda_a (1+R_b) + \lambda_b (1+R_a)} \quad (4.9)$$

and, using (4.6), the contribution of the demand factor is :

$$\lambda_a' - \lambda_a^* = \frac{\lambda_a \lambda_b R_e [\epsilon_a - \epsilon_b]}{\lambda_a (1+R_b) + \lambda_b (1+R_a)} \quad (4.10)$$

Income elasticity of demand can be defined as,

$$\epsilon_i = \frac{k_i'(1+R_e) - k_i}{k_i R_e} \quad (4.11)$$

By equating Equation (4.11) with Equation (4.1), growth rate of labour productivity can be calculated as follows,

$$\frac{\lambda_i'(1+R_i) - \lambda_i}{\lambda_i R_e} = \frac{k_i'(1+R_e) - k_i}{k_i R_e}$$

rearrange for R_i , then

$$R_i = \left[\frac{k_i' \cdot \lambda_i}{k_i \cdot \lambda_i'} (1 + R_e) \right] - 1 \quad (4.12)$$

The combination of demand and supply factors in determining whether the agricultural share of labour force declines with income growth or not depends on one condition, namely whether the ratio of the growth of labour productivity in the agricultural and non-agricultural sectors is greater or less than the ratio of income elasticities of demand for the products of the two sectors, that is :

$$\frac{R_a}{R_b} > \frac{\epsilon_a}{\epsilon_b} \longrightarrow \lambda_a' > \lambda_a \quad (4.13)$$

In addition to the assumptions imposed on the model, Booth and Sundrum argue that some additional factors must be taken into account. On the demand side, factors that must be considered are : first, the fact that agriculture produces not only food but also agricultural raw materials. So, in order to be consistent, the income elasticity of demand for all agricultural output rather than food alone should be used. Second, the model ignores the role of foreign trade. A country which whose comparative advantage shifts to manufactures may shift from exporting agricultural products to importing foods and exporting manufactures. The shift in resource allocation will induce a further decline in the agricultural share of labour force. Third, the model ignores changes in relative prices between agriculture and non-agriculture. Such a shift could affect the composition of sectoral output and consumption, which in turn could affect the distribution of employment. On the supply side, a factor that must be considered is that a part of the labour force engaged in the agricultural sector in the early stages of development is really 'surplus' or underemployed. Since this surplus is likely to be more extensive in the early of stages of development, the actual labour in agriculture tends to be overstated, and hence the decline in its share thereafter.

4.3 Application to Indonesia

4.3.1 Results of Applying the Basic Model

It is worth noting the nature of the data used in applying the Booth-Sundrum basic model to the Indonesian case before interpreting the effect of demand and supply on the change in the agricultural share of labour force. The data are taken at three points of time : 1971, 1980 and 1985. Hence, the estimates of the income elasticity of demand are average values calculated from two points that is between 1971 and 1980, and between 1980 and 1985. The effect of income changes between two points is not taken into account in the elasticity formula.

The sectoral shares of the labour force (λ_i) and (k_i) income, and labour productivity (q_i) are presented in Table 4.1. Table 4.2 presents estimates of the effect of demand and supply on the change in the agricultural share of labour force at the national level. The results assuming full employment and constant prices are derived from Equations (4.1), (4.9) and (4.10). In the first period, the contribution of the supply factor to the decline in the agricultural share of the labour force (-10.31 percentage point) was positive (2.94 percentage point). This was due to the fact that non-agricultural labour productivity grew more rapidly than did agricultural labour productivity. However, in the second period, as the labour productivity in non-agriculture grew more slowly than that in agriculture, the supply factor has a negative contribution (-0.16 percentage point).

The contributions of the demand factor to the total decline in the agricultural share of the labour force were negative in both periods (-10.25 percentage points in 1971-80, and -1.08 percentage points in 1980-85) due to the fact that the income elasticity of demand for agricultural output was lower than that for non-agricultural product. The combination of demand and supply factors in determining the decline in the agricultural share of labour force meets the condition defined in Equation (4.13), that is the ratio of the growth rate of labour productivity in the agricultural and non-agricultural sectors (0.84 in the first and 1.01 second period) is greater than the ratio of income elasticities

of demand for the products of the two sectors (0.49 in the first period and 0.88 in the second period).

The model shows that the process of structural change of employment, from agriculture to non-agriculture proceeds when labour productivity per worker in non-agriculture is higher than that in agriculture. Hasibuan argues (1987, pp. 524-526) that the process of structural change in the Indonesian economy is not intended to increase only non-agricultural output. According to him, agricultural labour productivity must grow in such a way as to create demand for non-agricultural output, to provide raw materials for non-agricultural sectors, and to meet increased consumption of agricultural output owing to an increased income²⁾.

TABLE 4.1
SECTORAL SHARE OF LABOUR FORCE (%) AND INCOME (%), AND LABOUR PRODUCTIVITY
(RP.THOUSAND), 1971-85
(AT 1973 CONSTANT PRICES)

	1971	1980	1985
λ_a	66.3	55.9	54.7
Change in λ_a		-10.4	-1.2
λ_b	33.7	44.1	45.3
k_a	44.0	30.7	29.7
k_b	56.0	69.3	70.3
q_a	97.9	118.8	122.3
q_b	246.6	340.9	344.4
q_e	147.4	216.7	223.0

Source: calculated from

- (1) for income: *Nota Keuangan Indonesia*: various issues. Splicing technique is used to estimate income in 1985 at 1973 constant prices (see Ya-lun Chou, 1989),
- (2) for labour force: Indonesian Population Censuses of 1971 (Series D) and 1980 (Series S, No.2), and Supas 1985 (Series No.5).

2) Long-term planning on employment has been discussed by Hasibuan (1987) applying the Booth-Sundrum model, and by Esmara (1986).

TABLE 4.2
PARAMETER VALUES AND DECOMPOSITION OF λ_A INTO SUPPLY
AND DEMAND FACTORS AT NATIONAL LEVEL, 1971-85
(AT 1973 CONSTANT PRICES)

		1971-80	1980-85
R_e	(%)	4.37	0.57
R_a	(%)	3.44	0.56
R_b	(%)	4.08	0.55
E_a		0.63	0.92
E_b		1.29	1.04
Change in λ_a	(% point)	-10.31	-1.24
Due to Supply	(% point)	2.94	-0.16
Due to Demand	(% point)	-13.25	-1.08

Note: R_i is calculated using the formula in (4.12). The total change in λ_a may not equal to that figures in Table 4.1 due to rounding.

E_a and E_b calculated using the formula in (4.1)

4.3.2 Comments on these Results

In the following section we make three points regarding the Booth-Sundrum model.

First, the Booth-Sundrum model assumes constant relative prices of agriculture to non-agriculture. We examine whether the assumption holds in the period under consideration. The changes in relative prices of agricultural and non-agricultural output are calculated from the GDP deflators for agriculture and non-agriculture, that is the ratio of sectoral GDP at current prices to sectoral GDP at 1973 constant prices. Other indicators that may be used to measure price changes are consumer price indices, and for agricultural and other commodities the terms of trade data between agriculture and non-agriculture. However, data are not available for the whole period for these indices. GDP (Gross Domestic Product) price deflators and their changes at the national level are presented in Table 4.3. we can see that the relative price of agriculture to non-

agriculture has tended to decline over time (Figure 4.1) ³⁾. The table shows that in 1974-83 the increase in prices was in favour of non-agriculture. As expounded in Chapter 2, this may be attributed to the oil price increases in 1973. Relative prices were relatively constant before the oil boom period (1971-1973) and after the fall in oil prices (1983-85). According to Warr (1986, pp.294-8) the impact of the petroleum boom in 1974-78 caused the real prices (1974=100) of non-traded goods to rise relative to traded goods, especially when we use the ratio of import and export prices to the 'housing' price series ⁴⁾. The relative prices of agriculture to the 'housing' price component of the CPI (consumer price index) declined to 94 in 1975 and 1976 and increased thereafter.

It may be worthwhile to examine the relative prices of agriculture to prices of other industries. For this purpose, GDP is broken down into three sectors that is A sector (agriculture), M sector (mining and quarrying, manufacturing, utility and construction), and S sector (trade, transportation and communication, ownership of dwelling, public administration, and services). The relative prices of A to M, A to S, M to S, and AM to S, at 1973 constant prices are presented in Table 4.4 (see also Figure 4.1). The table shows that after 1973: (1) the A prices increased relative to the M prices until 1976, declined until 1983, and tended to increase after 1983; (2) the A prices declined relative to the S prices until 1976, tended to increase up to 1983, and declined afterward; (3) the M prices rose relative to the S prices until 1978, declined until 1983, and tended to decline afterward; (4) the AM prices relative to the S prices had the same tendency as the relative prices of M to S. Thus, it may be said that during the period of oil boom, agricultural prices declined largely relative to all other prices.

3) A *t test* on the trend in relative prices is performed. The test shows that the non-agricultural prices are significantly different from the agricultural prices. This is to test whether the relative prices are equal to one ($H_0: \mu = 1$ against $H_1: \mu \neq 1$). The *t* values are -4.1 for the first period and -7.9 for the second period which are significant at 0.01, thus H_0 is rejected.

4) Indices of some aggregate prices are used to measure traded and non-traded prices. Aggregate price indices for traded goods are wholesale prices of imports, of exports, of agriculture, of exports non-petroleum, of manufacturing. Price indices for non-traded goods are Jakarta consumer prices of housing (Warr, 1986, p. 294). In practice, the dichotomy between 'tradable' and 'non-tradable goods' may not be very clear. For example, In Indonesia rice is traded internationally but its domestic marketing is controlled by the government. Thus, rice within this category may be closer to the 'tradable' extreme (see Corden and Warr, 1981, p. 338; Warr, 1986, pp. 293-294).

TABLE 4.3
GDP PRICE DEFLATORS AND RELATIVE PRICE DEFLATORS OF
AGRICULTURE TO NON-AGRICULTURE AT 1973 CONSTANT PRICES

	GDP Price Deflators			Relative Price Agriculture/ Non-Agriculture
	Agriculture	Non Agriculture	All Sectors	
1971	0.67	0.65	0.66	1.03
1972	0.74	0.76	0.75	0.98
1973	1.00	1.00	1.00	1.00
1974	1.24	1.62	1.47	0.77
1975	1.42	1.79	1.66	0.79
1976	1.63	2.04	1.90	0.80
1977	1.98	2.22	2.14	0.89
1978	2.14	2.49	2.38	0.86
1979	2.76	3.33	3.15	0.83
1980	3.30	4.41	4.07	0.75
1981	3.80	4.77	4.48	0.80
1982	4.27	5.08	4.84	0.84
1983	4.60	6.67	6.05	0.69
1984	5.08	7.18	6.55	0.71
1985	5.37	7.55	6.90	0.71
Growth Rate*				
1971-80	17.52	20.13	19.40	-2.61
1980-85	9.66	11.91	11.43	-2.25
1971-85	15.50	17.70	17.17	-2.20

Source: calculated from *Nota Keuangan Indonesia*: various issues.

* computed by regressing price deflators on time trend in the form $P = e^{rt}$.

Figure 4.1
Relative GDP Price Deflators

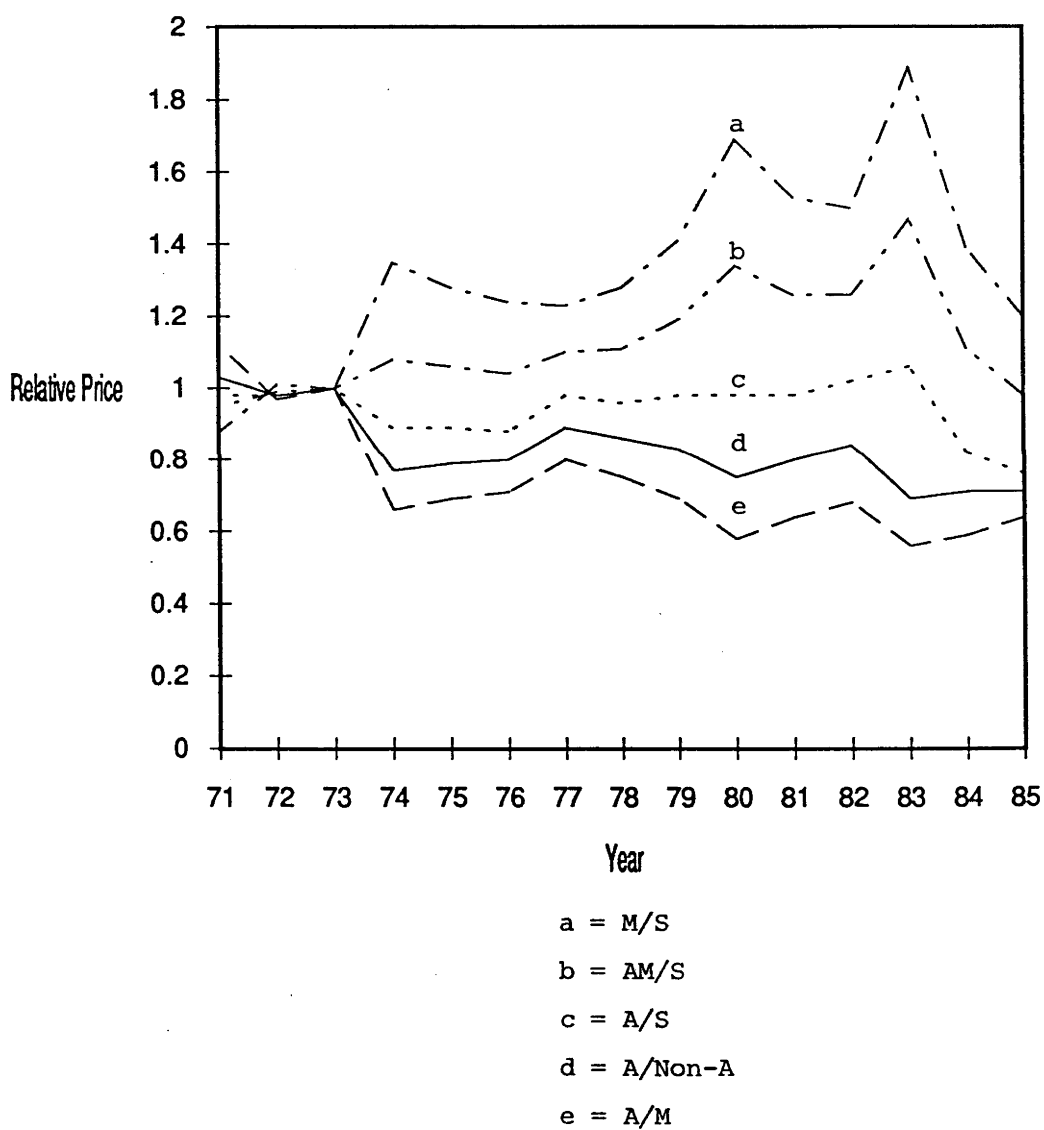


TABLE 4.4
RELATIVE PRICE DEFLATORS OF A, M, S SECTORS
1971-85 (AT 1973 CONSTANT PRICES)

	A/M	A/S	M/S	AM/S
1971	1.12	0.98	0.88	0.95
1972	0.97	0.98	1.01	0.99
1973	1.00	1.00	1.00	1.00
1974	0.66	0.89	1.35	1.08
1975	0.69	0.89	1.28	1.06
1976	0.71	0.88	1.24	1.04
1977	0.80	0.98	1.23	1.10
1978	0.75	0.96	1.28	1.11
1979	0.69	0.98	1.41	1.19
1980	0.58	0.98	1.69	1.34
1981	0.64	0.98	1.53	1.26
1982	0.68	1.02	1.50	1.26
1983	0.56	1.06	1.89	1.47
1984	0.59	0.82	1.39	1.11
1985	0.64	0.76	1.20	0.98

Source: calculated from *Nota Keuangan Indonesia*: various issues.

Note: A = Agriculture (Farm food crops, Farm non-food crops, Estate crops, Livestock and Products, Forestry, Fishery); M = Mining and Quarrying, Manufacturing, Utility, and Construction; S = Trade, Transportation and Communication, Ownership of Dwelling, Public Administration, Services.

Second, the basic Booth-Sundrum model must be extended to take account the effect of foreign trade, which is important in Indonesia. Here, we take account of exports and imports of agricultural and non-agricultural sector in the periods under discussion. A brief explanation of the nature of export and import data may be necessary for clarification. First, the classification of exports and imports are different in the periods under study. In 1971, exports and imports were classified by the Central Bureau of

Statistics by economic groups. Exports consisted of five main groups: live animals and animal products, vegetable products, mineral products, and other products. Imports comprised three main groups: consumption goods, raw materials, and capital goods. In 1981 and 1985, exports were classified into two main groups: (1) by commodity groups (twenty one categories), and (2) by sectors: agricultural products, industrial products, and mining products. Imports were classified by commodity groups (twenty one categories). Second, the data were given in current prices.

In order to be consistent with the classification of exports and imports, for the first period we use the 1971 and 1980 data, and for the second period we use the 1981 and 1985 data. The exports of agricultural products in the first period comprised live animals and animals product, and vegetable products, and the exports of non-agricultural products were mineral products and other products. Imports of agricultural products were rice, cloves, and milk. Other products were classified as non-agricultural products. In the second period, the classification of exports was clear Imports of agricultural products comprised live animals, vegetable products, and animal and vegetable fats.

To adjust the data into 1973 constant prices we use the GDP deflators as presented in Table A4.1. This may be a crude method. However, we have to accept this method because a more refined method for deflating the data is not possible for all periods under study. Therefore, recalling the nature of the data, care should be taken in interpreting the results. Net exports of agricultural and non-agricultural products including petroleum and gas are presented in Table 4.5. A large increase in net exports in 1985 was partly due to the devaluation in 1983.

Net exports affect the sectoral share of GDP and the sectoral labour productivities as shown in Table 4.6. The table shows that in 1985, non-agricultural share of GDP increased to 74.5 per cent from 45.3 per cent (when foreign trade is not taken into account in Table 4.1). However, its share was constant at 74.5 per cent in 1981 and

1985. This may be due to the fall in the world oil prices in 1983. The effects of the demand and supply factors taking into account the impact of trade are presented in Table 4.7. In the first period, the contribution of the supply factor to the total decline in the agricultural share of the labour force increased to 12.62 percentage points from 2.94 percentage points when foreign trade is ignored (Table 4.2). In the second period, the decline in the agricultural share of the labour force was entirely due to the supply factor due to the fact that income elasticities in both sectors are unity.

By taking account of inter-provincial trade in Indonesia, the model could in principle be applied at the provincial level. Unfortunately, reliable data on trade by province are not available. This may be worth further research in the future.

TABLE 4.5
NET EXPORTS OF AGRICULTURE AND NON-AGRICULTURE
AT 1973 CONSTANT PRICES, (RP. BILLION)

	Agriculture	Non-Agriculture*	Exchange rates Rp per US\$
1971	250.7	-196.0	418.00
1980	278.3	6739.6	633.70
1981	597.9	7049.5	643.05
1985	1450.8	12334.7	1655.40

Source:

1971: Central Bureau of Statistics '*Indikator Ekonomi*', No.2/75: Table VI2a, Table VI8a, Table VI9a.

1980: Central Bureau of Statistics, '*Indikator Ekonomi*', December 1982 (LU.EK.0225.8212): Table VI.2, Table VI.11a, Table VI.12a.

1981: Central Bureau of Statistics, '*Indikator Ekonomi*', December 1982 (LU.EK.0225.8212): Table VI.7,

1985: *Indikator Ekonomi*, January 1988 (03300.8801): Table 5.4.1 and Table 5.10.

Note : in 1971 and 1980, exports of agricultural products comprised live animals, animal products and vegetable products; and imports comprised rice and glutinous rice, cloves, and milk and cream.

In 1981 and 1985, only exports are categorised into agricultural products, industrial products, and mining products; and imports comprised live animals, vegetable products, and animal and vegetable fats.

* including petroleum and gas.

TABLE 4.6
TRADE ADJUSTMENT OF SECTORAL SHARE OF LABOUR FORCE (%) AND GDP (%), AND
LABOUR PRODUCTIVITY (RP. THOUSAND), AT NATIONAL LEVEL, 1971-85
(AT 1973 CONSTANT PRICES)

	1971	1980	1981	1985
k_a	48.8	24.4	25.5	25.5
k_b	51.2	75.6	74.5	74.5
q_a	109.0	126.4	140.3	149.9
q_b	224.4	495.8	520.7	307.9
q_e	148.0	289.2	307.9	320.8

Source: as for Table 4.1 and Table 4.5

TABLE 4.7
TRADE ADJUSTMENT OF PARAMETER VALUES AND DECOMPOSITION OF λ_A INTO SUPPLY AND
DEMAND FACTORS AT THE NATIONAL LEVEL, 1971-85 (AT 1973 CONSTANT PRICES)

	1971-80	1981-85
R_e (%)	7.73	1.03
R_a (%)	4.18	1.07
R_b (%)	8.85	0.98
E_a	0.435	1.0
E_b	1.538	1.0
Change in λ_a (% point)	-10.40	-1.20
Due to Supply (% point)	12.62	-1.20
Due to Demand (% point)	-23.02	0.00

Note: R_i is calculated using the formula in (4.12)
 E_a and E_b calculated using the formula in (4.1)

Third, the Booth-Sundrum model assumes full-employment. This may not be valid in Indonesia and in most other developing countries. However, the data (Indonesian Population Censuses and other surveys), show that open unemployment rate is quite low in Indonesia. The open unemployment data are not entirely helpful, because we do not know what effective rates of labour utilisation are in the agricultural and non-agricultural sectors. Therefore, no adjustment has been attempted to correct this assumption, although there is a strong presumption that effective rates of labour utilisation are lower in agriculture than in other sectors of the economy.

4.4 Summary and Conclusion

- (1) The cause of the change in the agricultural share of labour force can be decomposed in two main factors : the change due to demand factors and the change due to supply factors. The operation of the demand factor is reflected in the income elasticity of demand for sectoral output, and the operation of the supply factor is manifested in sectoral labour productivity.
- (2) Applying the Booth-Sundrum model, the results show that the decline in the agricultural share of labour force in period 1971-80 and 1980-85 was largely due to the demand factor ⁵⁾. In the first period, the contribution of the supply factors were positive owing to the fact that the growth rate of agricultural labour productivity was slower than that of non-agricultural labour productivity. In the second period, as labour productivity in agriculture grew at a slightly higher rate than in non-agriculture the supply factor gave a negative contribution. In the first period, the negative effect of the demand factor outweighed the positive supply effect. Nevertheless, in the longer period it may be expected that non-agricultural labour productivity will grow faster than agricultural labour productivity.

5) This was also true for the now-developed countries discussed by Booth and Sundrum (1984, Tables 2.3 and 2.5).

(3) The model assumes constant relative prices of agriculture to non-agriculture. However, the Indonesian data in the periods under study show that agricultural prices declined significantly relative to non-agriculture, especially to the M sector (mining and quarrying, manufacturing, utilities, and construction).

(4) The basic model assumes a closed economy. To adjust for the impact of foreign trade the income elasticities of demand must be altered to allow for the impact of net exports of both agricultural and non-agricultural goods and services.

Our adjustment for foreign trade shows that in the first period the contribution of the supply factor to the decline in the agricultural share of the labour force increased by around 10 percentage points compared with the result when foreign trade effects are ignored. The increase was due to the fact that non-agricultural labour productivity grew much faster than agricultural labour productivity. This may be partly attributed to the inclusion of petroleum and gas in exports and imports of non-agricultural products. However, data weaknesses should be taken into account in interpreting these results.

Chapter 5

The Role of Education in the Decline of the Agricultural Share of the Labour Force

This chapter examines the role of education in the decline of the agricultural share of the labour force. The first section provides a discussion of causes and consequences of the educational expansion which has taken place in Indonesia since 1970. The second section analyses the rapid growth of education in Indonesia by sector. The third section examines the role of education in the decline of the agricultural share of the labour force by age through the device of a U-curve. The fourth section analyses the role of education in the decline of the agricultural share of the labour force over time. The fifth section quantifies a relationship between education and the agricultural share of the labour force in the population aged 20-34. A summary and some conclusions are presented in the sixth section.

5.1 Educational Expansion : Causes and Consequences

5.1.1 Factors Leading to Expansion of Education.

The last two decades have seen a substantial improvement in education in most developing countries. Data on changes in age specific enrollment rates show that in middle-income economies the rates rose from 22 per cent in 1965 to 49 per cent in 1985 at secondary level, and at tertiary level the increase was even more striking, from 5 per cent to 14 per cent over the same period (World Development Report, 1988, Table 30).

The rapid expansion in education in most developing countries may be explained by both demand and supply factors. Education, from an economic development point of view, can be classified into two categories : (1) "investment" education which increases productive capacity and has a high priority, and (2) "consumption" education which does not increase productivity and should be treated as other forms of consumption (Lewis, 1983, p. 483). According to Edwards and Todaro (1973) the rapid increase in

demand in education is often attributed to the fact that education is wanted for its own sake, being treated as a consumption good. They argue that this may not be entirely true in developing countries, bearing in mind that their income per capita is low, although it may be valid in developed countries. According to Sundrum (1983, pp. 86-87), the main cause of private demand for education is the earnings differential by level of education. He has argued that these differentials are greatest at the tertiary level, and private demand for education has increased most rapidly at that level.

Thus, there is said to be a positive correlation between income earned and educational attainment. A number of studies substantiate this argument. For example, Houtakker's (1959, pp. 24-28) cross-sectional study in the USA shows that a longer school attendance is positively correlated with higher mean income, except for the age groups below 30. In Indonesia, Clark (1983) found that those with senior high school education who have jobs are earning much more than persons with lesser education. Similarly, Ananta and Sugiharso (1988) found in East Java a positive relationship between education and earnings, and the relationship is one of increasing returns. Data published by Central Bureau of Statistics from successive Labour Force Surveys (*Sakernas*) (Table 5.1) also suggest that a significant income differential by education exists but that the gap has been narrowed over the decade from 1976 to 1986. The ratio of salaries of college graduates to those of workers with incomplete primary school was 7.64 in 1976 and fell to 4.3 in 1986 (Keyfitz, 1989, pp. 50-52)

According to Arndt and Sundrum (1975, pp. 378-380), earnings differentials by education in Indonesia may be attributed to the standard practice of fixing the educational requirements for each job and then determining salaries accordingly. Thus it tends to cause unemployment among the better-educated workers who have higher expectations of their level of employment and remuneration. To overcome this problem it has been suggested that salaries be related more directly to the duties and levels of responsibility of the job rather than to the education of the workers (Jolly, as cited in

Arndt and Sundrum, 1975, p. 379). However, in practice education is used as a screening mechanism for access to a job, on the basis that those who have more education than others allegedly also have higher levels of ability (Psacharopoulos, 1981, p. 331). It may be said that the use of education as a screening device is convenient since education is regarded as an observable proxy for ability and capability.

TABLE 5.1
RATIO OF AVERAGE MONTHLY WAGES OF WORKER BY EDUCATIONAL
LEVEL TO NATIONAL AVERAGE, 1976-86

	1976	1978	1982	1986
Incomplete Primary School	61	58	60	56
Primary School	103	112	93	81
Junior High School	177	197	149	122
Senior High School	227	260	188	152
University	466	522	304	241
National average	100	100	100	100

Source : Central Bureau of Statistics (1986), *Indikator Tingkat Hidup Pekerja*: Table 2.3

The economic advantage of education from an individual standpoints may be examined through the rate of return to education. In Asia (India, Indonesia, South Korea, Malaysia, Philippines, Singapore, Taiwan, and Thailand) private returns to the cost of education have been estimated at 17 per cent for secondary education, and 19 per cent for high education, while for LDCs (Africa, Asia, and America Latin) the average figures are 19 per cent and 24 per cent (Psacharopoulos, 1981, pp. 327-329). A study on education, earnings and income expectation in Indonesia by Simanjuntak (1982, pp. 126-133) shows that expected-life-time income increases when education increases. He therefore argued that a Senior High School graduate will decide to seek a four-year bachelors (*Sarjana Muda*) diploma even though unemployment already exists among graduates.

Three other factors, in addition to the earnings differential, contribute to educational expansion especially in the post-literacy levels (Edwards and Todaro, 1973; Todaro, 1989, pp.337-341). First, there is the high wage/income differential between modern and traditional sector employment. This tends to increase demand for education since more educated people are employed in the modern sector. Second, perceived employment probabilities may be exaggerated because of the visible success of earlier generations in finding a job. And third, non-economic factors such as cultural tradition, social status, education of parents, and size of family influence the demand for education.

The supply of education, in contrast to the demand for education which is privately determined, is almost universally a government responsibility (Edwards and Todaro, 1973). In Indonesia, as discussed in Chapter 2, the government has paid great attention to education not only to increase the quality of the labour force but also to accomplish the mandate enshrined in the constitution of 1945, that : (1) all citizens have the right to receive education, and (2) the government has a duty to provide a national education system. However, as the education system has expanded there has been an increased demand for education at higher levels and especially at the tertiary level, as emphasised in paper 'certification' rather than capability (*Repelita V*, Vol. II, pp. 595-597). Educational expansion may be even faster in the coming years as the government has planned to raise the compulsory education requirement up to lower secondary level. The plan will be fully implemented in the first year of *Repelita VI*, 1994-99 (*Tempo*, 2 June 1990, p. 41).

5.1.2 Consequences of Educational Expansion.

The impact of an expansion in education on the development process has been widely studied in many countries. It may be summarized under three categories : (1) productivity and growth of income; (2) participation rates; and (3) migration.

(1) *Productivity and Growth of Income.* According to Tilak (1989, p. 23) education has several effects on the productivity of workers : (1) innovative effects such as abilities to decode new information, to estimate costs and benefits of alternatives, and to establish quicker access to newly available economically useful information; (2) allocative effects such as abilities to choose optimum combinations of agricultural practices, and to choose optimum time for activities; (3) worker effects; and (4) externalities ¹⁾. Several studies indicate that the educational level is positively correlated with productivity and growth of income. For example, Carnoy (1977) argues that schooling contributes to economic growth in that it helps people to solve problems associated with production, and it legitimates the existing or emerging social order that places higher values on economic output. Colclough (1982), basing his conclusions on the phenomenon that the main criteria used by employers when hiring labour are the level and type of education received, argues that education raises labour productivity through or because of cognitive or non-cognitive changes brought about by school which change attitudes and values. That is, educated people will "do better". In the USA a close and positive correlation is found between education and economic growth through an increase in human knowledge, in the sense that more schooling produces more new values (Schultz as cited in Mandi, 1981, pp. 25-33).

A cross-sectional study by McClelland (1966) showed that education and economic growth are positively associated, as education not only increases knowledge but also creates motivation. He came to conclusion that the better educated countries develop faster and the overall trend is highly significant. Similarly, Squire (1981, pp. 49-51), in a cross-sectional study using regression analysis, showed that the productivity per worker increases as educational levels increase from primary to secondary level.

1) Welch (1970, p. 42) argues that education has two distinct effects. First, the "worker effect", that is an increase in education results in a rise in output holding other factor quantities constant. Second, the "allocative effect", that is an increase in education may enhance a worker's ability to acquire and decode information about costs and productive characteristics of other inputs.

A farm level study by Chaudhri (1979, pp. 21-40) in Punjab and Haryana, India, suggested that there is a positive correlation between education and yield per hectare. He attributed this finding to the fact that the adoption of HYV seeds requires a higher level of education of the agricultural worker. A positive correlation was also found between education and the use of chemical fertiliser per hectare. A study of the allocative effect of education (the adjustment of farmers to the change in the optimum quantity of nitrogen fertilizer in corn production) in the USA by Huffman (1974) reveals that education is positively correlated with demand for fertilizer. He concluded that the decision makers with more education can adjust more quickly to changes. A similar study conducted by Lockheed *et al.* (1980) found that the effect of the educational level of small farmers on productive efficiency is positive in a modernizing the agricultural environment. Education also influences cost-efficiency. A study in the USA found that education (years of education of farm operator) is negatively associated with cost of production (Fane, 1975).

(2) Participation Rates and Unemployment. It is argued that the educational level is negatively correlated with participation rates: educational expansion lowers the over-all level of participation because it leads to an increase in the average age of labour force entry (Standing, 1978, pp. 139-140; Jones 1975, pp. 199-214). The pattern of participation rates by educational level in Indonesia follows a U-shaped form, with the lowest rates for lower secondary school and the highest rates for those with no education or academy/university (Widarti, 1984, Table 4, for females in 1971 and 1980; and Bukit and Bakir, 1983, Table 1.7 for males and Table 1.10 for females). For females, Jones and Manning (forthcoming, p. 5) found that the U-pattern has been maintained in the 1987 *Sakernas*. According to them "on balance, the changing educational composition of the female working-age population between 1977 and 1987 (a fall in the share of the uneducated and arise in the share of those with completed primary school education and above) should have led, other things being equal, to a slight fall in the female participation rate, because the share of those with completed

primary school and junior high school education, whose participation rates are low, increased the most".

The lower participation rates arising from educational expansion may reduce unemployment in the short run. As argued by Jones (1975, pp. 199-214), as activity rates at the younger working ages increase, in a country with an initially fairly high level of unemployment this will presumably result in both lower unemployment rates and lower total employment. However, it must be borne in mind that as education expands rapidly employment opportunities must also expand at the same rate, otherwise, educated unemployment may be generated. The argument is frequently made that educational expansion in developing countries has been too rapid for the educated to be absorbed into productive employment (Sundrum, 1983, pp. 88-90), and the job expectations generated by the traditional educational system are not commensurate with the job opportunities provided by the labour market (Blaug, 1973, pp. 7-8). However, the evidence for a positive relationship between education and unemployment has to be treated with caution. Education enhances personal horizons and expectations of a job. As stated by Bruton (1973, p. 12), it is not education that makes the educated unemployed: it is their refusal to accept jobs that they consider to be inappropriate. Also, the educated may be able to afford to be unemployed because of the support they get from their wealthier families ²⁾.

A negative correlation between placement rates (those absorbed into the labour market through Department of Manpower) and educational level may indicate that this phenomenon occurs in Indonesia. For example, according to the *Bursa Kesempatan Kerja*, Department of Manpower, of the total of those looking for jobs in 1987 and registered in the Department, the placement rates were six per cent for graduates (*Sarjana* and *Sarjana Muda*), 4.9 per cent for Senior High School, 11.4 per cent for

2) This phenomenon is known as "the luxury unemployment hypothesis": that high and rising unemployment rates might be concentrated among the people with relatively large assets which permit long search periods, because poorer workers can not afford long period of job search; or whose aspirations had been raised by access to moderate amounts of education (Udall and Sinclair, 1982, pp. 49-51).

Junior High School, and 40.4 per cent for Primary School (Simanjuntak, 1989, pp. 39-40).

(3) Migration. Studies on migration indicate that migration is positively correlated with education. A study by D'Aeth (1975, pp. 86-87) shows that the tendency to migrate to a city is higher as the education of rural children increases. He argued that this is partly because the curriculum and the outlook of the teachers are 'urban biased' and because rural students are attracted by the opportunities for higher education in cities. Apart from that, as discussed above, the use of education as a screening mechanism for access to urban jobs have caused those with more education to migrate to cities. As argued by Barnum and Sabot (1976), formal education may increase the preferences of rural residents for urban jobs as they gain increased knowledge of urban labour market conditions.

Speare and Harris (1986, pp. 228-229), in their study in Java, found that rural to urban migration in Indonesia appears to be selective of young adults who have a higher level of education than rural residents on average. A study by Mowat in Jakarta (1977, pp. 52-53) shows that education was one of the important factors in causing urban migration. A common tendency for educated people in rural Java to work in the non-agricultural sector (Soentoro, 1984, pp. 211-223) may also contribute to migration to urban areas

5.2 The Expansion of Education in Indonesia

In this section the following issues will be examined : (1) the rapid growth of education over the period 1971-85, and (2) the absorption of educated workers by industrial sector.

5.2.1 The Rapid Growth of Education : 1971-85

Since the early 1970s, Indonesia has gone through a massive improvement in the educational attainment of the labour force at all levels, especially in the primary and

secondary levels. In 1971, 43 per cent of the labour force had no schooling, while in 1985 this proportion fell by half to 22 per cent (Table 5.2). The introduction of compulsory education up to the primary level in the 1970s has led to a further decline in the proportion of the labour force with no education, and hence an increasing proportion of those with primary education. At higher levels, the proportion of labour force with upper secondary and tertiary qualifications has tripled to 9.3 per cent in 1985, compared to only 2.8 per cent in 1971.

TABLE 5.2
PERCENTAGE BREAKDOWN OF THE LABOUR FORCE
BY EDUCATIONAL LEVEL, MALE+FEMALE, 1971-85

	1971	1980	1985
1.Never attended school	43.2	29.6	21.7
2.Did not finish Primary School	28.6	37.6	34.4
3.Primary School	21.6	21.2	27.6
4.Junior High School	3.8	6.4	7.0
5.Senior High School	2.3	4.3	8.0
6.University	0.5	0.8	1.3
All educational levels	100.0	100.0	100.0
Mean Years of Schooling	2.8	3.6	4.5

Source: Computed from Indonesian Population Census of 1971 (Series D) and 1980 (Series S, No.2); *Supas* 1985 (Series No.5).

Note: Mean Years of Schooling (MYS) is computed as the sum of the product of the labour force and the duration of the formal education in each educational category divided by total labour force. The duration of the formal education is as follows : Never attended school (0 years); Did not finish Primary School (3 years); Primary School (6 years); Junior High School (9 years); Senior High School (12 years); University consists of Diploma, Academy, and University (15 years). The totals may not add up exactly due to rounding.

The educational attainment of the labour force as a whole as measured by the mean years of schooling remains low on average; however it has increased significantly from 2.8 to 4.5 years between 1971 and 1985³⁾. This low educational attainment compared

with more than 7 years in both Malaysia and the Philippines is due to the slow movement of older, poorly educated cohorts out of the labour force (Jones and Manning, forthcoming, p. 3).

The most rapid growth rate in the labour force was experienced at the upper secondary level (13.4 per cent per annum) followed by tertiary level (10 per cent per annum) between 1971 and 1980. In the second period, a striking expansion occurred in workers with primary education where the annual growth rate has nearly trebled, to 9.1 per cent, in this period.

As would be expected, workers in urban areas are better educated than in rural areas, and females are less educated than males (Table 5.3). The proportion of rural male labour force with lower secondary level and above was only about 5 per cent in 1971 compared to 27.5 per cent for urban males, while in 1985 the figures were 12 per cent for rural and 44 per cent for urban. The decline in the proportion with completed primary school for males between 1971 and 1980 shown in the data must be treated with caution since the 1971 census procedures led to an overstatement of the number with that level of education, while the 1980 census data left unrecorded the numbers with academy or university education (Hull and Sunaryo, n.d., pp. 8-17; Hugo *et al.*, 1987, p. 281).

For rural females the situation is even worse. Only around 2 per cent had secondary education in comparison with 15.0 per cent in urban areas in 1971. This proportion increased to 6 per cent and 27 per cent for rural and urban areas respectively in 1985. On average, rural areas had about half the mean years of schooling for females of urban areas over the period 1971-85.

3) Educational attainment in a country may be measured in two ways : (1) the stock concept which is the level of educational attainment of the adult population, usually taken as 15 years and over, or the average number of years of schooling received by the adult population; and (2) the flow concept which is usually measured by the enrollment ratio i.e. the proportion of the population of various school-going ages enrolled in different levels of educational system (Sundrum, 1983, p. 81).

TABLE 5.3
PERCENTAGE BREAKDOWN OF LABOUR FORCE
BY EDUCATIONAL LEVEL, 1971-85

	1971	1980	1985
Urban Male			
1.Never attended school	15.9	9.4	5.9
2.Did not finish Primary School	22.6	25.6	21.4
3.Primary School	34.1	28.3	28.7
4.Junior High School	13.8	21.8	16.4
5.Senior High School	10.6	11.1	22.9
6.University	3.1	3.8	4.7
All educational levels	100.0	100.0	100.0
Mean Years of Schooling	5.7	6.3	7.3
Urban Female			
1.Never attended school	45.2	28.9	20.7
2.Did not finish Primary School	20.5	27.7	26.1
3.Primary School	17.7	19.6	23.2
4.Junior High School	7.6	11.9	9.3
5.Senior High School	7.5	9.8	17.3
6.University	1.4	2.2	3.4
All educational levels	100.0	100.0	100.0
Mean Years of Schooling	3.5	4.6	5.6
Rural Male			
1.Never attended school	37.9	25.7	17.8
2.Did not finish Primary School	33.2	43.3	38.8
3.Primary School	24.3	23.0	31.2
4.Junior High School	3.1	4.3	6.4
5.Senior High School	1.3	3.3	5.2
6.University	0.1	0.3	0.6
All educational levels	100.0	100.0	100.0
Mean Years of Schooling	2.9	3.5	4.3
Rural Female			
1.Never attended school	63.4	47.3	36.6
2.Did not finish Primary School	22.7	34.3	35.4
3.Primary School	12.1	14.6	21.9
4.Junior High School	1.3	1.7	2.9
5.Senior High School	0.5	2.0	2.9
6.University	0.0	0.1	0.3
All educational levels	100.0	100.0	100.0
Mean Years of Schooling	1.6	2.3	3.0

Source : as for Table 5.2

note : the total (all educational levels) may show slight discrepancies due to rounding.

TABLE 5.4
PERCENTAGE DISTRIBUTION OF LABOUR FORCE
BY SECTOR AT DIFFERENT EDUCATIONAL LEVEL
MALE+FEMALE, 1971-85

	1971	1980	1985
A Sector			
1.Never attended school	76.1	68.7	70.7
2.Did not finish Primary School	69.8	62.6	64.2
3.Primary School	57.9	48.8	52.7
4.Junior High School	20.0	23.0	28.8
5.Senior High School	7.4	8.3	8.0
6.University	2.4	4.1	2.1
All educational levels	66.3	55.9	54.7
Mean Years of Schooling	2.2	2.7	3.3
M Sector			
1.Never attended school	7.3	10.3	9.6
2.Did not finish Primary School	9.7	13.3	12.9
3.Primary School	10.3	15.7	15.7
4.Junior High School	11.1	17.2	17.6
5.Senior High School	10.6	14.2	15.5
6.University	9.2	11.3	11.3
All educational levels	8.8	13.2	13.4
Mean Years of Schooling	3.3	4.1	5.0
S Sector			
1.Never attended school	16.7	20.9	19.9
2.Did not finish Primary School	20.5	24.1	23.0
3.Primary School	31.9	35.4	31.6
4.Junior High School	68.9	59.8	53.6
5.Senior High School	82.1	77.5	76.6
6.University	88.4	84.6	86.5
All educational levels	24.9	30.9	31.9
Mean Years of Schooling	4.5	5.3	6.3

Source : as for Table 5.2

note : the total (all educational levels) may show slight discrepancies due to rounding.

5.2.2 The Expansion of Education in the Labour Force by Sector

To simplify the analysis of education in relation to sectors, the types of activity are compressed into three sectors, followed classification used in Chapter 2 : A sector (Agriculture, Hunting, Forestry, and Fishery); M sector (Mining and Quarrying, Manufacturing, Utilities, and Construction); and S sector (Transportation, Trade, and Other Services).

Table 5.4 shows the share of each main industry in the labour force at different educational levels. A contrast in the distribution of the share between the A and S sectors over the period 1971-85 is noticeable. The agricultural sector absorbs a high percentage of all workers with less than primary education. By contrast, the S sector absorbs most of those workers with secondary education and above. Measured by mean years of schooling, the agricultural labour force was less educated than the labour force in the M and S sectors. It had only about half the mean years of schooling of the S sector in 1971. On average educational attainment in agriculture was well below completed primary level, while the S sector was slightly above primary level. But between 1971 and 1980 an improvement in education in the A sector (in comparison with the M and S sectors) was demonstrated by the fall in the agricultural share of 'Never attended school' and 'Did not finish primary school' categories. At the same time the fall in the share of the primary education category absorbed in agriculture indicated a movement away from the agricultural labour force to non-agricultural sectors for workers who had completed primary education.

Between 1980 and 1985 an increase of two percentage points in the agricultural share of the labour force which had no schooling (Table 5.4) was caused by a rapid decline in the growth rate of the labour force in the M and S sectors. The decline in the size of labour force with no schooling in agriculture was 1.8 per cent per year, while in the M and S sectors it fell by 4.1 and 3.4 per cent per annum respectively. In this period

education in the A sector improved substantially at the primary (10.6 per cent per annum) and lower secondary levels (14.8 per cent per annum).

5.3 The Role of Education: a U-curve.

It may be thought that sector of employment is a characteristic of a family as a whole rather than of an individual. Hence, there would not be much difference in the agricultural share of employment of individuals when they are classified by age. In other words, the agricultural share of the labour force could be conjectured to be the same at all ages. However, perhaps surprisingly, we find that there is a systematic variation of the distribution when the individual share is classified by age (Table 5.5)

If we graph the agricultural share of the labour force by age, as presented in Table 5.5, it can be seen that the higher shares occur both at the youngest and the oldest age groups, with a lower share in the intermediate age groups. This distribution of shares forms a U curve (Figure 5.1 for both sexes) with the lowest point at age 20-34 for each of the years 1971, 1980 and 1985. The marked difference in the agricultural share of the labour force aged 20-34 between 1971 and 1980 indicates that a rapid decline in the agricultural share of the labour force by age occurred within the younger age groups. This reflects the fact that it is youngsters who have moved away from the A sector to non-A sectors. Hence, the U-shape distribution of the agricultural share of the labour force by age suggests that it is individual rather than family characteristics which determine the sector of employment. In short, for the agricultural sector, two obvious characteristics of Figure 5.1 are perceptible. First, it depicts a U curve, and second, the curve shifts down steeply, especially at age 20-34, between 1971 and 1980. There was a less pronounced downward shift between 1980 and 1985. For females, the lowest point in 1980 and 1985 occurred at 15-24 age groups. This may indicate that females are leaving school earlier than males (see Figure 5.2 for males and Figure 5.3 for females).

TABLE 5.5
PERCENTAGE DISTRIBUTION OF THE AGRICULTURAL SHARE OF THE LABOUR FORCE BY AGE,
1971-1985

	1971	1980	1985
Males+Females			
10-14	79.7	73.9	73.8
15-19	70.4	59.6	59.2
20-24	62.2	50.3	47.6
25-29	62.9	49.8	47.2
30-34	61.9	50.9	48.2
35-39	64.0	53.3	52.4
40-44	63.9	54.9	54.3
45-49	65.5	58.8	56.6
50-54	68.6	61.4	60.8
55-59	70.5	63.9	63.7
60-64	75.0	68.1	68.3
65+	77.7	70.0	69.0
All Ages	66.3	55.9	54.7
Male			
10-14	84.6	81.2	82.0
15-19	72.7	64.6	65.9
20-24	61.7	50.5	48.3
25-29	61.5	49.3	45.4
30-34	61.1	50.0	46.5
35-39	64.3	52.7	50.8
40-44	64.0	54.7	52.9
45-49	66.2	59.9	55.9
50-54	69.4	63.0	62.3
55-59	72.1	66.6	66.8
60-64	78.1	72.5	72.8
65+	81.3	75.7	75.5
All Ages	66.7	57.3	55.3
Female			
10-14	72.3	63.1	61.4
15-19	66.6	52.1	49.9
20-24	63.4	49.8	46.7
25-29	65.7	50.9	50.8
30-34	63.8	52.9	51.8
35-39	63.3	54.7	55.5
40-44	63.9	55.4	56.8
45-49	64.0	56.8	57.9
50-54	66.9	58.1	58.2
55-59	67.1	58.0	58.7
60-64	68.6	58.4	59.5
65+	68.0	56.0	54.2
All Ages	65.4	54.2	53.7

Source : as for Table 5.1

Figure 5.1
The Agricultural Share of the Labour Force, Both Sexes, Urban+Rural

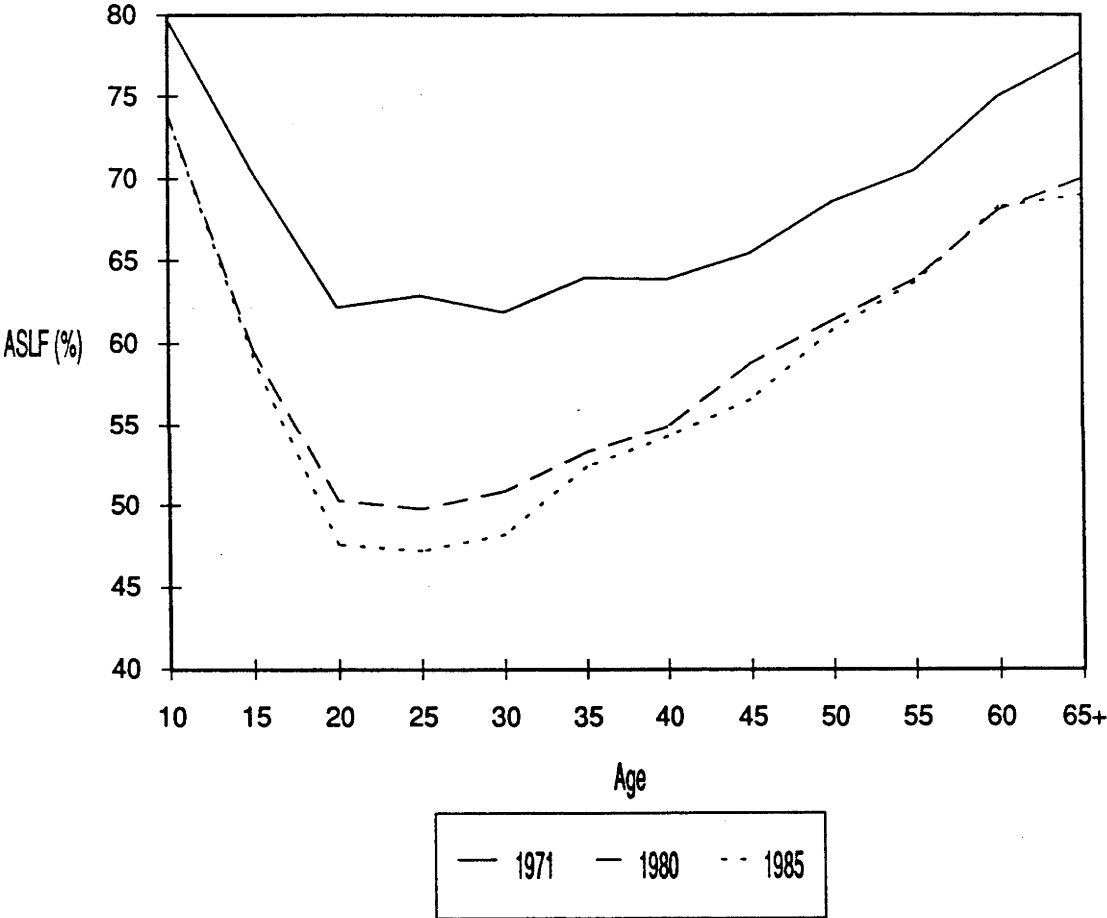


Figure 5.2
The Agricultural Share of the Labour Force, Male, Urban+Rural

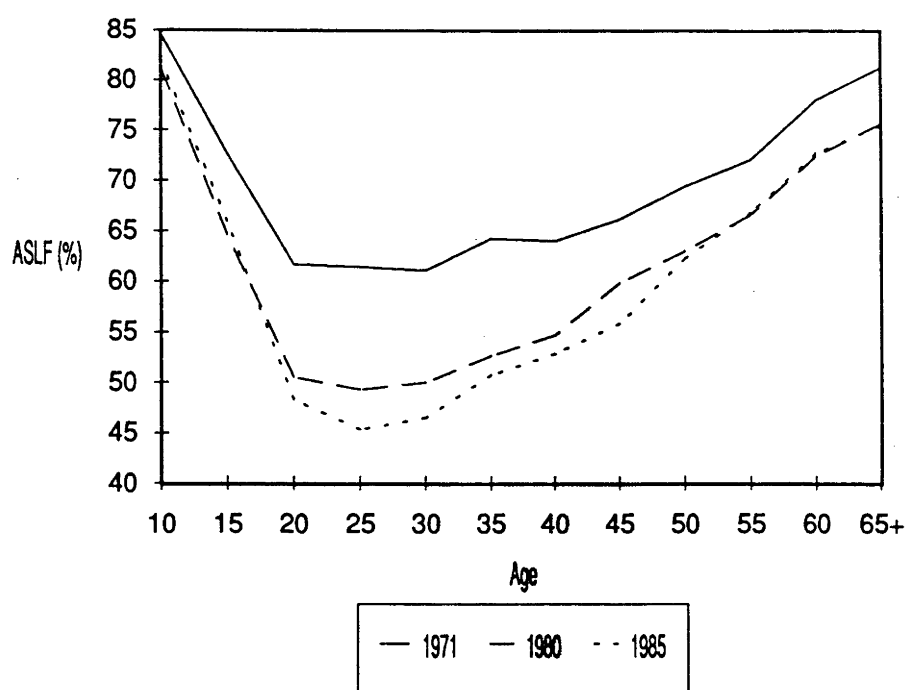
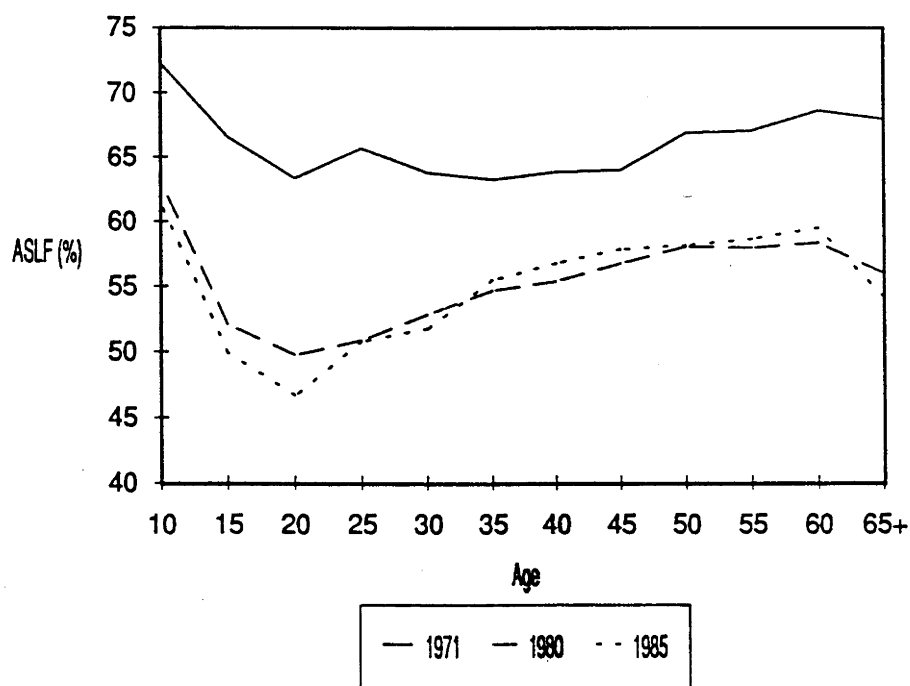


Figure 5.3
The Agricultural Share of the Labour Force, Female, Urban+Rural



We will now investigate the individual characteristics which influence the sector of employment. The analysis is based on the hypothesis that the U-curve can be attributed to the distribution of education in the labour force, which particularly affects younger age groups. The hypothesis is based on the fact that education expanded rapidly over time as discussed in section 5.3

We consider the role of education in two respects : (i) why the agricultural share of the labour force by age has a U-shape, and (ii) why the agricultural share of the labour force has declined over time.

5.3.1 Actual and Hypothetical Values of λ_a

To examine the role of education in explaining the shape of a U-curve we set up a hypothetical value of λ_a by age.

If we break down the labour force by education, we get

$$\lambda = \sum w_i p_i \quad (5.1)$$

where :

λ_a = the agricultural share of the labour force

w_i = proportion of the total labour force in education class i ,

p_i = probability that a person in education class i is in agriculture,

$i = 1 - 6$

1 = Never attended school

2 = Did not finish Primary School

3 = Primary School

4 = Junior High School

5 = Senior High School

6 = University

By applying the formula (5.1) for different age groups, we can get

$$\lambda_j = \sum w_{ji} p_{ji} \quad (5.2)$$

where :

λ_{aj} = proportion of j^{th} age group in agriculture,

w_{ji} = proportion of labour force in age group j with education i (shown in Table 5.6 for rural males, and in Table 5.9 for rural females),

p_{ji} = probability that person in age group j with education i is in agriculture (shown in Table 5.7 for rural males, and in Table 5.10 for rural females),

$j = 1-12$

1 = 10-14 years

2 = 15-19 years

3 = 20-24 years

4 = 25-29 years

5 = 30-34 years

6 = 35-39 years

7 = 40-44 years

8 = 45-49 years

9 = 50-54 years

10 = 55-59 years

11 = 60-64 years

12 = 65+ years

To estimate the importance of education in determining the U-curve, we construct a hypothetical U-curve to compare with the actual U-curve. For this hypothetical curve we assume that all values of p_{ji} are the same for each age group in a given educational category. This means that education is the main influence on λ_a for a given age group.

If this is so, the values of p in each row in a given column will be the same as the value of p for the column total. These values of p_{ji} in the bottom row are designed Π_i .

We substitute Π_i for p_{ji} in the identity (5.2) above to get a hypothetical value of λ , i.e.

$$\lambda_j^* = \sum w_{ji} \Pi_i \quad (5.3)$$

We now apply this analysis to rural males and females.

5.3.2 Rural Males

The percentage distribution of labour force for rural males by educational level is given in Table 5.6. The table shows that there is a marked difference in educational level by age. This is also indicated in the final columns on mean years of schooling. The proportion of those with no schooling (NAS) increases as age increases while the proportion of those with primary (PS) and secondary (JHS and SHS) education falls after age 24.

TABLE 5.6
PERCENTAGE DISTRIBUTION OF TOTAL LABOUR FORCE BY AGE AND EDUCATIONAL
ATTAINMENT, RURAL-MALE, 1985
(w_{ji})

	NAS	DFPS	PS	JHS	SHS	UNI	Total	MYS
10-14	4.8	62.5	32.4	0.3	0.0	0.0	100.0	3.8
15-19	5.8	31.6	50.2	11.1	1.2	0.0	100.0	5.1
20-24	7.5	33.8	38.4	10.0	9.9	0.4	100.0	5.5
25-29	9.5	37.4	36.6	7.7	8.0	0.8	100.0	5.1
30-34	11.1	38.7	33.8	8.0	7.4	1.0	100.0	4.9
35-39	13.3	38.6	33.6	6.9	6.4	1.2	100.0	4.7
40-44	18.7	39.8	29.4	5.7	5.7	0.7	100.0	4.3
45-49	24.3	41.1	24.1	5.2	4.8	0.5	100.0	3.8
50-54	33.9	44.2	17.0	2.4	2.3	0.3	100.0	2.9
55-59	37.5	42.1	16.5	2.4	1.4	0.2	100.0	2.7
60-64	44.8	38.2	14.5	1.6	0.8	0.0	100.0	2.3
65+	52.6	34.2	11.5	1.1	0.6	0.1	100.0	1.9
All Ages	17.8	38.8	31.2	6.4	5.2	0.6	100.0	4.3

Source : calculated from *Supas* 1985 (unpublished)

note: NAS: Never attended school, DFPS: Did not finish Primary School, PS: Primary School, JHS: Junior High School, SHS: Senior High School, UNI: University/Academy/Diplomas, MYS: Mean Years of Schooling.

The table also reveals that, measured by mean years of schooling, the younger people are more educated than the older. The greater mean years of schooling for younger people is due to the fact that access to education expanded rapidly only in the 1970s.

Table 5.7 shows the probability (p_{ji}) that a person is in agriculture by age and educational level for rural males in 1985.

TABLE 5.7
PERCENTAGE SHARE OF AGRICULTURAL SECTOR IN TOTAL LABOUR FORCE BY AGE AND
EDUCATIONAL ATTAINMENT, RURAL-MALE, 1985
(p_{ji})

	NAS	DFPS	PS	JHS	SHS	UNI	Total	MYS
10-14	91.4	87.0	81.3	71.9	*)	0.0	85.3	3.8
15-19	81.4	75.7	73.4	66.0	49.1	*)	73.5	5.0
20-24	79.1	68.8	61.5	54.5	31.6	10.6	61.5	4.9
25-29	80.3	68.6	61.7	42.0	15.8	7.6	60.4	4.3
30-34	79.5	70.4	62.4	44.0	15.0	6.2	61.8	4.1
35-39	81.0	73.6	65.6	43.3	13.3	4.6	65.2	3.9
40-44	85.1	75.8	64.9	38.6	10.4	2.7	68.0	3.4
45-49	83.8	76.9	66.4	38.9	8.3	3.2	70.4	3.0
50-54	85.0	78.8	66.3	38.4	13.4	3.3	76.1	2.4
55-59	85.2	80.4	73.6	50.9	20.3	38.8	79.5	2.4
60-64	87.5	82.2	73.2	70.4	46.0	42.6	82.8	2.1
65+	86.7	83.7	75.7	67.2	47.6	50.0	84.0	1.8
All Ages	83.9	75.0	66.3	48.7	18.6	6.7	68.9	3.7

Source : as for Table 5.6

note: NAS: Never attended school, DFPS: Did not finish Primary School, PS: Primary School, JHS: Junior High School, SHS: Senior High School, UNI: University/Academy/Diplomas, MYS: Mean Years of Schooling.

*) The values of probability in these cells are excluded due to extremities. This could be due to a statistical error in enumeration, or due to a small sample size in these cells.

The two tables above do show a big difference in w_{ji} by age (Table 5.6) but only a small difference in p_{ji} by age (Table 5.7) for different educational levels. However, it is not easy from the above figures to observe the relative importance of education. To see the effect of education we draw a hypothetical λ_{aj} curve using formula (5.3). The result of this calculation is shown in Table 5.8.

Figure 5.4
The Actual and Hypothetical of the Agricultural Share of the Labour force,
Rural Male, 1985

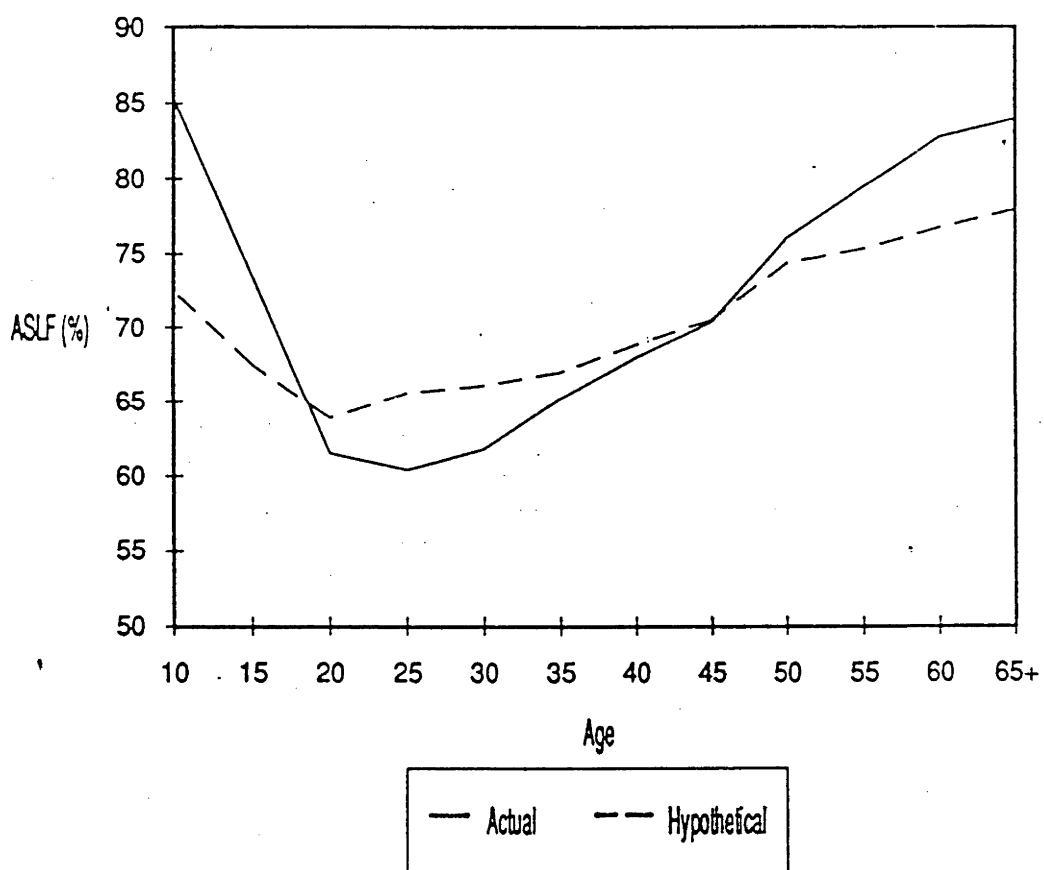


TABLE 5.8
ACTUAL AND HYPOTHETICAL λ_{aj}
RURAL-MALE, 1985

	λ_{aj} (actual)	λ_{aj}^* (hypothetical)	$\lambda_{aj}^{**} = (\lambda_{aj} - \lambda_{aj}^*)$
10-14	85.3	72.5	12.8
15-19	73.5	67.5	6.0
20-24	61.5	63.9	-2.4
25-29	60.4	65.6	-5.2
30-34	61.8	66.1	-4.3
35-39	65.2	67.0	-1.8
40-44	68.0	68.9	-0.9
45-49	70.4	70.6	-0.2
50-54	76.1	74.4	1.7
55-59	79.5	75.4	4.1
60-64	82.8	76.8	6.0
65+	84.0	78.0	6.0

Source: calculated from Table 5.6 and Table 5.7

The difference between the actual and hypothetical λ_{aj} curves is shown in Figure 5.4. If the actual and hypothetical values of λ_{aj} for each age group were equal, this would imply that the shape of the U-curve would be entirely due to education. In other words, the decline in the share of agricultural labour force by age was only determined by education. However, this is not completely correct. The values of λ_{aj}^{**} (the difference between the actual and hypothetical value of λ_{aj} as shown in Table 5.8 have both positive and negative values at different age levels, indicating that there are some other factors affecting the distribution of the agricultural share of the labour force. In addition, the different values are also due to the extreme value of p_{ji} at ages 10-14 and 15-19 which affect the Π_i value.

A positive value of λ_{aj}^{**} implies that people have a tendency to remain in agriculture in spite of their education, while a negative value of λ_{aj}^{**} implies people have an inclination to move out from agriculture. The positive values of λ_{aj}^{**} at age 10-19 in 1985 could be attributed to social factors. Relatively young people are much influenced by their parents in making decisions to separate from their family. On the other hand,

the positive values of λ_{aj}^{**} at age over 50 could have a different explanation. These people may have less opportunity, compared with young people, to find jobs outside agriculture. It seems that, realising they had little chance of finding a job elsewhere, agriculture was the last resort for them.

Those aged between 20 and 49 (especially between 20-34) have tended to move out from agriculture to an even greater extent than their educational attainment alone would suggest. This is indicated by the negative values of λ_{aj}^{**} . While the two extreme age groups (below 19 and over 55 years of age) remained in agriculture because of parental pressure or inertia, the middle age groups have moved away, influenced by education and other economic factors. Those who moved out from agriculture could be absorbed in the non-agricultural sector in rural areas or could migrate to cities. Suharso *et al.* (1976, pp.30-35) suggested that for males, the important reasons for migration were education and the search for a "better life".

5.3.3 Rural Females

A marked difference in educational level by age for the rural female labour force is shown in Table 5.9, similar to the pattern for rural males. The proportion of those with no education increases as age increases, while the proportion of those who completed primary school or more declines as age increases. Moreover, the younger are more educated than the older as measured by average years of schooling. The share of the agricultural labour force by age reaches its minimum level at age 15-24 (Table 5.10). It follows a U-curve (Figure 5.3), but one which is flatter than the U-curve for males (Figure 5.2). Contrary to rural males, it seems that the share of employment for rural females relies more on family than on individual characteristics.

Applying the formula (5.3) above for females, the hypothetical value of λ_{aj} is presented in Table 5.11. It indicates that the value of λ_{aj}^{**} is quite small. This implies that education is a very significant factor in determining the distribution of agricultural share

of the rural female labour force by age. This is demonstrated by the almost identical shapes of the hypothetical and actual U-curves (Figure 5.5). The positive value of λ_{aj}^{**} for most age groups indicates that females have a greater tendency to remain in the agricultural sector in spite of education. This is probably due to cultural factors.

The negative value of λ_{aj}^{**} of 1.3 at age 60-64 seems to be caused by the extreme values of probability (p_{ji}) for the Junior and Senior High School categories. Hence, the negative values of λ_{aj}^{**} at the end of age brackets almost certainly does not suggest a tendency for older woman to move away from agriculture. Those who do move from agriculture may migrate to cities. According to Suharso *et al.* (1976, pp. 30-35) the reasons for female migration were generally to follow parents, or spouse/relatives. However, it may also happen that some females find jobs within the rural areas in the non-agricultural sector. This employment pattern will be examined in detail in Chapter 6.

TABLE 5.9
PERCENTAGE DISTRIBUTION OF TOTAL LABOUR FORCE BY AGE AND EDUCATIONAL
ATTAINMENT, RURAL-FEMALES, 1985
(w_{ji})

	NAS	DFPS	PS	JHS	SHS	UNI	Total	MYS
10-14	7.2	58.7	33.9	0.1	0.0	0.0	100.0	3.8
15-19	10.9	35.1	45.8	7.2	1.0	0.0	100.0	4.6
20-24	14.3	39.3	32.4	5.2	8.3	0.6	100.0	4.7
25-29	19.6	42.6	28.3	3.9	4.9	0.7	100.0	4.0
30-34	23.8	42.8	25.4	3.5	4.2	0.4	100.0	3.7
35-39	34.1	40.4	19.9	2.3	2.9	0.4	100.0	3.0
40-44	48.3	34.1	13.9	1.6	1.9	0.2	100.0	2.3
45-49	58.4	30.4	9.0	1.1	1.1	0.0	100.0	1.7
50-54	69.6	23.8	5.7	0.5	0.4	0.0	100.0	1.1
55-59	74.6	20.8	4.1	0.3	0.1	0.0	100.0	0.9
60-64	80.5	16.0	3.2	0.1	0.1	0.0	100.0	0.7
65+	86.5	11.1	2.1	0.3	0.0	0.0	100.0	0.5
All Ages	36.6	35.4	21.9	2.9	2.9	0.3	100.0	3.0

Source : as for Table 5.6

note: NAS: Never attended school, DFPS: Did not finish Primary School, PS: Primary School, JHS: Junior High School, SHS: Senior High School, UNI: University/Academy/Diplomas, MYS: Mean Years of Schooling.

TABLE 5.10
PERCENTAGE SHARE OF AGRICULTURAL SECTOR IN TOTAL LABOUR FORCE BY AGE AND
EDUCATIONAL ATTAINMENT, RURAL-FEMALE, 1985
(p_{ji})

	NAS	DFPS	PS	JHS	SHS	UNI	Total	MYS
10-14	78.6	70.9	61.0	0.0	0.0	0.0	68.0	3.7
15-19	74.8	62.0	58.5	55.6	22.5	0.0	60.9	4.3
20-24	73.4	65.9	62.2	47.4	12.3	1.1	60.0	3.9
25-29	74.4	67.7	62.4	44.7	6.4	1.2	63.1	3.4
30-34	73.6	67.8	59.6	40.5	4.0	0.0	63.2	3.0
35-39	71.1	69.3	64.2	35.8	3.3	3.5	66.0	2.6
40-44	70.9	68.3	64.9	36.3	3.3	0.0	67.2	1.9
45-49	70.5	69.6	63.0	41.6	8.4	0.0	68.5	1.5
50-54	68.8	70.3	61.8	29.8	30.7	0.0	68.4	1.1
55-59	69.0	71.4	64.9	47.1	16.5	0.0	69.2	0.9
60-64	67.8	71.6	57.7	*)	*)	0.0	68.1	0.7
65+	61.6	65.1	62.7	44.2	0.0	0.0	61.9	0.5
All Ages	70.2	67.8	61.4	46.1	8.6	1.2	64.7	2.6

Source : as for Table 5.6

note: NAS: Never attended school, DFPS: Did not finish Primary School, PS: Primary School, JHS: Junior High School, SHS: Senior High School, UNI: University/Academy/Diplomas, MYS: Mean Years of Schooling.

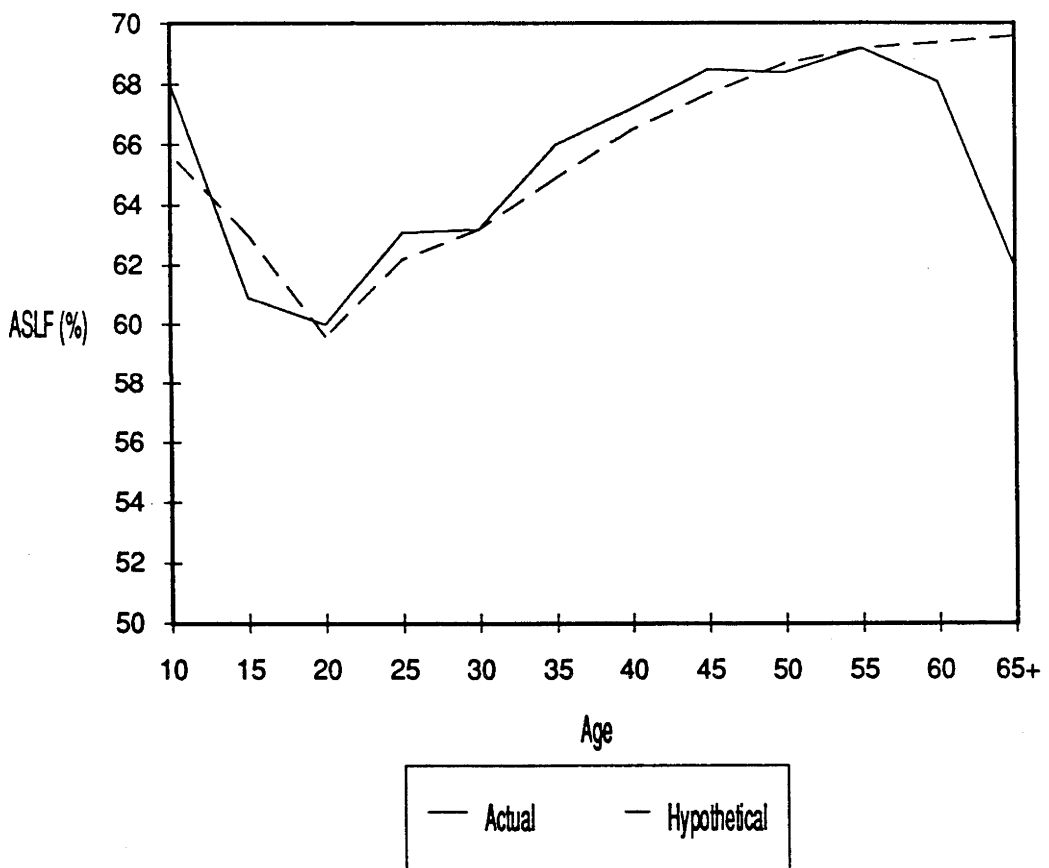
*) The values of probability in these cells are excluded due to extremities. This could be due to a statistical error in enumeration, and due to a small sample size in these cells.

TABLE 5.11
ACTUAL AND HYPOTHETICAL λ_{aj}
RURAL-FEMALE, 1985

	(λ_{aj})	(λ_{aj}^*)	$\lambda_{aj}^{**} = (\lambda_{aj} - \lambda_{aj}^*)$
10-14	68.0	65.7	2.3
15-19	60.9	63.0	-2.1
20-24	60.0	59.6	0.4
25-29	63.1	62.2	0.9
30-34	63.2	63.2	0.0
35-39	66.0	64.9	1.1
40-44	67.2	66.5	0.7
45-49	68.5	67.7	0.8
50-54	68.4	68.7	-0.3
55-59	69.2	69.2	0.0
60-64	68.1	69.4	-1.3
65+	61.9	69.6	-7.7

Source: calculated from Table 5.9 and Table 5.10.

Figure 5.5
The Actual and Hypothetical of the Agricultural Share of the Labour Force,
Rural Female, 1985



5.4 The Decline in λ_{aj}^* over time

In section 5.3.1 we used the total labour force data by educational attainment and age groups in estimating λ_{aj}^* . Unfortunately, these data are only available for 1985. Therefore, to be consistent in making a comparison of λ_{aj}^* between two years, we use the population data as a proxy for the educational attainment of the labour force.

As explained in section 5.3.1, in any one year the hypothetical value of the agricultural share of the labour force $\lambda_{aj}^* = \sum w_{ji} \Pi_i$

Therefore, the difference in λ_{aj}^* 's between two years is due to :

- (i) differences in w_{ji}
- (ii) differences in Π_i

The relative importance of these two components can be estimated in the following ways:

$$\begin{aligned} \lambda_{aj}^{*'} - \lambda_{aj}^* &= dw_{ji} \Pi_i \\ &= \sum \Pi_i dw_{ji} + \sum w'_{ji} d\Pi_i \end{aligned} \quad (5.4)$$

or

$$\begin{aligned} \lambda_{aj}^{*'} - \lambda_{aj}^* &= dw_{ji} \Pi_i \\ &= \sum w_{ji} d\Pi_i + \sum \Pi_i' dw_{ji} \end{aligned} \quad (5.5)$$

These two methods of decomposition will generally give different results. Therefore, to get a single answer, we take the average of the two results, i.e. we use the following decomposition formula :

$$dw_{ji} \Pi_i = 1/2 \sum dw_{ji} (\Pi_i + \Pi_i') + 1/2 d\Pi_i (w_{ji} + w'_{ji}) \quad (5.6)$$

due to education + due to other factors

The decomposition of the change in λ_{aj}^* between two years is shown in Table 5.12 and Table 5.13.

TABLE 5.12
FACTORS AFFECTING THE CHANGE IN λ_{aj}^* BETWEEN TWO years
RURAL-MALE AND RURAL-FEMALE

	λ_{a85}^*	λ_{a71}^*	$\lambda_{a85}^* - \lambda_{a71}^*$	Education	Due to Other Factors	Education(%)
	(1)	(2)	(3)=(1-2)	(4)	(5)	(6)=(4/3)
Rural-Male						
10-14	73.4	78.1	-4.7	-2.0	-2.7	42.9
15-19	64.4	71.7	-7.3	-7.0	-0.3	95.9
20-24	60.7	69.4	-8.7	-8.1	-0.6	93.0
25-29	65.1	72.4	-7.3	-5.8	-1.4	80.3
30-34	66.0	74.3	-8.2	-6.8	-1.5	82.2
35-39	67.1	77.2	-10.1	-8.3	-1.7	82.8
40-44	69.0	78.8	-9.8	-7.9	-1.9	80.8
45-49	70.7	79.2	-8.5	-6.6	-1.9	77.6
50-54	74.5	80.3	-5.8	-3.7	-2.1	63.0
55-59	75.3	80.4	-5.2	-3.1	-2.1	59.8
60-64	76.7	82.0	-5.3	-3.2	-2.1	59.8
65+	78.2	82.8	-4.6	-2.5	-2.1	54.0
All Ages	68.9	76.1	-7.1	-5.5	-1.6	76.9
Rural-Female						
10-14	66.5	72.6	-6.1	-0.8	-5.4	12.3
15-19	60.4	70.1	-9.7	-5.4	-4.4	55.2
20-24	59.7	70.3	-10.7	-5.8	-4.8	54.8
25-29	62.8	71.8	-9.1	-4.1	-5.0	44.8
30-34	63.6	72.7	-9.1	-4.3	-4.8	47.0
35-39	65.1	73.3	-8.3	-3.5	-4.8	41.8
40-44	66.5	73.6	-7.1	-2.5	-4.6	35.0
45-49	67.7	73.8	-6.1	-1.6	-4.5	26.0
50-54	68.7	74.0	-5.3	-0.9	-4.4	16.3
55-59	69.1	74.0	-4.9	-0.6	-4.4	11.4
60-64	69.4	74.1	-4.8	-0.5	-4.3	10.6
65+	69.7	74.2	-4.5	-0.3	-4.2	6.7
All Ages	64.7	72.4	-7.7	-3.0	-4.8	38.4

note: the values of λ_{a85}^* in this Table may not be equal to those values of λ_{a85}^* in Table 5.8 for males and Table 5.11 for females because here we are using the population data as a proxy for the educational attainment of the labour force in order to be comparable with 1971 and 1980 data.

TABLE 5.13
FACTORS AFFECTING THE CHANGE IN λ_{aj}^* BETWEEN TWO years
RURAL-MALE+FEMALE

	λ_{a85}^*	λ_{a71}^*	$\lambda_{a85}^* - \lambda_{a71}^*$	Education	Due to Other Factors	Education (%)
	(1)	(2)	(3)=(1-2)	(4)	(5)	(6)=(4/3)
10-14	71.0	76.5	-5.5	-1.4	-4.1	24.8
15-19	63.4	71.7	-8.3	-6.3	-2.0	76.0
20-24	61.7	71.3	-9.6	-6.9	-2.6	72.4
25-29	65.2	73.7	-8.5	-5.2	-3.3	61.3
30-34	65.9	75.1	-9.2	-5.9	-3.3	63.7
35-39	67.2	76.6	-9.4	-5.8	-3.6	61.7
40-44	68.8	77.6	-8.7	-4.9	-3.8	56.7
45-49	70.2	77.8	-7.6	-3.7	-3.8	49.3
50-54	72.4	78.5	-6.1	-2.0	-4.1	32.9
55-59	73.0	78.5	-5.5	-1.4	-4.1	25.8
60-64	73.7	79.3	-5.6	-1.4	-4.1	25.9
65+	74.4	79.5	-5.1	-0.9	-4.2	18.2
All Ages	67.8	75.4	-7.6	-4.2	-3.4	54.8

	λ_{a80}^*	λ_{a71}^*	$\lambda_{a80}^* - \lambda_{a71}^*$	Education	Others	Education (%)
					Factors	
10-14	69.3	76.5	-7.2	-0.5	-6.7	6.9
15-19	64.4	71.7	-7.3	-1.1	-6.2	15.1
20-24	63.5	71.3	-7.8	-1.8	-6.1	23.1
25-29	64.3	73.7	-9.4	-3.2	-6.3	34.0
30-34	65.4	75.1	-9.7	-3.4	-6.4	35.1
35-39	67.0	76.6	-9.6	-3.1	-6.5	32.3
40-44	68.5	77.6	-9.1	-2.5	-6.6	27.5
45-49	70.3	77.8	-7.5	-0.8	-6.7	10.7
50-54	71.1	78.5	-7.4	-0.7	-6.7	9.5
55-59	71.3	78.5	-7.2	-0.5	-6.7	6.9
60-64	72.1	79.3	-7.2	-0.5	-6.7	6.9
65+	72.6	79.5	-6.9	-0.1	-6.8	1.4
All Ages	67.3	75.4	-8.1	-1.7	-6.5	21.0

	λ_{a85}^*	λ_{a80}^*	$\lambda_{a85}^* - \lambda_{a80}^*$	Education	Others	Education (%)
					Factors	
10-14	71.0	69.3	1.7	-0.9	2.7	-52.9
15-19	63.4	64.4	-1.0	-4.6	3.7	460.0
20-24	61.7	63.5	-1.8	-4.8	3.0	266.7
25-29	65.2	64.3	0.9	-2.0	2.9	-222.2
30-34	65.9	65.4	0.5	-2.4	2.9	-480.0
35-39	67.2	67.0	0.2	-2.7	2.8	-1350.0
40-44	68.8	68.5	0.3	-2.4	2.8	-800.0
45-49	70.2	70.3	-0.1	-2.8	2.7	2800.0
50-54	72.4	71.1	1.3	-1.2	2.6	-92.3
55-59	73.0	71.3	1.7	-0.9	2.6	-52.9
60-64	73.7	72.1	1.6	-1.0	2.6	-62.5
65+	74.4	72.6	1.8	-0.8	2.6	-44.4
All Ages	67.8	67.3	0.5	-2.4	2.9	-480.0

Table 5.12 shows that for rural males, education explains 77 per cent of the decline in λ_{aj}^* between 1971 and 1985. For rural females, the figure was 38 per cent. In this period, education has made a great contribution to the decline in λ_{aj}^* (55 per cent for both sexes). However, the years 1971 and 1985 span two distinct economic periods. The first period, 1971-80, was characterised by rapid growth of the economy. By contrast, in the second period 1980-85, the growth of the economy was slackening. Therefore, it is interesting to examine the effect of education on the decline in λ_{aj}^* in these two different periods.

As shown by Table 5.13, between 1971 and 1980 education explained 21 per cent of the decline in λ_{aj}^* for both sexes in rural areas. This means that the decline in λ_{aj}^* was largely due to other factors. By contrast, between 1980 and 1985 λ_{aj}^* increased by 0.5 percentage points. Education had a negative effect of -2.4 percentage points on the change in λ_{aj}^* , while other factors had a positive effect. The positive contribution of other factors implies that they have caused workers to move back to the agricultural sector during the slackening of economic growth. The increase of 0.5 percentage points of λ_{aj}^* was attributed to the increase in the λ 's female from 63.7 to 64.8 per cent, while the λ 's male was constant at 68.9 per cent.

5.5 Regression Analysis

As discussed in Sections 5.3 and 5.4 the fall in the agricultural share of the labour force for both sexes, at the national level, between 1971 and 1980, and between 1980 and 1985 largely occurred in the 20-34 age groups. This section tries to quantify the relationship between the agricultural share of the labour force and the educational attainment of workers aged 20-34 at the provincial level. The proposed hypothesis is that education is negatively associated with the agricultural share of the labour force. The higher the education level the lower will be the agricultural share of the labour force. To test the hypothesis, two simple regressions (OLS) are attempted. The equations, in semi-logarithmic form can be written as follows:

$$ASLF^y_i = \alpha + \beta_1 Ln[MYS^y]_i + \mu, \quad (5.7)$$

$$ASLF^y_i = \alpha + \beta_1 Ln[MYS^y]_i + \beta_2 D[MYS^y]_{JAVA} + \mu \quad (5.8)$$

where :

$ASLF^y$ is the agricultural share of the labour force aged 20-34 for males, and aged 15-24 for females.

MYS^y is educational attainment (in mean years of schooling) of workers aged 20-34 for males, and aged 15-24 for females.

D is a dummy variable for Java (West Java, Central Java, Yogyakarta, and East Java), 1 = Java, 0 = outer islands.

α, β are coefficient parameters.

μ is an error term.

Ln is natural logarithmic.

i refers to gender, m for males and f for females.

A dummy variable for slope (Equation 5.8) is set up to see if Java is significantly different from the rest of the countries. Unfortunately the data on sectoral employment by age and education are available only for 1985 (*Supas* 1985, unpublished data sheets obtained from the Central Bureau of Statistics). Therefore, we test the effect of education only in 1985 at provincial level. The data are presented in Table A5.1 (for males and females aged 20-34) and Table A5.2 (for females aged 15-24) in the appendix. The lowest point of the agricultural share of the labour force in rural areas in 1985 was at 20-34 age groups for males (Table 5.7 and Figure 5.4), and at 15-24 age groups for females (Table 5.10 and Figure 5.5). So, we apply OLS estimates of the agricultural share of the labour force for males and females at different age groups. OLS estimates for females in the 20-34 age group are also attempted.

The results for males are presented in Table 5.14. The table shows that education is negatively associated with the agricultural share of the labour force. In Equation 5.7,

education is significant at 0.10. The results of Equation 5.8 suggest that education both in Java and outer islands significantly explains the variation in the agricultural share of the labour force. All diagnostic tests are met satisfactorily.

TABLE 5.14
OLS ESTIMATES OF THE AGRICULTURAL SHARE OF
THE LABOUR FORCE, RURAL MALES AGED 20-34, 1985

Explanatory variables	Independent Variable : ASLF	
	(Equation 5.7)	(Equation 5.8)
Constant	0.9265 (6.1342)*	0.9531 (8.5276)*
Ln[MYS]	-0.0480 (-1.7254)**	-0.0480 (-2.3331)*
D{Ln[MYS] _{JAVA} }		-0.0315 (-4.4861)*
Sample size	25	25
R-squared	0.1146	0.5376
R-bar-squared	0.0761	0.4956
F	2.9770	12.7887
Diagnostic tests:		
A.Functional Form($\chi^2, 1$)	0.0246	0.0076
B.Normality($\chi^2, 2$)	1.1300	0.7268
C.Heteroscedasticity($\chi^2, 1$)	0.0304	0.8177

Figures in brackets are t values

Level of significance : * = 0.05; ** = 0.10

A.Ramsey's RESET test using the square of the fitted values

B.Based on a test of skewness and kurtosis of residuals

C.Based on the regression of squared residuals on squared fitted values

D: Dummy for Java[West Java, Central Java, Yogyakarta, East Java]

Similar results are found for females aged 15-24 (Table 5.15). Education is a significant factor in explaining the variations of the agricultural share of the labour force. As

indicated by the coefficient of determination, the role of education for males and females is almost the same. However, when a dummy-slope for Java is included, education plays a bigger role for males compared to females. In addition, education in Java is much more significant than in outer islands. The lower coefficient of determination for females (when a dummy is included) may be, to some extent, due to the fact that decisions made by females are more influenced by parents.

TABLE 5.15
OLS ESTIMATES OF THE AGRICULTURAL SHARE OF
THE LABOUR FORCE, RURAL FEMALES AGED 15-24, 1985

Explanatory variables	Independent Variable : ASLF	
	(Equation 5.7)	(Equation 5.8)
Constant	1.0422 (5.3897)*	1.0312 (5.8059)*
Ln[MYS]	-0.2402 (-1.9174)**	-0.2157 (-1.8669)**
D{Ln[MYS] _{JAVA} }		-0.1056 (-2.2979)*
Sample size	25	25
R-squared	0.1378	0.3047
R-bar-squared	0.1003	0.2415
F	3.6764	4.8204
Diagnostic tests:		
A.Functional Form($\chi^2, 1$)	0.5874	0.7855
B.Normality($\chi^2, 2$)	2.3065	3.9792
C.Heteroscedasticity($\chi^2, 1$)	0.0737	1.0826

Figures in brackets are t values

Level of significance : * = 0.05; ** = 0.10

A.Ramsey's RESET test using the square of the fitted values

B.Based on a test of skewness and kurtosis of residuals

C.Based on the regression of squared residuals on squared fitted values

D: Dummy for Java[West Java, Central Java, Yogyakarta, East Java]

Regressions for females aged 20-34 are attempted applying Equations 5.7 and 5.8. The results, as presented in Table A5.3, are similar with those for females aged 15-24, in that education significantly influences variations in the agricultural share of the labour force both in Java and outer islands.

5.6 Summary and Conclusion

- (1) It appears that educational expansion in Indonesia has been mainly due to supply side factors, in the sense that the educational system and facilities are mostly a government responsibility at least at primary and lower secondary levels. The most rapid improvement in educational attainment after 1971 occurred at primary and secondary levels partly owing to the introduction of compulsory primary education policy in 1970s. As measured by the mean years of schooling the educational attainment of the labour force remains low but it has expanded rapidly from 2.8 to 4.8 years between 1971 and 1985.
- (2) As would be expected, males are better educated than females, and those in urban areas are better educated than in rural areas. For example, on average, the mean years of schooling of the labour force in 1985 were 7.3 for urban males, and 4.3 for rural males, and 5.6 for urban females, and 3.0 for rural females. The educational attainment of the agricultural labour force was the lowest of the three sectors examined. For example, in 1985 mean years of schooling in the A sector was 3.3 years compared to 5.0 years for the M sector and 6.3 years for the S sector.
- (3) Between 1971 and 1980, the improvement in educational attainment of the agricultural labour force was demonstrated by a decline in the share of those with primary qualifications and below. The fall in the share of those with primary education may indicate a movement of labour away from agriculture, probably for higher education or a job outside agriculture.

- (4) The distribution of the agricultural share of the labour force by age depicts a U-curve, with the lowest point at age 20-34 for both sexes in all periods under study. The sharp fall in the share of this age group between 1971 and 1980 indicated that a rapid decline in the agricultural share of the labour force occurred within the younger groups, reflecting the fact that those who moved away from agriculture were mainly youngsters. The fall during the period of the slowing economy from 1980 to 1985 was less pronounced.
- (5) The difference between the actual distribution of the agricultural share of the labour force and the hypothetical one in 1985 shows that the U-shape distribution of the agricultural share of the labour force for both sexes was largely due to education especially at the younger age groups. The U-shape distribution of the agricultural share of the labour force is more marked for males.
- (6) Using the decomposition method described in the chapter, it is found that between 1971 and 1980 education contributed 21 per cent to the total decline in the agricultural share of the labour force for both sexes. For the 20-34 age groups (both sexes), the contribution of education in this period was even higher, more than 30 per cent, and the following period, 1980-1985, the contribution of education was higher still.
- (7) Our regressions analyses reveal that education significantly affects variations in the agricultural share of the labour force in rural areas in 1985, both for males (aged 20-34) and females (aged 15-24 and aged 20-34). The association between two variables is negative and significant.

Chapter 6

Factors Underlying Regional Differences in the Agricultural Share of the Labour Force: 1971-1985

This chapter analyses the variation in the agricultural share of the labour force across regions in the years 1971, 1980 and 1985. The first section of the chapter presents data regional variations in the agricultural share of the labour force. The second section elucidates variables considered significant in determining these variations. The third section quantifies the association between the agricultural share of the labour force and the determined variables in the form of regression analysis, followed by conclusion in the fourth section.

6.1 Differences in the Agricultural Share of the Labour Force

In general, the agricultural share of the labour force (hereafter called ASLF) has tended to be lower in Java and to be higher outside Java in the years 1971, 1980 and 1985. Also there was a consistent tendency that outside Java (except in Bali, West and East Nusa Tenggara, and Southeast Sulawesi) the agricultural share of female workers was higher than that of males. This may indicate that mobility of female workers in those provinces was higher than that in other provinces. However, distribution of the ASLF either by location (urban and rural) or by sex (male and female) varies widely across regions.

In 1985, the ASLF was very low in West Java and East Kalimantan in urban+rural areas for both sexes (Table 6.1) and for males (Table A6.1 appendix). This indicates that the non-agricultural sector provided more employment opportunities in these provinces than in other provinces. The fact that several *kabupaten* in West Java are on the fringe area of Jakarta has allowed people to seek jobs in the capital city. Economic expansion

and major improvements in public transport have greatly increased the number of commuters from West Java (Hugo, 1977, pp. 58-62). Agriculture as the major source of household income declined as they had found a niche in the urban economy in white collar and professional occupations, manufacturing and service work (Manning, 1987, pp. 66-68).

East Kalimantan, a resource-rich province, provided many employment opportunities in urban areas, especially for males, and showed a corresponding low share in agriculture. About half of all foreign investment has been in agriculture, almost all of it is in forestry (Pangestu, 1989).

The female ASLF, in 1985, in urban plus rural areas was low in Java, Bali, West Nusa Tenggara, North Sulawesi and South Sulawesi. Many were absorbed in trade sector. In Central Java this sector contributed 27.3 per cent to total female employment. In Yogyakarta, East Java and Bali it provided 20.6 per cent, 25.4 percent and 22.1 percent of total employment respectively. Manufacturing industry provided only a modest share.

The pattern of variation in the female ASLF in rural areas in 1985 was the same as that in urban+rural areas (Table A6.1 in the appendix). However, for males it was slightly different. In East Kalimantan, the male ASLF in rural areas was much higher (68.3 per cent) compared to that in urban plus rural areas (44.7) as a large share of the non-agricultural labour force was obviously absorbed in urban areas. Of the total employment in non-agriculture, around 65 percent was absorbed in urban areas compared to 39 per cent in West Java and 46 per cent at the national level (Supas, 1985, Seri No.5: Table 45.1 and Table 45.4). The percentage of the employed living in urban areas in East Kalimantan was higher than any other province.

In 1980 the differences in the ASLF had the same pattern as in 1985, being low in West Java and East Kalimantan for both sexes in urban+rural areas (Table 6.1).

TABLE 6.1
THE AGRICULTURAL SHARE OF THE LABOUR FORCE,
MALE+FEMALE, 1971-85

	Urban+Rural			Rural		
	1971	1980	1985	1971	1980	1985
<i>Java+Bali</i>						
Yogyakarta	56.7	53.1	52.0	63.7	61.9	62.2
West Java	61.1	48.2	46.8	67.2	56.8	58.3
Central Java	63.6	54.6	50.9	69.4	63.1	62.0
East Java	68.3	56.8	54.9	76.3	65.7	65.2
Bali	69.2	51.0	52.4	74.2	56.6	59.3
<i>Outer Island</i>						
East Kalimantan	65.8	49.2	47.6	86.1	70.8	69.4
North Sulawesi	68.2	55.8	58.0	77.8	64.2	67.6
South Sulawesi	68.8	59.6	59.5	77.8	69.7	69.7
West Nusa Tenggara	69.1	54.4	58.5	72.1	59.3	64.8
Riau	69.5	60.1	59.7	76.9	73.4	75.1
South Kalimantan	71.0	60.3	58.9	84.3	71.4	69.7
West Sumatra	71.5	62.4	62.3	78.3	68.0	69.4
South Sumatra	71.5	65.4	64.2	85.0	79.6	79.2
North Sumatra	75.5	67.3	62.9	84.1	80.1	79.2
Aceh	78.4	71.0	68.0	82.7	75.5	72.3
Jambi	78.7	71.5	68.0	89.4	77.5	76.4
Central Sulawesi	79.1	71.8	72.0	81.2	76.7	76.6
Maluku	79.8	71.5	70.3	87.1	77.4	77.3
Lampung	82.3	76.1	74.0	87.2	82.4	80.8
Central Kalimantan	83.0	73.8	67.5	88.2	78.9	74.3
East Nusa Tenggara	85.2	77.1	82.1	87.1	80.6	86.4
Southeast Sulawesi	85.2	70.4	70.7	87.6	76.2	75.3
Bengkulu	87.4	81.2	76.5	93.0	86.0	82.5
West Kalimantan	88.3	80.3	76.6	92.8	89.0	86.1
Irian Jaya	--	74.8	75.0	--	85.4	87.3

Source : Indonesian Population Censuses of 1971 (Seri D) and 1980 (Seri S, No.2); and *Supas* 1985, No.5.

note :-- excluded from calculation as the agricultural labour force data are available for urban areas only.

Likewise, for males, both in urban+rural areas, and rural areas (Table A6.2 appendix). Apart from Java, in rural areas of Bali and West Nusa Tenggara the ASLF for both sexes was low compared with other regions. This was due to a low share of females.

In 1971 the pattern was slightly different. In this period, in the beginning of economic recovery, the non-agricultural sector had not yet offered many employment opportunities. The ASLF was high in all regions except in Yogyakarta which experienced the lowest share for both sexes in urban and rural areas (Table 6.1 and Table A6.3 appendix). A higher participation in trade and small-scale manufacturing may in part have been responsible for the low ASLF.

6.2 Factors Affecting Differences in the Agricultural Share of The Labour Force

As discussed in Chapter 3, income per capita does not explain regional variations in the ASLF in the years under study. This finding is different from the general pattern of the negative and significant association between income per capita and the ASLF in the cross country studies of Kuznets (1959, 1982), Chenery and Syrquin (1975), and Adelman and Morris (1984). Hence, this chapter tries to investigate other explanatory variables which are relevant to the situation in Indonesia. Several factors which could be closely associated with regional differences in the ASLF are labour productivity per worker in agriculture and non-agriculture, landlessness, distribution of land, mechanisation, and education. The associations of those variables are explained in the following sub-section.

6.2.1 Productivity of Labour

One explanation for the pattern of variation in the ASLF across regions can be sought through productivity of labour per worker in agriculture. This supply-side explanation may be set out as follows. As the productivity of the agricultural worker increases due to technological progress, the labour needed to produce sufficient food for an entire society is less. Labour will be released from agriculture to non-agricultural occupations,

hence the proportion of labour engaged in agriculture to total labour force declines (Clark, 1957, p. 491; Booth and Sundrum, 1984, p. 36). Thus, higher labour productivity in agriculture relative to other sectors will tend to push people out of agriculture to non-agriculture. A region with a low share of its labour force in agriculture should have higher relative labour productivity in agriculture.

On the other hand, an increase in the productivity of labour in non-agricultural occupations will tend to lead to higher incomes, which in turn will pull people into the non-agricultural sector. As a result, the proportion of labour engaged in the non-agricultural sectors increases when labour productivity outside agriculture is higher. So, it may be hypothesized that agricultural and non-agricultural labour productivity per worker are both negatively associated with the ASLF. The higher labour productivity per worker in both sectors the lower the ASLF.

Table 6.2 shows that the variation in the relative productivity of labour (agriculture and non-agriculture) across regions seems to be the same in 1980 and 1985, as shown by the coefficients of variation of 0.62 and 0.63 respectively. Excluding Irian Jaya, average labour productivity in agriculture relative to non-agriculture for Indonesia was 0.41 (with coefficient of variation of 0.58) in 1980, and 0.31 (with coefficient of variation of 0.58) in 1985. A lower coefficient of variation of relative labour productivity in 1971 (0.46) can be attributed to the fact that oil production was at that time concentrated mainly in Riau. The expansion of oil and gas extraction in Aceh and East Kalimantan led to higher variations in the relative labour productivity in 1980 and 1985.

In the resource-rich regions - Aceh, Riau, East Kalimantan, and Irian Jaya - where RGDP largely originated from the non-agricultural sector, the relative labour productivity was very low in 1980 and 1985.

Variations in labour productivity in the agricultural sector can further be examined by the use of two productivity measures, viz. output per unit of land and land per unit of labour.

TABLE 6.2
RELATIVE PRODUCTIVITY OF LABOUR IN AGRICULTURE (Q_a) TO
NON-AGRICULTURE (Q_b),
AT CURRENT PRICES, 1971-85

	1971	1980	1985
<i>Java+Bali</i>			
Yogyakarta	0.44	0.64	0.33
East Java	0.46	0.46	0.37
West Java	0.47	0.38	0.29
Bali	0.57	0.78	0.75
Central Java	0.58	0.58	0.48
<i>Outer Islands</i>			
Riau	0.03	0.02	0.04
South Sumatra	0.14	0.15	0.11
Southeast Sulawesi	0.15	0.36	0.33
West Kalimantan	0.18	0.18	0.15
Central Kalimantan	0.18	0.28	0.23
North Sumatra	0.19	0.28	0.27
Bengkulu	0.19	0.27	0.29
Lampung	0.27	0.39	0.26
Jambi	0.28	0.39	0.27
East Kalimantan	0.30	0.12	0.06
South Kalimantan	0.35	0.42	0.32
East Nusa Tenggara	0.37	0.48	0.26
North Sulawesi	0.39	0.74	0.35
West Sumatra	0.40	0.29	0.28
Aceh	0.44	0.07	0.08
Central Sulawesi	0.52	0.38	0.29
South Sulawesi	0.54	0.67	0.56
Maluku	0.54	0.46	0.30
West Nusa Tenggara	0.64	1.01	0.82
Irian Jaya	-	0.07	0.09
Average for Indonesia	0.36	0.40	0.30
		(0.41)	(0.31)
Coefficient of Variation	0.46	0.62	0.63
		(0.58)	(0.58)

Source : Calculated from :

1971 : Regional Income in Indonesia by Province 1971-1977, LYR80-84: Table II.1; and Indonesian Population Census of 1971 : Table 44 and Table 44a.

1980 : Provincial Income in Indonesia, 1979-84, Part II, 04400.8801: Table 1-26; and Indonesian Population Census of 1980 (Seri S, No.2): Table 45.9.

1985 : Provincial Income in Indonesia, 1983-86, Part II, 04440.8901: Table 1-26; and *Supas* 1985, No.5 : Table 45.9.

note : Figures in brackets are excluding Irian Jaya.

The measures may be written using the following identity,

$$\frac{Y_a}{L_a} = \frac{Y_a}{A} \cdot \frac{A}{L_a}$$

where : Y_a is agricultural income, L_a is agricultural employment and A is agricultural land.

The productivity of labour in agriculture in 1985 across regions varies as is shown in Table 6.3. However, variations are much less than in non-agriculture. To illustrate, the coefficient of variation of labour productivity per worker in agriculture is 0.37 compared to 1.38 in non-agriculture. The table shows that Java and some other provinces experienced relatively low agricultural labour productivity. The low productivity in Java, Lampung and West Nusa Tenggara can be mainly attributed to the low land-man ratio (Table 6.4). The scope for extensification of agricultural area in those provinces has been limited, and population pressure appears to have been the main factor responsible for the low productivity per worker. Net *sawah* area has actually contracted over period 1978-86 in Java (except West Java) and Bali (ILO, 1989, Table 3.2, pp. 27). In addition, of the total agricultural labour around 55 per cent was located in Java (*Supas* 1985, Table 45.9, pp. 251), while the proportion of the total arable land utilised was only 24 per cent (Statistical Yearbook of Indonesia, 1988, Table 5.1.1.a, pp. 208-209)¹). However, we have to bear in mind the fact that a large part of agricultural households' income in Java accrues from non-agricultural activities (Table 6.5). Table 6.5 shows that, in 1984, on average, 49.5 per cent of the total income of agricultural households in Java and Bali was derived from non-farm activities, compared with 38.5 per cent in the outer islands.

On the other hand, land productivity in these provinces appeared to be very high. Intensive agricultural technology developed over many decades has been a major contribution to high land productivity. Extensive use of HYVs and fertilizer gave rise to

1) Arable land includes wet land, estates, house compound and surroundings, bareland/garden/shifting cultivation, and steppe pastures.

rapid growth in output per hectare of food production. The proportion of land using improved seeds, participating in the official 'intensification' program, and applying fertilizer on wet rice land has tended to be much higher on Java and Bali (ILO, 1989, pp. 30-32). In addition, better irrigation was another cause of high land productivity as it facilitated the use of HYVs.

Outside Java, Sumatra in part, Kalimantan and South Sulawesi all experienced higher agricultural labour productivity. This can mainly be attributed to area extensification (Table 6.4). Net *sawah* area has grown rapidly between 1978 and 1986 except in Jambi, East Kalimantan and South Sulawesi, and growth in output has been due to area expansion (ILO, 1989, pp. 27-29). Of the total arable land, 33 per cent was located in Sumatra, 17 per cent in Kalimantan, and 13 per cent in Sulawesi (Statistical Yearbook of Indonesia, 1988, Table 5.1.1.a, pp. 208-209), while the proportion of agricultural labour situated in those provinces was 23 per cent, 6 per cent and 7 per cent respectively (*Supas* 1985, Table 45.9, p. 251).

It is worth noting that there are three provinces outside Java, East Kalimantan, Bali and Aceh, which show remarkably high agricultural labour productivity. In East Kalimantan this can mainly be attributed to the forestry sector. In 1985, it contributed 54.4 per cent to total agricultural RGDP compared to only 21 per cent from food production. The technology used in forestry is much more capital intensive than in food production, which caused the land per worker to be high. The land utilized for *sawah* was only 11 per cent while dry land accounted for 51 per cent of the total land utilization. A similar case occurred in Aceh. There, estates have contributed 22.7 per cent to agricultural RGDP and food production 39.8 per cent. Production of coffee increased rapidly in the 1970s resulting from favourable international prices, and a massive increase in palm-oil production has occurred since 1971 (Dawood and Sjafrizal, 1989, pp. 117-120). When estate agriculture and forestry were excluded, agricultural labour productivity per

worker in East Kalimantan dropped by more than half to Rp.572 thousand, and in Aceh it fell from Rp.1,046 to Rp. 562 thousands (Table 6.3).

TABLE 6.3
PRODUCTIVITY OF LABOUR IN AGRICULTURE (Q_a) AND
NON-AGRICULTURE (Q_b) AT CURRENT PRICE (Rp.'000),
1985

	Agriculture				Non-Agriculture	
	Q_a	Index	Q_a^*	Index	Q_b	Index
<i>Java+Bali</i>						
Yogyakarta	358	61	320	68	1090	46
Central Java	525	89	434	92	1102	47
East Java	589	100	514	109	1614	69
West Java	605	102	543	115	2097	89
Bali	1004	170	958	202	1333	57
<i>Outer Islands</i>						
East Nusa Tenggara	331	56	297	63	1271	54
Lampung	353	60	234	49	1337	57
West Kalimantan	406	69	268	57	2796	119
Irian Jaya	498	84	454	96	5624	239
Central Sulawesi	502	85	300	63	1756	77
South Sumatra	526	89	279	59	4781	203
Southeast Sulawesi	549	93	410	87	1678	71
North Sulawesi	557	94	407	86	1592	68
Bengkulu	560	95	350	74	1947	83
West Nusa Tenggara	616	104	564	119	755	32
Jambi	621	105	430	91	2258	96
West Sumatra	628	106	524	111	2237	95
South Kalimantan	629	107	538	114	1940	82
North Sumatra	660	112	443	94	2453	104
Central Kalimantan	687	116	427	90	2991	127
Riau	704	119	520	110	19145	814
Maluku	706	119	333	70	2379	101
South Sulawesi	876	148	805	170	1562	66
Aceh	1046	177	652	138	12447	529
East Kalimantan	1399	237	562	119	22361	950
All Provinces	591	100	474	100	2353	100
Coefficient of variation	0.37		0.36		1.38	

Source : Calculated from Provincial Income in Indonesia 1983-1986, Part II : Table 1-Table 26, and Supas 1985: Table 45.9.

Note : * excluding Estate and Forestry from GDP data.

For comparison, labour productivity and land productivity data in 1980 are presented in Tables A6.4 and A6.5 in the appendices.

TABLE 6.4
LAND PRODUCTIVITY AND LAND-MAN RATIO,
1985

	Y/Land (Rp.'000/Ha)	Land/ALF (Ha/person)	Index(Ind=100)	
			Y/Land	Land/ALF
<i>Java+Bali</i>				
Yogyakarta	959	0.37	174	35
West Java	982	0.62	179	57
Central Java	1233	0.43	224	40
East Java	1426	0.41	259	38
Bali	1746	0.58	318	54
<i>Outer Islands</i>				
West Kalimantan	121	3.37	22	313
Central Kalimantan	154	4.45	28	414
Riau	180	3.90	33	363
Maluku	185	3.82	34	355
Jambi	205	3.03	37	282
Southeast Sulawesi	205	2.67	37	249
Irian Jaya	207	2.41	38	224
East Nusa Tenggara	249	1.33	45	124
Central Sulawesi	255	1.97	46	183
South Kalimantan	285	2.21	52	206
South Sumatra	313	1.68	57	157
North Sulawesi	322	1.73	59	161
Lampung	398	0.89	72	83
East Kalimantan	432	3.24	79	301
Bengkulu	448	1.25	82	116
South Sulawesi	471	1.86	86	173
North Sumatra	521	1.27	95	118
West Sumatra	545	1.15	99	107
Aceh	572	1.83	104	170
West Nusa Tenggara	773	0.80	141	74
All Provinces	550	1.07	100	100

Source : Provincial Income in Indonesia 1983-86, Part II, Table 1-26: Y refers to Agricultural RGDP at current prices:

Supas 1985, No.2, Table 45.9: ALF refers to the number of workers employed in the agricultural sector.

Statistical Yearbook of Indonesia, 1988, Table 5.1.1.a., pp.208-209: Land includes *sawah* (wet land), estates, housecompounds and surroundings, bareland/garden/shifting cultivation and steppe pasture (Ha).

Note: ALF = Agricultural labour force.

TABLE 6.5
PERCENTAGE BREAKDOWN OF AVERAGE INCOME OF AGRICULTURAL
HOUSEHOLD BY PROVINCE AND SOURCES, 1983

	Farm Income	Non-Farm Income	Total
<i>Java and Bali</i>	<i>50.5</i>	<i>49.5</i>	<i>100</i>
West Java	41.6	58.4	100
Yogyakarta	42.5	57.5	100
Central Java	50.4	49.6	100
East Java	58.0	42.0	100
Bali	58.9	41.1	100
<i>Outer Islands</i>	<i>61.5</i>	<i>38.5</i>	<i>100</i>
South Kalimantan	32.6	67.4	100
West Sumatra	51.8	48.2	100
North Sumatra	55.2	44.8	100
North Sulawesi	56.3	43.7	100
Riau	57.1	42.9	100
Central Sulawesi	57.5	42.5	100
Aceh	60.3	39.7	100
Central Kalimantan	60.4	39.6	100
Southeast Sulawesi	60.8	39.2	100
East Kalimantan	61.3	38.7	100
West Nusa Tenggara	62.7	37.3	100
Lampung	63.1	36.9	100
West Kalimantan	63.7	36.3	100
South Sulawesi	65.3	34.7	100
South Sumatra	66.7	33.3	100
Maluku	66.8	33.2	100
Bengkulu	69.1	30.9	100
Jambi	69.2	30.8	100
East Nusa Tenggara	72.6	27.4	100
Irian Jaya	73.8	26.2	100
Indonesia as a whole	55.0	45.0	100
Average	59.1	40.9	100
Coefficient of variation	0.16	0.24	

Source: Calculated from Agricultural Census, 1983, Seri I : Table 9, p.14.

The coefficients of variation show that provincial variations of agricultural labour productivity drop slightly from 0.37 (including estate and forestry) to 0.36 (excluding estate and forestry). A high agricultural labour productivity in South Sulawesi was partly due to fishery which contributed 20 per cent to provincial agricultural income. On the other hand, in Bali high labour productivity can be primarily attributed to high land productivity. It was mainly due to adoption of high yielding varieties (HYV) and a large fertilizer input (ILO, 1989, Table 3.6, p. 32, Jayasuriya and Nehen, 1989, pp. 336-7). The water management organization, the so-called *Subak* that is entrenched in the Balinese way of life, has facilitated a rapid diffusion of HYVs. This water management system is much more advanced than in almost any other region in Indonesia (Bendesa and Sukarsa, 1980, p. 40).

In the non-agricultural sectors two productivity measures may be used to examine variations in labour productivity, that is output per unit of capital and capital per unit of labour. This identity can be written as follows,

$$\frac{Y_b}{L_b} = \frac{Y_b}{K} \cdot \frac{K}{L_b}$$

where : Y_b is non-agricultural income, L_b is non-agricultural employment and K is capital.

Unfortunately, data on capital stock by sector and province are not available. Nevertheless, as a matter of conjecture, the high labour productivity in a resource-rich province such as Aceh, Riau, East Kalimantan or Irian Jaya was mainly due to high capital per unit of labour, especially in sectors such as mining and forestry. In 1971, Aceh and East Kalimantan did not exhibit low relative productivity as labour productivity in non-agriculture was also low (Table 6.2 and A6.6 appendix). In Aceh, LNG was just discovered in 1971 and a massive exploitation process subsequently developed (Dawood and Sjafrizal, 1989, pp. 115). In East Kalimantan, even though crude oil was discovered a long time ago, around the turn of the century, its share rose

dramatically only after 1973. Its export increased rapidly to reach its peak level in 1978 combined with world-oil-price increases. This was followed by huge expansion of gas in 1983 (Pangestu, 1989, pp.156-162).

6.2.2 Landlessness

The second factor which is considered to affect the ASLF is landlessness, that is the proportion of agricultural households who did not own land. It may be hypothesized that landlessness is negatively associated with the ASLF. Therefore, the ASLF tends to be lower in a region with a higher proportion of agricultural households who did not own land. In Indonesia the problem of agricultural land is pressing especially in Java where area extensification is almost impossible. The pressure of population on land has led to very low ratios of agricultural land per unit of labour (Table 6.4). This was also reflected in the high proportion of agricultural households who did not own land (Table 6.6). Landlessness was high in densely populated areas, such as Java except Yogyakarta, Bali and West Nusa Tenggara. This fact may have pushed people out of agriculture. The low degree of landlessness found in Bali could be associated with cultural factors. Land, as in other most provinces, may be a status symbol. However, in Bali, land is regarded as part of the way of life, and people believe that at last they will come back to their own village and to their own land. In addition, having a piece of land means maintaining a relationship with the village community through activities such as the *subak* organisation (traditional water-organisation). In West Nusa Tenggara, the low landlessness, to a lesser extent, may be associated with the fact that many Balinese live in the western part of West Nusa Tenggara. However, this argument needs to be supported with information on landlessness among Balinese which unfortunately is not available.

6.2.3 Distribution of Land

The third factor that may influence the ASLF is the distribution of cultivated land. The proposed hypothesis is that the land distribution is negatively associated with the ASLF,

that is the more unequal the land distribution, the lower the ASLF. This hypothesis is based on the alleged inverse relationship between farm size and labour use per acre. As argued by Sen (1962, pp.243-45, 1975, pp. 147), the total amount of labour per acre is inversely correlated with the size of the farm, and productivity per acre decreases with the size of holding. This argument is attributed to a family labour-based explanation, as follows :

"in a situation of wide-spread unemployment, the opportunity cost of labour to a family-based farm is very low, but for various reasons, the wage rate does not go down below a certain level, considerably higher than the opportunity cost. As a consequence the family-based farmer applies labour more liberally with less restraint than the wage-based farmer, and this naturally leads to a higher productivity per acre of the small farms because these are mostly family farms rather than wage-based ones" (Sen, 1964, pp.323).

Another reason for the higher productivity in smaller farms is that a unit of family labour perhaps does more or better work than a unit of hired labour (Khusro, 1964, pp.54-63) and intensity of cultivation in the smaller farms is generally higher than on the larger farms (Saini, 1971, pp. 79-85; Rao as cited in Ahmed, 1981, p.74).

Using the 1973 Indonesian Agricultural Census data, Abey *et al.* (1983, pp. 47-50) found that labour input in terms of numbers of persons per hectare declines with increasing farm size. According to them, this inverse relationship is attributed to several factors. Firstly, that the quality of land in the smaller farms may be more fertile, and better irrigated, thus allowing more cropping intensity with more labour intensive crops. In addition, the smaller farms have a tendency to possess a greater proportion of *sawah* than larger farms which is usually more fertile and better irrigated, and hence more intensively cultivated. Also, the smallest holdings contain a high proportion of house gardens which can be very intensively cultivated. Secondly, the rate of use of

family labour depends on family size, and a large part of the total agricultural labour are family workers (about 80 per cent). As the increase in the number of family workers by farm size, from the lowest to the largest size, is quite small, there will be a decline in the family labour input per hectare as farm size increases. Keuning (1984, pp. 59-66), using the 1975 Indonesian Agricultural Survey (*Survey Pertanian*), found a tendency for yields of *padi sawah* per hectare to vary inversely by holding size, and food crops are generally much less frequently harvested on larger land holdings.

The distribution of cultivated land in Indonesia in 1983, as indicated by Gini coefficients in Table 6.5, is quite high (0.4757 on average). According to an ILO report (1989, pp. 74), for the country as whole, 68 per cent of households control holdings of less than one hectare but these holdings only account for 26.2 per cent of total land. This indicates that a large proportion of the agricultural labour force is concentrated in smallest holdings by size.

6.2.4 Mechanisation

The fourth factor that may explain the regional variations in the ASLF is mechanisation in the agricultural sector. The hypothesis concerning mechanisation is that agricultural mechanisation is negatively associated with the ASLF. Thus, more intensive mechanisation in agriculture tends to lower the ASLF.

According to Hayami and Ruttan (1985, pp. 76-79), agricultural mechanisation has different characteristics from industrial mechanisation, even though it reflects the same response to changing factor prices in that machinery is adopted as a response to the scarcity of labour. They argue that mobility is a characteristic of mechanisation in agriculture in the sense that the machine must be able to move across areas under operation. And the machine must be specialized in that it must be adapted to perform special operations for a short time in a year such as land preparation, planting, weed control and harvesting.

TABLE 6.6
INCIDENCE OF POVERTY, MECHANISATION, DISTRIBUTION OF LAND, AND LANDLESSNESS,

	% of Rural population below Poverty line 1984 ¹⁾	Number of tractors/1000 agricultural workers 1983 ²⁾	GINI coefficient of land distribution 1983 ³⁾	% of Agric. Households not Owning Land 1985 ⁴⁾
<i>Java+Bali</i>				
West Java	18.26	1.212	0.5413	28.90
Yogyakarta	23.53	0.120	0.5169	8.40
East Java	30.81	0.317	0.5068	25.00
Central Java	37.27	0.275	0.4767	22.30
Bali	39.13	0.803	0.4777	18.20
<i>OuterIslands</i>				
Jambi	4.83	0.145	0.4713	8.80
Aceh	4.97	0.954	0.4748	10.70
Riau	6.38	0.057	0.4858	13.10
Bengkulu	7.48	0.125	0.4190	6.70
West Sumatra	7.78	0.282	0.4352	16.50
North Sumatra	11.03	0.449	0.4850	21.80
South Kalimantan	11.57	0.484	0.4696	13.80
West Kalimantan	13.94	0.097	0.5341	11.00
South Sumatra	16.84	0.121	0.4398	8.90
North Sulawesi	25.91	0.572	0.5008	14.20
West Nusa Tenggara	32.99	0.169	0.5332	22.90
Southeast Sulawesi	33.30	0.285	0.4452	5.80
Central Kalimantan	33.78	0.143	0.4973	8.40
South Sulawesi	36.33	1.125	0.4623	14.70
Irian Jaya	39.87	0.175	0.5657	7.20
Maluku	45.25	0.042	0.4752	8.00
Central Sulawesi	49.84	0.811	0.4187	4.80
East Kalimantan	52.43	0.267	0.4262	14.00
East Nusa Tenggara	57.05	0.219	0.4413	3.90
Lampung	61.89	0.106	0.4190	13.00
Average for Indonesia	28.10	0.374	0.4757	13.24
Coefficient of variation	0.62	0.92	0.09	0.51

Source :

- 1) Calculated from Statistical Yearbook of Indonesia, 1986: Table 10.2.10, and Minimum Physical Needs Index prepared by the Department of Labour. The incidence of poverty is measured in terms of minimum physical needs for a family.
- 2) Calculated from Indonesian Agricultural Census 1983, Series 2: Table 25; and *Supas* 1985: Table 45.9 (Tractors for land processing comprising two and three wheels).
- 3) ILO, 1989: Table 4.1. Data refer to land cultivated by food crops, livestock and inland fishery households.
- 4) Calculated from *Supas* 1985: Table 58.3. An agricultural household was defined as one where at least one household member was engaged in agricultural work.

In this study, agricultural mechanisation is defined as the number of tractors utilized in agriculture for land processing, comprising of two and three wheel tractors in 1983. This type of labour-saving technology has a negative impact on the use of labour in agriculture (Birowo, 1975, Lingard and Bagyo, 1983, pp. 53-57).

The first impact is to displace labour which could cause a decline in the ASLF. The second impact is to reduce labour costs which results in an increase in labour productivity. This is likely to reinforce the decline in the ASLF. Thus, mechanisation has a tendency to push people out of agriculture. Sinaga (1978, pp. 102-111) in his study of the implication of agricultural mechanisation for employment and income distribution in Indramayu, West Java, found that the introduction of one tractor in normal use replaces 2210 mandays of human labour per year if replacing cultivation by hoe; or 650 mandays per year if replacing a combination of plough and hoe. The use of machinery related to agricultural product (mainly paddy) per worker varies markedly across regions (Table 6.6). The highest ratio was in South Kalimantan, followed by South Sulawesi and West Sumatra, while the lowest figure occurred in Maluku, Irian Jaya and East Nusa Tenggara.

In West Java and South Sulawesi in 1979-81, as in other developing countries, the impact of mechanisation on yields and cropping intensity was not significant (Jayasurya et al., 1986, pp. 327-335). According to Collier et al. (1982, pp. 84-86) mechanisation was also induced by acceleration of rural development facilitated by the improved rural transport which has made it possible for agricultural labourers in rural areas to travel to cities. As a result, labour shortages occurred in some densely populated areas. This in turn has tended to accelerate mechanization of rice farms such as the use of tractors, threshers and hullers. The operation of rice hullers in place of hand pounding has released a substantial portion of female hired labour in Java (Collier, 1979). It may be argued that huller activity is located in the non-agricultural sector. A contraction in employment due to agricultural mechanisation may, to some extent, be offset by an additional employment engaged in huller activities. For example, in Rowosari village

the large number of rice hullers created additional employment (Kasryno in Shand, 1988, pp. 294). If huller activity is non-agricultural, rice hullers should not be taken into consideration as agricultural mechanisation. Compared with other Asian countries, agricultural mechanisation in Indonesia is very low (Booth, 1988, pp. 181-85).

6.2.5 Educational Attainment

The fifth factor that responsible for the regional differences in the ASLF is education. As expounded in Chapter 5, education has apparently contributed to the decline in the ASLF in the period under study. It has been demonstrated that education directly affects the change in the ASLF. An increase in education, in average years of schooling, has tended to lessen the ASLF in the younger and better educated age groups. However, this study will argue that education may also affect the ASLF indirectly through labour productivity. As the educational attainment of labour increases, labour productivity increases, and hence the ASLF may decline for the reasons discussed in 6.2.1. In this study, education is treated as an indirect variable which is positively associated with labour productivity, and as a direct variable which is negatively associated with the ASLF.

The educational attainment of the labour force in terms of average years of schooling by province in the years 1985, 1980 and 1971 is shown in Table A6.7 to A6.9 in the appendices. The patterns are similar, in that urban workers were more educated than rural, and male workers were enjoying higher education than females. It appears that a higher educational level occurred in Northern Sumatra, South Sumatra, Sulawesi and in the resource-rich provinces. This may indicate that the estate sector in those provinces absorbed more educated people. In the resource-rich provinces, well educated people were needed to operate the more advanced technology. This suggests that better educated people migrated to those provinces.

6.2.6 Poverty

In addition to variables explained above, poverty may be considered an important variable closely associated with the ASLF. However, unlike previous factors, the causality between the two variables could be reversed in that the ASLF could determine the incidence of poverty rather than vice versa. This implies that the more people are engaged in agriculture, the higher the level of poverty will be. On this basis, the incidence of poverty will tend to be high in a region with a high ASLF.

In this study, the poverty line is defined as the minimum physical needs required by a family. These comprise a basket of goods and services, which includes 17 food items, fuel, rental (for a 'modest' house), basic kitchen utensils and furnishings, clothing and a markup of 12.5 per cent for transport, health and education charges, and recreational activities (Booth, 1988b)²). The proposed hypothesis is that the ASLF is positively correlated with the incidence of poverty. To test this hypothesis, the incidence of poverty is regressed on the ASLF in a simple linear model, as follows :

$$IP = \alpha + \beta(ASLF)_i + D + \mu,$$

where:

IP is incidence of poverty, that is the proportion of the rural population below the poverty line,

ASLF is the agricultural share of the labour force,

D is dummy for Aceh, West Sumatra, Riau, Jambi, Bengkulu,

α and β are coefficient parameters,

μ is error term,

i indicates location and sex, viz.

URMF for male+female in urban+rural areas,

RMF for male and female in rural areas,

2) A comprehensive comparison of poverty concepts in Indonesia put forward by individual scholars and agencies such as Sajogyo, Hendra Esmara, the World Bank and Central Bureau of Statistics is given by Booth (1988b).

RM for male in rural areas,

RF for female in rural areas,

Applying the OLS method the result is shown in Table 6.7.

TABLE 6.7
OLS ESTIMATES OF THE INCIDENCE OF POVERTY IN RURAL AREAS
ON ASLF, 1985

	Dependent Variable: Incidence of Poverty		
	Both sexes	Male	Female
Constant	24.06 (1.08)	-17.79 (-0.65)	33.18 (2.08)*
ASLF	0.13 (0.43)	0.70 (1.88)**	0.01 (0.02)
Dummy	-27.88 (-3.94)*	-26.34 (-4.88)*	-27.31 (-3.74)*
R-squared	0.416	0.492	0.411
R-bar-squared	0.362	0.446	0.357
F	7.82	10.65	7.66*
Sample size	25	25	25
Diagnostic Tests			
Functional Form ($\chi^2, 1$)	0.03	0.85	0.00
Normality ($\chi^2, 2$)	0.17	0.48	0.22
Heteroscedasticity ($\chi^2, 1$)	5.81	4.41	3.74

Level of significance: * = 0.05; ** = 0.10

Figures in parentheses are t values.

Dummy : Aceh, West Sumatra, Riau, Jambi, Bengkulu

A. Ramsey's RESET test using the square of the fitted values

B. Based on a test of skewness and kurtosis of residuals

C. Based on the regression of squared residuals on squared fitted values

The results show that all regressions have the correct signs and satisfy diagnostic tests. However, a significant result is found only for rural males with a relatively high correlation coefficient of 0.701. Dummy variables are significant in all regressions and have negative signs, indicating that Aceh, West Sumatra, Riau, Jambi and Bengkulu

In quadrant I, the horizontal axis measures the total agricultural labour force and total labour force, and the vertical axis measures the total agricultural output. In quadrant III, the vertical axis measures the total non-agricultural labour force and total labour force, and the horizontal axis measures the total non-agricultural output. Total output which comprises agriculture and non-agriculture is shown by production possibility frontier (PPF), U_0 and U_1 , in quadrant IV. Total labour force, agriculture+non-agriculture, is shown in quadrant II.

At U_0 , the total agricultural output is OQ_a with OL_a agricultural worker and L total worker. OL_a/OL is the agricultural share of labour force, and the rest, L_aL/OL , is the non-agricultural labour force which is lower than OL_a/OL . Q_aL_a is agricultural labour productivity per worker. The total non-agricultural output is OQ_b with OL_b non-agricultural worker and OL total worker. OL_b/OL is the non-agricultural share of labour force which is equal to L_aL/OL , and the agricultural share of labour force is L_bL/OL which is equal to OL_a/OL . Q_bL_b is non-agricultural labour productivity per worker which is higher than agricultural labour productivity (the slope of Q_bL_b is steeper than Q_aL_a).

Say, for example, due to technological change, agricultural labour productivity increases to Q_aL_a' . This implies the same output (OQ_a) can be produced with less labour OL_a' . As a result, the ASLF declines to OL_a'/OL . L_aL_a' of agricultural labour can be transferred into non-agricultural sector, or stay unemployed in agriculture. If they move into non-agriculture, where the labour productivity is higher than in the agriculture ($Q_bL_b > Q_aL_a$ and $Q_bL_b > Q_aL_a'$), U_0 shifts up to U_1 equi-proportionally (The shift of U_0 to U' may be biased to Q_a or Q_b or equi-proportionally depended on technological change and output prices in both sectors. This relationship will not be discussed in detail in this study). If the shift of U_0 is biased in favour of Q_b , from U_0 to U_2 (for example, the total non-agricultural output has increased due to the use of more capital intensive technology), this means that an increase in non-agricultural labour

productivity may not provide additional employment. So, with the same amount of labour more output can be produced. The ASLF declines still, as growth rate of the agricultural labour force is slower than that of the non-agricultural labour force.

6.3.2 Functional Form

The choice of appropriate functional form is an empirical matter as theory does not always dictate the determination of a suitable functional form for the equation being estimated (Tomek and Robinson, 1972). Nevertheless, there are several criteria which may be used to assess the relevance of a functional form for a particular purpose. First, a model should be theoretically plausible, so that it can explain reasonably the economic phenomenon to which it associates. Second, a model should be able to elucidate the observed behaviour. Third, a model should be accurate in the sense the estimates of the parameters approximate the true parameters. Fourth, a model should also be able to predict a future value of the explained variables, and fifth, a model should be simple. The simpler their mathematical form, the better the model is considered, to be *ceteris paribus*. Also, the more of the above criteria a model possesses the better it is considered for any practical purposes (Koutsoyiannis, 1979).

The variables discussed in sections 6.2 are used to explain variations in the ASLF across regions in the years 1971, 1980 and 1985. Estimations are made separately for each period. Hence, the data in money terms are presented in current prices. Estimations are also generated for different locations (urban plus rural, and rural areas) and sexes (male plus female, male, female) for each year.

To test the influence of all variables which are considered significant on the ASLF, these variables are combined in one equation. A Recursive Equation System is applied in the following form ³⁾.

3) This functional form has some similarity to that of the Suits (1985, pp. 819-821), and Ogawa and Suits (1985) models. However, Suits's model is non-quadratic and derived from Corden and Findlay's figure as presented in Chapter 3 to illustrate the Todaro hypothesis regarding urban-rural migration.

1985 :

$$\begin{aligned} \text{Ln}(\text{ASLF}) = & \alpha + \beta_1 \text{Ln}(Q_a E) + \beta_2 \text{Ln}(Q_b E_i) + \beta_3 \text{Ln}(\text{MYS}) + \beta_4 \text{Ln}(\text{LANDLESS}) \\ & + b_5 \text{Ln}(\text{GINIL}) + b_6 \text{Ln}(\text{MEC}) + D + \varepsilon, \end{aligned} \quad (6.1)$$

$$\begin{aligned} \text{Ln}(\text{ASLF}^m) = & \alpha + \beta_1 \text{Ln}(Q_a E) + \beta_2 \text{Ln}(Q_b E_i) + \beta_3 \text{Ln}(\text{MYS}^m) + \beta_4 \text{Ln}(\text{LANDLESS}) \\ & + b_5 \text{Ln}(\text{GINIL}) + b_6 \text{Ln}(\text{MEC}) + D + \varepsilon, \end{aligned} \quad (6.2)$$

$$\begin{aligned} \text{Ln}(\text{ASLF}^f) = & \alpha + \beta_1 \text{Ln}(Q_a E) + \beta_2 \text{Ln}(Q_b E_i) + \beta_3 \text{Ln}(\text{MYS}^f) + \beta_4 \text{Ln}(\text{LANDLESS}) \\ & + b_5 \text{Ln}(\text{GINIL}) + b_6 \text{Ln}(\text{MEC}) + D + \varepsilon, \end{aligned} \quad (6.3)$$

$$\text{Ln}(Q_a E) = \gamma_0 + \gamma_1 \text{Ln}(\text{MYS}_{fr}) + v, \quad (6.4)$$

$$\text{Ln}(Q_b E_i) = \pi_0 + \pi_1 \text{Ln}(\text{MYS}_{nf}) + n, \quad (6.5)$$

1980 :

$$\text{Ln}(\text{ASLF}) = \alpha + \beta_1 \text{Ln}(Q_a E) + \beta_2 \text{Ln}(Q_b E_i) + \beta_3 \text{Ln}(\text{MYS}) + D + \varepsilon, \quad (6.6)$$

$$\text{Ln}(\text{ASLF}^m) = \alpha + \beta_1 \text{Ln}(Q_a E) + \beta_2 \text{Ln}(Q_b E_i) + \beta_3 \text{Ln}(\text{MYS}^m) + D + \varepsilon, \quad (6.7)$$

$$\text{Ln}(\text{ASLF}^f) = \alpha + \beta_1 \text{Ln}(Q_a E) + \beta_2 \text{Ln}(Q_b E_i) + \beta_3 \text{Ln}(\text{MYS}^f) + D + \varepsilon, \quad (6.8)$$

$$\text{Ln}(Q_a E) = \gamma_0 + \gamma_1 \text{Ln}(\text{MYS}_{fr}) + v, \quad (6.9)$$

$$\text{Ln}(Q_b E_i) = \pi_0 + \pi_1 \text{Ln}(\text{MYS}_{nf}) + v, \quad (6.10)$$

1971 :

$$\text{Ln}(\text{ASLF}) = \alpha + \beta_1 \text{Ln}(Q_a E) + \beta_2 \text{Ln}(Q_b E_i) + \beta_3 \text{Ln}(\text{MYS}) + D + \varepsilon, \quad (6.11)$$

$$\text{Ln}(\text{ASLF}^m) = \alpha + \beta_1 \text{Ln}(Q_a E) + \beta_2 \text{Ln}(Q_b E_i) + \beta_3 \text{Ln}(\text{MYS}^m) + D + \varepsilon, \quad (6.12)$$

$$Ln(ASLF^f) = \alpha + \beta_1 Ln(Q_aE) + \beta_2 Ln(Q_bE_i) + \beta_3 Ln(MYS^f) + D + \epsilon, \quad (6.13)$$

$$Ln(Q_aE) = \gamma_0 + \gamma_1 Ln(MYS_{fr}) + v, \quad (6.14)$$

$$Ln(Q_bE_i) = \pi_0 + \pi_1 Ln(MYS_{mf}) + v, \quad (6.15)$$

In all years : Cov(ϵ, v) = Cov(ϵ, v) = Cov(v, v) = 0 (see Pindyck and Rubinfeld, 1981).

where :

ASLF is the agricultural share of the labour force

Q_aE is labour productivity per worker in agriculture, that is total RGDP in agriculture at current prices divided by the number of labour engaged in agriculture,

Q_bE is labour productivity in per worker in non-agriculture, that is total RGDP in non-agriculture at current prices divided by the number of labour engaged in non agriculture,

MEC is technology intensity in agriculture, that is total number of tractors employed in agriculture in 1983 divided by the number of workers employed in agriculture (in thousands) in 1985,

LANDLESS is landlessness, that is the proportion of agricultural households not owning land in 1985,

GINIL is Gini coefficient of land distribution in 1983,

MYS is educational attainment of total labour in urban+rural areas in mean years of schooling,

Ln is natural logarithmic,

i refers to non-agricultural labour productivity category : EM = excluding mining;

IM= including mining.

m refers to male,

f refers to female,

fr refers to farmers,

nf refers to non-farmers,
D is a dummy variable.

A dummy variable is set up to account for variations in the ASLF that can be regarded as outliers. Hence, the number of dummies may not be the same in different locations, sexes and periods.

MYS variable is a predetermined variable in all periods. As discussed in Chapter 5, the educational level of labour force in years of schooling was, on average, below primary level. In addition, education up to primary school has been 'compulsory' since the mid-1970s. Hence it may be said that, in general, education is not much affected by income. In other words, education is an exogeneous variable. To some extent, the educational attainment of an individual may be affected by other factors such as culture, parents educational level, etc. However, these factors are not taken into consideration in this study.

As we discussed in Chapter 5, agricultural labour productivity is positively associated with farmer education (MYS_{fr}), and non-agricultural labour productivity is positively associated with non-farmer education (MYS). Farmer education and non-farmer education are used as proxies for education of agricultural and non-agricultural labour as educational attainment of labour by sector and province is not available in 1971 and 1980. The data are available in 1985 (*Supas* 1985, unpublished); however, to be consistent with the earlier years, the farmer education variable is used. Farmer and non-farmer educational levels in mean years of schooling are given in Table A6.10 (in the appendix). The table shows that, on average, the educational attainment of farmers is around half that of non-farmers in the years under study.

The data on labour productivity per worker in agriculture (Q_a) and in non-agriculture (Q_b), agricultural mechanisation (MEC), landlessness (LANDLESS), and distribution of cultivated land (GINIL) are aggregated data for urban+rural and for both sexes, and

available only for 1983 and are assumed to apply in 1985. Hence those variables are not included in the regression functions in 1971 and 1980.

To examine whether the effect of non-agricultural labour productivity per worker is affected by the inclusion of rich-resource provinces, mining is excluded from RGDP in all provinces. So, the variable Q_{bEM} represents non-agricultural labour productivity per worker without mining as is shown in Table A6.11 (appendix). The table shows that, on average, non-agricultural labour productivity without mining was much lower than that with mining (around half in 1985, one third in 1980, and three quarter in 1971).

6.3.3 Regression Results

1985

A recursive OLS method of regression with a simple log linear form is applied. The results are shown in Table 6.8 for urban+rural. The results of the regression generally substantiate the hypothesis proposed in the section 6.2. The diagnostic tests are met, that is functional forms of the model are correct, and the variability in error variance is normal, and there are no heteroscedasticities.

For both sexes in urban+rural areas, the explanatory variables explain around 77 per cent of the variation in the ASLF across regions. The negative coefficient signs of agricultural labour productivity suggest that the ASLF declines if labour productivity per worker in agriculture increases. In other words, when we move from a region with lower labour productivity per worker in agriculture to a region with higher productivity, the ASLF tends to decline. However, the coefficient sign of non-agricultural labour productivity is positive. This may indicate that the use of technology in non-agriculture is, in general, more capital intensive, so that as a whole the non-agricultural sector does not provide abundant employment opportunities.

The negative coefficient sign of LANDLESS variable indicating that the ASLF will decline if the proportion of agricultural households not owning land increases. The coefficient sign of GINIL variable is negative and significant suggesting that the

inequality of land distribution has resulted in a lower ASLF. The coefficient of the mechanisation variable has a negative sign as expected but does not significantly explain variation in the ASLF (Table A6.12 in the appendix). This may be due to the fact that mechanisation in terms of the use of tractors was very low in 1983 as discussed in section 6.2.2.

The result for males in urban+rural areas is rather different from that for both sexes in that non-agricultural labour productivity is not significant. For females, landlessness and land distribution do not explain variations in the ASLF. This may be due statistical problems in the measurement of the female labour force which is not as reliable as the male data. Education (MYS), as expected, has a negative sign and significantly explain variations in the ASLF for males, females and both sexes.

The regression results of rural areas (Table 6.9) are different from urban+rural areas. The coefficient of agricultural labour productivity is not significant. This suggests that an increase in agricultural labour productivity is not strong enough to push people out of agriculture. Land distribution has a negative effect and significantly explains variation in the ASLF. The result for females is not as good as indicated by the high value of Chi-square test of functional form which is rejected at 0.005. In rural areas, landlessness and mechanisation do not significantly explain variations in the ASLF for both sexes, and for males and females (Table A6.13 in the appendix). As for urban+rural, education plays a significant role in influencing the ASLF; the higher the education the lower the ASLF.

The regression results of ASLF excluding mining are presented in appendices in Table A6.14 (urban+rural), and Table A6.15 (rural). The inclusion of mining changes only the intercept and coefficient of non-agricultural labour productivity while others remain constant. The table shows that the coefficient of non-agricultural labour productivity increases in all cases. This may indicate that the non-agricultural sectors other than mining do not provide much employment opportunities in some provinces.

TABLE 6.8
OLS ESTIMATES OF THE AGRICULTURAL SHARE OF
THE LABOUR FORCE, 1985
URBAN+RURAL
(RGDP AT CURRENT PRICES AND INCLUDING MINING)

Explanatory variables	Dependent Variable : Ln (ASLF)		
	Both Sexes	Males	Females
Constant	4.2327 (13.9405)*	4.4576 (12.0842)*	4.5346 (27.9568)*
Ln(Q _a E)	-0.3364 (-2.9115)*	-0.3112 (-2.5172)*	-0.4570 (-3.4181)*
Ln(Q _b E)	0.1678 (2.9915)*	0.0840 (1.4515)	0.6329 (9.2759)*
Ln(MYS)	-0.3960 (-2.4187)*	-0.4778 (-2.2723)*	-0.9385 (-6.9539)*
Ln(Landlessness)	-0.0894 (-1.8398)**	-0.0889 (-1.7903)**	
Ln(GINI land distribution)	-0.5280 (-2.1878)*	-0.5708 (-2.2919)*	
Sample size	25	25	24 ^{a)}
R-squared	0.7745	0.7131	0.8134
R-bar-squared	0.7152	0.6377	0.7855
F	13.0539	9.4472	29.0681
Diagnostic tests:			
A.Functional Form ($\chi^2,1$)	2.8718	2.2694	7.5717
B.Normality ($\chi^2,2$)	1.1717	1.3219	0.5527
C.Heteroscedasticity ($\chi^2,1$)	0.3638	1.3512	0.0478

Figures in brackets are t values

Level of significance : * = 0.05; ** = 0.10

note: ^{a)} excluding Irian Jaya. The coefficient estimates are unstable when Irian Jaya is included.

A. Ramsey's RESET test using the square of the fitted values

B. Based on a test of skewness and kurtosis of residuals

C. Based on the regression of squared residuals on squared fitted values

TABLE 6.9
OLS ESTIMATES OF THE AGRICULTURAL SHARE OF
THE LABOUR FORCE, 1985
RURAL
(RGDP AT CURRENT PRICES AND INCLUDING MINING)

Explanatory variables	Dependent Variable : Ln (ASLF)		
	Both Sexes	Males	Females
Constant	4.5064 (21.2321)*	4.8243 (18.1984)*	4.4230 (25.7440)*
Ln(Q _a E)	-0.0778 (-0.8838)	-0.0319 (-0.3507)	-0.0792 (-0.5413)
Ln(Q _b E)	0.2198 (6.7552)*	0.1523 (4.6155)*	0.3439 (6.1263)*
Ln(MYS)	-0.4958 (-4.4767)*	-0.6004 (-4.2830)*	-0.4165 (-3.7674)*
Ln(GINI land distribution)	-0.3719 (-2.2756)*	-0.3716 (-2.2629)*	
Sample size	25	25	25
R-squared	0.7392	0.6332	0.6543
R-bar-squared	0.6871	0.5599	0.6050
F	14.1741	8.6331	13.2511
Diagnostic tests:			
A.Functional Form ($\chi^2, 1$)	5.4197	1.5428	13.1634*
B.Normality ($\chi^2, 2$)	1.1359	0.7778	3.9935
C.Heteroscedasticity ($\chi^2, 1$)	0.0016	1.2043	1.5723

Figures in brackets are t values

Level of significance : * = 0.05; ** = 0.10

A. Ramsey's RESET test using the square of the fitted values

B. Based on a test of skewness and kurtosis of residuals

C. Based on the regression of squared residuals on squared fitted values

Table 6.10 shows regression results of agricultural labour productivity per worker on education (mean years of schooling) of farmers. The results show that, as expected, education is positively associated with agricultural labour productivity in all periods. In 1971 and 1980, education significantly influenced productivity of labour. A study by Hadjam and Basuki (1988, pp.1-9) on the effect of education on farmer's productivity in East and Central Java found that farmer's income is positively and significantly correlated with education. They found the farmers with longer period of schooling are relatively more productive than those with less education. Our results support their finding.

Agricultural labour productivity in East Kalimantan was significantly higher than that in other provinces as indicated by t value of dummy variable. As is discussed above, dummy variable is set up to detect an outlier since this affect regression result and hence diagnostic tests.

Non-agricultural labour productivity per worker including mining (Q_{bIM}) is positively associated with education of non-farmers (Table 6.11). The table shows that non-agricultural labour productivity is significantly influenced by education in all periods under study. A dummy variable is set up for Riau and it shows that non-agricultural labour productivity in Riau was significantly higher than in any other province (in 1971 oil exploration was mainly concentrated in Riau).

The same result is found for non-agricultural labour productivity without mining (Q_{bEM}). It is positively associated with the education of non-farmers (Table 6.12). In all periods, education significantly determined the level of labour productivity. In East Kalimantan, in 1980, labour productivity was very high compared to that in other provinces. These results show that association between education and labour productivity was higher in agricultural sector than in non-agricultural sector as indicated by coefficient of determination. However, it must be borne in mind that education is not the only factor that affects labour productivity. Technology and natural factors may also have an important influence but they are not examined in this study.

TABLE 6.10
OLS ESTIMATES OF THE AGRICULTURAL LABOUR
PRODUCTIVITY PER WORKER, 1981-85
URBAN+RURAL FOR BOTH SEXES
(RGDP AT CURRENT PRICES)

Explanatory variables	Dependent Variable : Ln (Q _a)		
	1971	1980	1985
Constant	-3.3593 (-17.7769)*	-1.6448 (-5.3213)*	-0.8970 (-2.8228)*
Ln(MYS _f)	0.6385 (3.0198)*	0.6930 (2.3643)*	0.2938 (1.1371)
Dummy	1.2566 (4.4616)*	1.7310 (6.0471)*	0.8851 (2.9923)*
Sample size	24	24	24
R-squared	0.5413	0.6463	0.3146
R-bar-squared	0.4977	0.6126	0.2523
F	12.3926	19.1871	5.0501
Diagnostic tests:			
A.Functional Form ($\chi^2, 1$)	0.0297	1.3882	0.2344
B.Normality ($\chi^2, 2$)	7.1316	0.0177	0.0809
C.Heteroscedasticity ($\chi^2, 1$)	0.0157	0.554	0.2007

Dummy : 1971-1985 : East Kalimantan

Irian Jaya is excluded

Figures in brackets are t values

Level of significance : * = 0.05; ** = 0.10

A. Ramsey's RESET test using the square of the fitted values

B. Based on a test of skewness and kurtosis of residuals

C. Based on the regression of squared residuals on squared fitted values

TABLE 6.11
OLS ESTIMATES OF THE NON-AGRICULTURAL LABOUR
PRODUCTIVITY PER WORKER, 1981-85
URBAN+RURAL FOR BOTH SEXES
(RGDP AT CURRENT PRICES)
(INCLUDING MINING)

Explanatory variables	Dependent Variable : Ln (Q_bIM)		
	1971	1980	1985
Constant	-4.0626 (-5.5741)*	-5.4534 (-3.1453)*	-5.1324 (-2.9848)*
Ln(MYS _{nf})	1.5971 (3.2908)*	3.4192 (3.3512)*	3.2593 (3.5234)*
Dummy	2.1672 (3.9223)*		
Sample size	24 ^{a)}	25	25
R-squared	0.5849	0.3281	0.3505
R-bar-squared	0.5453	0.2989	0.3223
F	14.7921	11.2303	12.4141
Diagnostic tests:			
A.Functional Form ($\chi^2,1$)	0.0000	0.0034	0.5659
B.Normality ($\chi^2,2$)	0.9355	6.1729	7.0898
C.Heteroscedasticity ($\chi^2,1$)	0.1172	0.4992	4.4726

Dummy : 1971 : Riau

^{a)} Irian Jaya is excluded

Figures in brackets are t values

Level of significance : * = 0.05; ** = 0.10

A. Ramsey's RESET test using the square of the fitted values

B. Based on a test of skewness and kurtosis of residuals

C. Based on the regression of squared residuals on squared fitted values

TABLE 6.12
OLS ESTIMATES OF THE NON-AGRICULTURAL LABOUR
PRODUCTIVITY PER WORKER, 1981-85
URBAN+RURAL FOR BOTH SEXES
(RGDP AT CURRENT PRICES)
(EXCLUDING MINING)

Explanatory variables	Dependent Variable :Ln (Q _b EM)		
	1971	1980	1985
Constant	-3.9949 (-5.6907)*	-3.2753 (-4.3488)*	-2.9332 (-3.6582)*
Ln(MYS _{nf})	1.5022 (3.2239)*	1.8903 (4.2343)*	1.9284 (4.4708)*
Sample size	24 ^a)	24 ^a)	25
Dummy		0.9287 (2.3597)*	
R-squared	0.3209	0.5747	0.4650
R-bar-squared	0.2900	0.5342	0.4417
F	10.3938	14.1896	19.9880
Diagnostic tests:			
A.Functional Form ($\chi^2,1$)	0.0954	0.4131	0.1282
B.Normality ($\chi^2,2$)	0.6986	1.4510	2.5493
C.Heteroscedasticity ($\chi^2,1$)	0.0414	0.0807	1.4936

Dummy : East Kalimantan

a) Irian Yaja is excluded

Figures in brackets are t values

Level of significance : * = 0.05; ** = 0.10

A. Ramsey's RESET test using the square of the fitted values

B. Based on a test of skewness and kurtosis of residuals

C. Based on the regression of squared residuals on squared fitted values

D. Based on the regression of squared residuals on squared fitted values

1980

For 1980, data on landlessness, land distribution and mechanisation are not available. Hence, the variables used to explain the variation in the ASLF are agricultural and non-agricultural labour productivity per worker (with and without mining) and mean years of schooling as indicated in Equation 6.6-6.10. The regression result for urban+rural areas in 1980 is presented in Table 6.13.

For both sexes, the model explains around 71 per cent of the variations in the ASLF. This coefficient of determination is lower than that in 1985 because the number of explanatory variables is less. Education has a negative effect and significantly explains variations in the ASLF. The effect of agricultural labour productivity on the ASLF is the same as that found in 1985 in that the ASLF tends to decline when agricultural labour productivity per worker increases. The coefficient sign of non-agricultural labour productivity has is positive and significant indicating that in this period an increase in non-agricultural productivity sector did not pull people into non-agriculture. Since there are only two sectors in the model, the results must be interpreted with caution. Some non-agricultural sectors may provide employment opportunities while others, which are utilising more capital intensive technologies, may not. However, as non-agricultural sectors are aggregated into one sector the total effect of an increase in the non-agricultural labour productivity may be positive as indicated by its coefficient sign. The results for males and for females are the same as that for both sexes. As indicated by dummy variable, the male ASLF was very low in West Java (in urban+rural) in 1980 compared with other provinces.

Similar results are found for rural areas (Table 6.14). Variations in the ASLF is significantly determined by education and the association is negative. Agricultural labour productivity is negatively associated with the ASLF but it is not significant. Non-agricultural labour productivity has a positive sign and is significant. Compared with other provinces, in rural areas, male ASLF was significantly lower in West Java, and for both sexes, ASLF was very low in West Java and Bali.

The regression results excluding mining are presented in Table A6.16 for urban+rural, and Table A6.17 for rural (appendices). For urban+rural the results are similar to those including mining. Agricultural labour productivity and education have negative effects and are significant, and non-agricultural labour productivity has a positive effect and significant for males, females and both sexes. Coefficient of determinations are lower than those including mining since variations in non-agricultural labour productivity is less. Unlike the results of 1985, where the exclusion of mining affects only the intercept and coefficient of non-agricultural labour productivity, the results of 1980 without mining are different from that with mining in intercept, coefficients of all parameters, and diagnostic tests because a dummy variable is not used in the model without mining. For rural areas, the results are different in that agricultural labour productivity is significant in explaining variations in the ASLF.

1971

For 1971, equations 6.11-6.13 have been attempted but the results econometrically failed. So, a quadratic functional form is applied, as follows :

$$\begin{aligned} \text{Ln(ASLF)} = & \alpha + \beta_1 \text{Ln}(Q_a E) + \beta_2 [\text{Ln}(Q_a E)]^2 + \beta_3 \text{Ln}(Q_b E_i) + \beta_4 [\text{Ln}(Q_b E_i)]^2 + \\ & \beta_5 \text{Ln}(MYS) + D + \epsilon, \end{aligned} \quad (6.16)$$

$$\begin{aligned} \text{Ln(ASLF}^m) = & \alpha + \beta_1 \text{Ln}(Q_a E) + \beta_2 [\text{Ln}(Q_a E)]^2 + \beta_3 \text{Ln}(Q_b E_i) + \beta_4 [\text{Ln}(Q_b E_i)]^2 + \\ & \beta_5 \text{Ln}(MYS^m) + D + \epsilon, \end{aligned} \quad (6.17)$$

$$\begin{aligned} \text{Ln(ASLF}^f) = & \alpha + \beta_1 \text{Ln}(Q_a E) + \beta_2 [\text{Ln}(Q_a E)]^2 + \beta_3 \text{Ln}(Q_b E_i) + \beta_4 [\text{Ln}(Q_b E_i)]^2 + \\ & \beta_5 \text{Ln}(MYS^f) + D + \epsilon, \end{aligned} \quad (6.18)$$

$$\text{Ln}(Q_a E) = \gamma_0 + \gamma_1 \text{Ln}(MYS_{fr}) + v, \quad (6.19)$$

$$\text{Ln}(Q_b E) = \pi_0 + \pi_1 \text{Ln}(MYS_{nf}) + v, \quad (6.20)$$

TABLE 6.13
OLS ESTIMATES OF THE AGRICULTURAL SHARE OF
THE LABOUR FORCE, 1980
URBAN+RURAL
(RGDP AT CURRENT PRICES AND INCLUDING MINING)

Explanatory variables	Dependent Variable : Ln (ASLF)		
	Both Sexes	Males	Females
Constant	4.7606 (21.9125)*	4.7323 (18.7153)*	4.5179 (29.7287)*
Ln(Q _a E)	-0.1586 (-2.4349)*	-0.1618 (-2.5619)*	-0.2150 (-2.4526)*
Ln(Q _b E)	0.3369 (6.5499)*	0.2073 (3.9465)*	0.5508 (9.0753)*
Ln(MYS)	-0.2246 (-4.2368)*	-0.1843 (-3.2329)*	-0.2593 (-5.8785)*
Dummy		-0.2713 (-2.8704)*	
Sample size	24	24	24
R-squared	0.7053	0.6624	0.8067
R-bar-squared	0.6611	0.5913	0.7777
F	15.9570	9.3186	27.8163
Diagnostic tests:			
A.Functional Form ($\chi^2,1$)	0.0818	5.0126	1.3435
B.Normality ($\chi^2,2$)	0.4898	0.2586	0.7190
C.Heteroscedasticity ($\chi^2,1$)	0.7130	2.2665	0.6727

Dummy : West Java

Irian Jaya is excluded

Figures in brackets are t values

Level of significance : * = 0.05; ** = 0.10

A. Ramsey's RESET test using the square of the fitted values

B. Based on a test of skewness and kurtosis of residuals

C. Based on the regression of squared residuals on squared fitted values

TABLE 6.14
OLS ESTIMATES OF THE AGRICULTURAL SHARE OF
THE LABOUR FORCE, 1980
RURAL
(RGDP AT CURRENT PRICES AND INCLUDING MINING)

Explanatory variables	Dependent Variable : Ln (ASLF)		
	Both Sexes	Males	Females
Constant	4.9065 (36.9160)*	4.9152 (31.9464)*	4.6751 (36.0071)*
Ln(Q _a E)	-0.0190 (-0.4827)	0.0168 (-0.4364)	-0.0927 (-1.2381)
Ln(Q _b E)	0.2588 (7.8084)*	0.1697 (5.3073)*	0.4858 (9.3691)*
Ln(MYS)	-0.1889 (-5.7623)*	-0.1619 (-4.6686)*	-0.2335 (-6.1951)*
Dummy	-0.1396 (-3.1291)*	-0.2374 (-4.1284)*	
Sample size	24	24	24
R-squared	0.8410	0.7463	0.8210
R-bar-squared	0.8076	0.6929	0.7942
F	25.1288	13.9756	30.5835
Diagnostic tests:			
A.Functional Form ($\chi^2,1$)	0.7948	0.1371	3.8709
B.Normality ($\chi^2,2$)	1.6237	2.1054	1.3455
C.Heteroscedasticity ($\chi^2,1$)	0.3787	0.9496	0.6312

Dummy Both Sexes : West Java and Bali

Dummy Males : West Java

Irian Jaya is excluded

Figures in brackets are t values

Level of significance : * = 0.05; ** = 0.10

A. Ramsey's RESET test using the square of the fitted values

B. Based on a test of skewness and kurtosis of residuals

C. Based on the regression of squared residuals on squared fitted values

where ASLF, Q_aE , Q_bE , MYS and all notations are the same as indicated in section 6.4.2.

The regression results for urban+rural are presented in Table 6.15. The model explains 60 per cent of variations in the ASLF for both sexes, 65 per cent for male and 66 per cent for female. All regression coefficients are significant and statistical requirements for diagnostic tests are fulfilled satisfactorily. However, the effect of non-agricultural labour productivity on the ASLF is different from that in 1980 and 1985. The coefficient signs are negative indicating that an increase in the non-agricultural labour productivity will reduce the ASLF at an increasing rate. It appears that people were pulled into the non-agricultural sector. Agricultural labour productivity has the same effect on the ASLF as indicated by its negative sign.

Male ASLF was significantly lower in Java (West Java, Central Java, Yogyakarta, and East Java) compared with other provinces. For females, non-agricultural labour productivity does not significantly explain variations in the ASLF. Education is negatively associated with the ASLF and significant in all cases.

The regression results for rural areas also suggest that agricultural and non-agricultural labour productivity negatively and significantly explains variations in the ASLF. The ASLF tends to decline in increasing rate if labour productivity in both sectors increases. In all cases education is a significant factor in explaining variations in the ASLF.

The results excluding mining are presented in Table A6.18 for urban+rural, and Table A6.19 for rural (appendices). However, the results are different from those including mining in that non-agricultural labour productivity has a positive sign and is significant for both sexes in urban+rural and rural areas. The instability of the coefficient signs indicate that the results are, to a large extent, affected by the exclusion of mining especially in Riau where non-agricultural labour productivity per worker including mining was very high in 1971 (Table A6.11 in the appendix).

TABLE 6.15
OLS ESTIMATES OF THE AGRICULTURAL SHARE OF
THE LABOUR FORCE, 1971
URBAN+RURAL
(RGDP AT CURRENT PRICES AND INCLUDING MINING)

Explanatory variables	Dependent Variable : Ln (ASLF)		
	Both Sexes	Males	Females
Constant	-1.9238 (-1.2512)	1.7710 (1.5926)	-3.7115 (-1.5350)
Ln(Q _a E)	-7.1917 (-4.2935)*	-2.8026 (-2.1593)*	-8.0178 (-3.6404)*
[Ln(Q _a E)] ²	-1.5492 (-4.2515)*	-0.5654 (-2.0156)*	-1.7396 (-3.6974)*
Ln(Q _b E)	-0.0664 (-1.1168)	-0.1134 (-2.1358)*	-0.0476 (-0.4366)
[Ln(Q _b E)] ²	-0.0897 (-2.6383)*	-0.0650 (-1.8396)**	-0.0842 (-1.3883)
Ln(MYS)	-1.4318 (-4.6798)*	-0.6861 (-2.1558)*	-0.8456 (-4.6620)*
Dummy		-0.1233 (-2.3661)*	
Sample size	24	24	24
R-squared	0.6017	0.6485	0.6563
R-bar-squared	0.4911	0.5244	0.5609
F	5.4387	5.2265	6.8751
Diagnostic tests:			
A.Functional Form ($\chi^2, 1$)	1.1475	0.0219	2.4768
B.Normality ($\chi^2, 2$)	0.5874	1.7645	1.6068
C.Heteroscedasticity ($\chi^2, 1$)	4.7707	0.3764	2.2738

Dummy : West Java, Central Java, Yogyakarta, East Java.

Figures in brackets are t values

Irian Jaya is excluded

Level of significance : * = 0.05; ** = 0.10

A. Ramsey's RESET test using the square of the fitted values

B. Based on a test of skewness and kurtosis of residuals

C. Based on the regression of squared residuals on squared fitted values

TABLE 6.16
OLS ESTIMATES OF THE AGRICULTURAL SHARE OF
THE LABOUR FORCE, 1971
RURAL
(RGDP AT CURRENT PRICES AND INCLUDING MINING)

Explanatory variables	Dependent Variable : Ln (ASLF)		
	Both Sexes	Males	Females
Constant	0.2963 (0.2300)	2.6870 (4.1949)*	-2.0985 (-1.0469)
Ln(Q_aE)	-5.1587 (-3.6759)*	-2.4591 (-3.4703)*	-6.5806 (-3.6040)*
[Ln(Q_aE)] ²	-1.1386 (-3.7292)*	-0.5346 (-3.5108)*	-1.4367 (-3.6833)*
Ln(Q_bE)	-0.0658 (-1.3216)	-0.1126 (-3.4158)*	-0.0427 (-0.4717)
[Ln(Q_bE)] ²	-0.0850 (-2.9826)*	-0.0767 (-3.7471)*	-0.0823 (-1.6364)
Ln(MYS)	-1.1430 (-4.4588)*	-0.7435 (-4.5243)*	-0.7091 (-4.7156)*
Dummy		-0.2325 (-4.9473)*	
Sample size	24	24	24
R-squared	0.6176	0.7614	0.6957
R-bar-squared	0.5113	0.6772	0.6112
F	5.8132	9.0412	8.2318
Diagnostic tests:			
A.Functional Form ($\chi^2,1$)	0.2663	0.9040	2.6757
B.Normality ($\chi^2,2$)	0.9991	0.2554	2.1691
C.Heteroscedasticity ($\chi^2,1$)	4.8191	3.4181	2.4823

Dummy : West Java

Irian Jaya is excluded

Figures in brackets are t values

Level of significance : * = 0.05; ** = 0.10

A. Ramsey's RESET test using the square of the fitted values

B. Based on a test of skewness and kurtosis of residuals

C. Based on the regression of squared residuals on squared fitted values

6.4 Summary and Conclusion

- (1) Several factors hypothesized to explain the regional variations in the ASLF are agricultural labour productivity per worker, non-agricultural labour productivity per worker, landlessness, land distribution, mechanisation, and the educational attainment of the labour force.

- (2) Regression analyses show that agricultural labour productivity is negatively associated with the ASLF in all periods under study. Agricultural labour productivity was positively influenced by the educational level of the farmers.

In 1980 and 1985, the higher agricultural labour productivity (when we move from a region with lower agricultural labour productivity to a region with higher productivity) was associated with a lower ASLF. In 1971, the increase in agricultural labour productivity per worker resulted in the decline in the ASLF at an increasing rate.

- (3) Non-agricultural labour productivity, with and without mining, as indicated by the regression results, explain variations in the ASLF in all periods under study. The association was positive and significant in some cases in 1980 and 1985. The increase in labour productivity in the non-agricultural sector tended to increase the ASLF. This result may indicate that non-agricultural sectors, in general, do not provide employment opportunities. In 1971, association between non-agricultural labour productivity and the ASLF was negative. The non-agricultural labour productivity was significantly affected by educational attainment of the workers (non-farmers). Labour productivity tends to increase when education rises.

- (4) The regression results also show that landlessness and the distribution of land were negatively associated with and significantly explain the ASLF. The latter implies that the a more unequal distribution of cultivated agricultural land has tended to reduce the ASLF.

- (5) Mechanisation did not explain regional variations in the ASLF. This is due to the fact that agricultural mechanisation, as indicated by the number of tractors per worker, was relatively low everywhere in Indonesia and indeed very low in comparison with other Asian countries.
- (6) Educational attainment of the total labour force, in mean years of schooling, significantly affect the ASLF. An increase in education has tended to reduce the ASLF in all period under study for all sexes in urban+rural and rural areas.

Chapter 7

Factors Underlying Regional Differences in the Change in the Agricultural Share of the Labour Force: 1971-1985

This chapter presents an explanation for differences in the change of the agricultural share of labour force by province in the periods 1971-80 and 1980-85. The first section of the chapter discusses the change in the ASLF and other relevant indicators at the national level. The second section presents factors affecting variations in the change of ASLF at provincial level. The third section presents a quantitative analysis of the association between the agricultural share of the labour force and the determined variables. The fourth section provides further explanation for females earning workers, followed by conclusions in the fifth section.

7.1 The Change in the Agricultural Share of the Labour Force: National Level

Changes in the agricultural share of the labour force (ASLF) at national level are given in Table 7.1. Between 1971 and 1980 the ASLF fell considerably both for males and for females. However, by contrast, as the economy slowed down, the fall for both sexes in urban plus rural areas was only around one-sixth that of the first period. In rural areas the share of females increased by 0.9 percentage point. The figures on the change of the ASLF were also affected by the fact that agricultural employment in 1971 and 1980 were underestimated due to the timing of the census in the relatively slack season. As discussed in Chapter 1, the agricultural share of the labour force in 1971 was also underestimated compared with the 1980 census figure because the 1980 census used a broader definition of "employed" and it included a large numbers of unpaid family workers which were concentrated in agriculture.

TABLE 7.1
CHANGES IN THE AGRICULTURAL SHARE OF THE LABOUR FORCE
AND OTHER RELATED VARIABLES, BOTH SEXES

	1971-80	1980-85
Changes in :		
1. ASLF (% point) ¹⁾		
<i>Rural+Urban :</i>		
Male+female	-10.0	-1.8
Male	-9.6	-2.0
Female	-11.2	-1.0
<i>Rural :</i>		
Male+Female	-8.1	0.2
Male	-7.6	*
Female	-9.1	0.9
2. Share of non-A in RGDP(% point)	13.4	4.0
3. Mean years of schooling		
<i>Rural+Urban :</i>		
Male+female	0.77	0.82
Male	0.74	0.89
Female	0.86	0.81
<i>Rural :</i>		
Male+Female	0.63	0.77
Male	0.59	0.81
Female	0.71	0.72
4. Relative labour productivity (Q_a/Q_b) ²⁾	-0.02	-0.04
5. Annual growth rate of Q_a (%) ²⁾	2.2	0.6
6. Annual growth rate of Q_b (%) ²⁾	2.5	3.0

Source : calculated from 1,3,5: Indonesian Population Censuses of 1971 (Series D), and 1980 (Series S, No.2), and *Supas* 1985 (Series No.5);

2,4,5,6: *Nota Keuangan* 1988/89 (GDP at constant 1973 prices).

1) Excluding Irian Jaya

2) GDP at 1973 constant prices

* negligible

In line with that, some changes in economic indicators were encountered. In the first period, the share of non-agriculture in RGDP rose by 13.4 percentage points, while in the second period the figure was one-third the first period. Second, the ratio of labour productivity per worker in agriculture to that in non-agriculture (Q_a/Q_b) declined at an increasing rate in the second period. A negative change in the ratio was due to the fact that the growth rate of labour productivity per worker in non-agriculture was faster than

that in the agriculture. Third, the educational level of the labour force increased by 0.77 and 0.82 point years of schooling in the two periods. As was discussed in Chapter 5, education was provided free up to the primary level by the government which may have pushed people out of agriculture. The marginal increase for males was larger than that for females, and that for urban areas was higher than that for rural areas.

Thus, at the national level, it may be said that the decline in the ASLF was associated with the fall in relative labour productivity which implied that development in the non-agricultural sector had a dominant effect in driving the people out of agriculture. This was also indicated by the negative association between the change in the ASLF and the change in the share of non-agriculture in RGDP. So, over two periods of time it seemed that, at the national level, the pull factor had a stronger tendency than the push factor to transfer people from agriculture to non-agriculture. However, as regional development in Indonesia is not homogeneous and not proceeding at the same pace, it will be interesting to examine variations in the changes of those variables by province in each periods.

7.2 Factors Affecting Differences in the Change of the Agricultural Share of the Labour Force: Provincial Level

Several factors which could be related to regional differences in the change in the ASLF over a period of time are : (1) the change in the labour productivity per worker in agriculture and in non-agriculture, (2) the change in educational attainment of the total labour force, (3) the change in the share of non-agricultural sector in RGDP, (4) the change in rural population, and (5) the initial level of the ASLF. The following section explains the associations of those variables with the ASLF.

7.2.1 The Change in the Labour Productivity per Worker

The argument concerning the impact of a change in labour productivity on the change in the ASLF is similar to that stated in Chapter 6. An increase in agricultural labour productivity per worker over a period of time leads to a decline in the ASLF as fewer workers are needed to produce the same amount of output. And, an increase in non-

agricultural labour productivity over a period of time causes a fall in the ASLF because people tends to move into more remunerative sectors where labour productivity is higher than in agricultural sector. Thus, when we move from a region with higher labour productivity in both sectors to a region with lower productivity, the decline in the ASLF tends to be lower.

The changes in ASLF between 1971-80 by province are presented in Table 7.2. Provinces are ranked with respect to the change in the ASLF in ascending order and classified into Java+Bali and Outer Islands. The table shows that all provinces experienced a decline in the ASLF and it varies considerably, being highest in Bali and East Kalimantan, and lowest in Yogyakarta.

Differences in the change in the relative labour productivity were also substantial, from -0.336 in Central Sulawesi to +0.272 in North Sulawesi. A positive change implies that the growth rate of labour productivity in agriculture is faster than that in non-agriculture; this was experienced by Bali and Yogyakarta and some other provinces. However, care should be taken in interpreting the changes as they may in part be attributed to the quality of the RGDP data, especially in 1971. For example, in Yogyakarta the growth rate of agricultural labour productivity was the highest at 11.1 per cent per annum compared to the national, with 2.1 per cent. The agricultural sector is mainly made up of food crop production which in turn is dominated by rice. Average growth rate of production of *padi sawah* in Yogyakarta between 1972 and 1978 was 2.1 per cent per annum, much lower than that the national level of 4.2 per cent (Booth and Damanik, 1989, p.290). Therefore, the remarkably high growth rate in this period may not fully represent reality and could be the result of statistical problems.

The contribution of the non-agricultural sector in Yogyakarta mainly originated from trade and services followed by manufacturing. Their shares of RGDP in 1980 were 33.0 and 9.6 per cent respectively. Tourism, which was second only to Bali, has made a great contribution to trade. Tourists influx increased steadily due to improvement of air

services, and this has accelerated other economic activities such as accommodation (Hill and Mubyarto, 1978, pp.36-39). However, the growth rate of non-agricultural labour productivity of 10.1 per cent per annum, in comparison with Bali of 1.0 per cent and the national level of 4.4 per cent, looks far too high. A rapid growth rate of non-agricultural labour productivity also occurred in Aceh and Central Sulawesi. In Aceh it was owing to the mining (LNG) boom. In Central Sulawesi it has been attributed to a rapid expansion in several service industries, mainly due to a large increase in the government's development budget (Makaliwe-Watupongoh, 1989, pp.518-522). From 1971 to 1980 the real share of government and personal services rose from 9.5 to 19.2 per cent, and trade and transport increased from 16.6 to 19.5 per cent.

On the other hand, in some provinces the decline in the ASLF was associated with a fall in relative labour productivity. This occurred in Java excluding Yogyakarta and in the rich-resource provinces. It seems that employment opportunities provided by non-agriculture have caused the decline in the ASLF, suggesting the pull factor had a primary effect in these provinces.

Compared to the first period, variations in the change in ASLF between 1980-85 were even larger in that some provinces experienced a rise in the ASLF such as Bali, Sulawesi, West and East Nusa Tenggara (Table 7.3). A marked decline in the growth rate of labour productivity in non-agriculture took place in Riau and in Irian Jaya. This was mostly attributable to declining world oil prices. In Riau, mining, at 1975 constant prices, contributed 83.2 per cent of total RGDP and of this around 90 per cent was generated by petroleum and natural gas. It dropped to 70.6 per cent owing to the fall in the world oil prices, a fall from Rp.1655.5 to 1147.4 billions resulting in a decline in the growth rate of the non-agricultural labour productivity. Also a slackness in approved foreign investment in mining after 1978 may in part be responsible for the decline in mining income (Rice, 1989, pp. 129-136). In Irian Jaya, regional product fell mainly due to a decline in oil and timber production (Manning and Rumbiak, 1989, p. 80). From 1980 to 1985 income generated by mining fell from Rp.269.9 to 228.8 billions

causing the growth rate of labour productivity in non-agriculture to decline. Its real share of RGDP dropped from 46.8 to 35.2 per cent and of this 95.7 per cent was contributed by petroleum. A marked decline of 10.0 per cent in agricultural labour productivity was due to a steep rise in the labour force engaged in agriculture. It grew at 8.6 per cent per annum from 1980 to 1985 which was second only to Southeast Sulawesi, with 9.3 per cent.

In Bali, Sulawesi (except South Sulawesi), West and East Nusa Tenggara a rise in the ASLF was associated with a decline in the relative labour productivity. Surprisingly those provinces (except Southeast Sulawesi) experienced a very high growth rate of labour productivity in non-agriculture but a remarkably low one in agriculture. This suggests either that employment in non-agriculture grew more slowly than that in agriculture or that output grew more rapidly. In Bali the growth rate of employment was 5.0 and 6.1 per cent for non-agriculture and agriculture respectively, in West Nusa Tenggara 1.6 and 5.0 per cent; in East Nusa Tenggara 0.5 and 6.6 per cent, in North Sulawesi 3.6 and 5.4 per cent, in Central Sulawesi 6.0 and 6.2 per cent, and in Southeast Sulawesi 9.1 and 9.3 per cent. In North Sulawesi, apart from a faster growth rate of employment in agriculture, the decline in agricultural labour productivity was attributed to the disappointing output performance of agriculture, especially plantation crops which contributed a large share to agricultural income. The value of production of main plantation crops, cloves and coconuts, declined in response to declining international prices (Sondakh and Jones, 1989, pp. 367-74). As a whole, the growth rate of agricultural income dropped by 1.4 per cent per year. According to Sondakh and Jones (1989, p. 378), although North Sulawesi underwent a marked decline in fertility, the growth rate of population rose slightly to 2.31 per cent, in the 1980-85 period. They suggest that there must have been some net in-migration to North Sulawesi over this period. If it was the case, those immigrants were probably absorbed in the agricultural sector as indicated by a faster growth of employment in agriculture than that in non-agriculture.

TABLE 7.2
CHANGES IN THE AGRICULTURAL SHARE OF THE LABOUR FORCE (ASLF) AND OTHER
RELATED VARIABLES, BOTH SEXES, IN URBAN+RURAL
1971-80

	Change in				Annual Growth Rate of	
	ASLF	(Q_a/Q_b)	BSY	MYS	Q_a	Q_b
	(% point)		(% point)			
<i>Java+Bali</i>						
Bali	-18.2	0.088	15.7	0.86	2.5	1.0
West Java	-12.8	-0.057	14.3	0.70	2.3	3.4
East Java	-11.4	-0.008	12.5	0.79	3.0	3.2
Central Java	-9.0	-0.249	19.3	0.78	2.2	7.0
Yogyakarta	-3.6	0.045	1.5	1.17	11.1	10.1
<i>Outer Islands</i>						
East Kalimantan	-16.6	-0.071	15.1	1.49	-0.9	6.8
Southeast Sulawesi	-14.8	-0.090	10.8	1.59	1.4	-3.4
West Nusa Tenggara	-14.6	-0.062	16.4	1.00	2.8	3.6
North Sulawesi	-12.4	0.272	0.4	0.55	3.9	-1.9
South Kalimantan	-10.6	-0.002	11.6	0.59	-1.0	-0.9
Riau	-9.4	-0.009	3.6	0.90	-1.2	2.0
Central Kalimantan	-9.2	-0.097	22.4	0.32	1.3	5.5
South Sulawesi	-9.2	0.034	8.6	0.69	4.8	4.1
West Sumatra	-9.1	-0.126	18.2	0.36	1.9	5.7
Maluku	-8.3	-0.210	21.2	0.81	0.4	5.5
North Sumatra	-8.2	-0.013	10.9	0.72	4.0	4.5
East Nusa Tenggara	-8.1	-0.012	13.0	0.52	4.1	4.5
West Kalimantan	-8.0	-0.016	17.5	0.53	1.9	3.0
Aceh	-7.3	-0.203	33.4	0.57	2.4	16.7
Central Sulawesi	-7.3	-0.336	24.6	1.00	4.9	12.9
Jambi	-7.2	0.117	1.5	0.40	-2.1	-5.6
Bengkulu	-6.2	0.033	8.2	0.60	1.6	0.0
Lampung	-6.2	0.004	9.0	0.68	-0.8	-1.0
South Sumatra	-6.1	0.016	3.5	0.72	0.4	-0.7

Source : as for Table 6.1 and Table 6.2

Note: Q_a/Q_b : ratio of labour productivity in agriculture to non-agriculture at 1975 constant prices (labour productivity data are presented in Table A7.1 in the appendix).

BSY: proportion of non-agriculture in RGDP at 1975 constant prices.

MYS: mean years of schooling.

Q_a : agricultural labour productivity per worker.

Q_b : non-agricultural labour productivity per worker.

TABLE 7.3
CHANGES IN THE AGRICULTURAL SHARE OF THE LABOUR FORCE
AND OTHER RELATED VARIABLES, BOTH SEXES, IN URBAN+RURAL
1980-85

	Change in				Annual Growth Rate of	
	ASLF	(Q_a/Q_b)	BSY	MYS	Q_a	Q_b
	(% point)		(% point)			
<i>Java+Bali :</i>						
Central Java	-3.7	-0.047	5.6	0.84	3.5	5.6
East Java	-1.9	-0.045	4.2	0.73	0.9	2.9
West Java	-1.4	-0.057	3.9	0.97	1.2	4.0
Yogyakarta	-1.2	-0.150	8.0	0.72	-2.2	4.0
Bali	1.4	-0.223	7.9	0.61	0.2	8.2
<i>Outer Islands</i>						
Central Kalimantan	-6.3	-0.014	8.3	0.77	-1.5	-0.2
Bengkulu	-4.8	0.028	4.5	0.94	5.0	2.8
North Sumatra	-4.4	0.062	0.2	1.09	3.5	-0.4
Irian Jaya	-3.8	-0.015	1.5	0.64	-10.0	-7.8
West Kalimantan	-3.7	-0.021	8.2	0.88	-1.1	1.7
Jambi	-3.5	-0.073	8.9	1.02	-3.3	0.5
Aceh	-3.1	0.007	1.0	1.32	2.1	0.5
Lampung	-2.1	0.028	0.7	0.54	0.4	-1.3
East Kalimantan	-1.6	-0.028	2.7	1.05	-7.2	2.3
South Kalimantan	-1.5	-0.048	4.5	0.66	-0.6	2.1
Maluku	-1.2	-0.069	6.5	0.43	-3.0	1.1
South Sumatra	-1.2	-0.016	2.7	0.74	-0.01	2.1
Riau	-0.4	0.024	-3.1	0.99	0.8	-11.4
West Sumatra	-0.1	-0.016	2.3	0.82	3.7	5.7
South Sulawesi	0.0	-0.080	3.5	0.76	-0.9	1.9
Central Sulawesi	0.2	-0.101	7.8	0.49	-2.7	3.9
Southeast Sulawesi	0.3	-0.022	1.8	0.32	-1.7	0.1
North Sulawesi	2.1	-0.272	10.3	0.66	-5.7	4.4
West Nusa Tenggara	4.1	-0.251	4.1	0.48	0.5	7.3
East Nusa Tenggara	5.0	-0.160	5.6	0.42	-1.9	8.9

Source : as for Table 6.1 and Table 6.2

Note: Q_a/Q_b : ratio of labour productivity in agriculture to non-agriculture at 1975 constant prices labour productivity data are presented in Table A7.1 in the appendix).

BSY: proportion of non-agriculture in RGDP at 1975 constant prices.

MYS: mean years of schooling.

Q_a : agricultural labour productivity per worker.

Q_b : non-agricultural labour productivity per worker.

The high growth rate of labour productivity in non-agriculture in Bali, North and Central Sulawesi, West and East Nusa Tenggara was in part due to the decline in the employment growth rate in some non-agricultural sectors (Table A7.2 appendix). In Southeast and Central Sulawesi labour productivity in mining was very high in 1980 (second to financial sector) owing to the use of very capital intensive technology.

It appeared in many provinces that high labour productivity in non-agriculture mainly occurred in the government sector which requires better qualified workers compared to other sectors. Thus, due to this entry barrier the ability to absorb additional workers has been limited resulting in a lower growth rate of employment in comparison to that in agriculture.

7.2.2 The Change in Educational Attainment

The significant role of education in explaining regional variations in the ASLF has been discussed in Chapter 5 and 6. In this section, it is hypothesized that the change in the ASLF is negatively associated with the change in education, and that an increase in education over a period of time tends to reduce the ASLF. Thus, the decline in the ASLF tends to be faster in a region with higher increase in educational attainment as measured by mean years of schooling. The negative association which occurred between the change in the ASLF and the change in the educational level occurred in all provinces in the first period (Table 7.2), and in the majority of provinces in the second period (Table 7.3).

7.2.3 The Change in the Share of Non-agriculture in RGDP

As expounded in Chapter 4 the change in the ASLF may be explained in part by demand factors. As income increases, demand for output rises. Because the elasticity of demand for non-agricultural output is higher (generally more than unity) than that for agricultural output (generally less than unity), this means the demand for non-agricultural output rises faster than for agricultural output as income grows. Thus, there is an increase in the non-agricultural share of output (a decline in the agricultural share)

which causes the decline in the ASLF. Therefore, it may be said that the change in the non-agricultural share of RGDP is negatively associated with the change in the ASLF over a period of time. So, the decline in the ASLF tends to be higher in a region with a higher increase in the share of non-agriculture in RGDP.

Table 7.2 shows that all provinces underwent a rise in the share of non-agriculture in RGDP although the extent of the rise it differed significantly. It was negatively associated with the change in the ASLF in each province. Similar to the first period, in the majority of provinces in 1980-85, a negative association was found between the change in the ASLF and the change in the share of non-agriculture in RGDP (Table 7.3).

7.2.4 The Change in Rural Population

The fourth factor that may affect the change in the ASLF is the growth rate of the rural population. But, it may be argued that the change in the population density on arable land (for example, wet land, estates, housegardens, bareland cultivation, and steppe pasture) is a more relevant variable to explain the change in the ASLF. However, data on arable land in 1971 are not available. An increase in rural population pressure could be expected to lead to a decline in the proportion of people engaged in agriculture. Thus, we expect a higher decline in the ASLF to occur in a region with a faster rate of rural population growth.

7.2.5 The Initial Level of the Agricultural Share of the Labour Force

The change in the ASLF, to a some extent, may be affected by the initial level of the ASLF. The argument is that there is a minimum limit to the number of workers that can be employed in order to produce a certain amount of agricultural output. However, there is little empirical evidence regarding this minimum requirement of workers. Thus, this argument could be interpreted in the sense that the decline in the ASLF tends to be lower in a region with a lower initial level of ASLF.

7.3 Regression Analysis

7.3.1 The Model

To test the influence of those variables we propose 2 testable models. The choice of the appropriate model will be based on a non-nested regression models test. The models for 1971-80 and 1980-85, in semi-logarithmic form, can be formalized mathematically as follows:

Model M1

$$d[ASLF] = \alpha + \beta_1 \ln[dQ_a] + \beta_2 \ln[dQ_b^i] + \beta_3 d[MYS] + \beta_4 d[BSY^i] + \beta_5 [ASLF_I] + \beta_6 \ln[dRPOP] + \mu, \quad (7.1)$$

Model M2

$$d[ASLF] = \alpha + \beta_1 \ln[dQ_a E] + \beta_2 \ln[dQ_b E^i] + \beta_3 d[MYS] + \beta_4 d[BSY^i] + \beta_5 [ASLF_I] + \beta_6 \ln[dRPOP] + \mu, \quad (7.2)$$

$$\ln[dQ_a E^i] = \gamma_0 + \gamma_1 d[MYS_f] + v, \quad (7.3)$$

$$\ln[dQ_b E^i] = \delta_0 + \delta_1 d[MYS_{nf}] + v, \quad (7.4)$$

in all years $cov(\mu, v) = cov(\mu, v) = cov(v, v)$

where :

$d[ASLF]$ is the change in the ASLF in percentage point between two years,

dQ_a is the change in agricultural labour productivity per worker between two years = $\ln[Q_a'/Q_a]$

dQ_b is the change in non-agricultural labour productivity per worker between two years = $\ln[Q_b'/Q_b]$,

$d[MYS]$ is the change in education of the total labour force in mean years of schooling between two years,

$d[BSY]$ is the change in the share of non-agricultural sector in RGDP in percentage point between two years,

RPOP is the change in rural population between two years = $\text{Ln}[(\text{Rural population})' / (\text{Rural population})]$

$ASLF_t$ is the agricultural share of the labour force in the initial year of the two different years.

Ln is natural logarithmic,

i refers to non-agricultural labour productivity category : EM = excluding mining, and IM = including mining,

a prime indicates final values,

α is a constant term,

β, γ, δ are coefficient parameters,

v, u, μ are error terms,

no superscript refers to both sexes in urban+rural areas.

7.3.2 The Regression Results

1971-80: Including Mining (RGDP only)

Table 7.4 presents the regression results of all models, both sexes in urban+rural areas.

Model M1. Model M1 explains 68 per cent of variations in the change of the ASLF across province. A better result is obtained after dropping the rural population variable as it is not significant. Agricultural labour productivity has a negative sign as expected but is not significant. Non-agricultural labour productivity significantly explains variations in the change in the ASLF, but the sign is positive, indicating that an increase in non-agricultural labour productivity will increase the ASLF. This implies that in a region with a higher increase in labour productivity in non-agriculture, there is a less decline in the ASLF. The coefficient parameters of education and the share of non-agriculture in RGDP are significant and have the expected negative sign. These substantiate the hypotheses proposed above, that the increase in educational level and in the share of non-agriculture of RGDP have a negative effect on the change in the ASLF.

This implies that in a region with a higher increase in educational level, there is a more rapid decline in the ASLF. Likewise for the change in the share of non-agriculture in RGDP.

A positive significant correlation is found between the change in the ASLF and the initial level of the ASLF. This suggests that a decline in the ASLF is higher in a region with a lower initial level of ASLF. The explanation is that in some provinces especially in Java, Bali and East Kalimantan, the decline in the ASLF was rapid although the initial level of the ASLF was low. This could be due to the fact that more employment opportunities were available outside agriculture.

Model M2. In this model labour productivity is determined by educational level (of farmers in agriculture and non-farmers in non-agriculture as indicated by equations 7.3 and 7.4). Table 7.5 shows that the change in education is positively associated with the change in labour productivity in both sectors (it is mildly significant in agriculture, but it is not in non-agriculture). Dummy variables are used to detect an outlier. In non-the agricultural sector, labour productivity is significantly higher in Aceh compared with the rest of provinces.

As shown in Table 7.4, model M2 explains 45 per cent of variations in the change of the ASLF. Both labour productivity in agriculture and in non-agriculture are significantly and positively associated with the change in the ASLF. Coefficient signs of education and the share of non-agriculture in RGDP are negative as expected and significant.

Alternative tests for non-nested regression models is presented in Table 7.6¹⁾. The tests indicate that Model M1 is preferable to Model2. All test statistics are in favours M1.

1) As Pesaran argued (1974, p. 153), the most popular procedures employed to choose among models has been "to check the regression coefficients for their 'plausibility' and then to select that model which has the least residual variance, or, equivalently, the one has the highest multiple correlation coefficient when adjusted for the loss of degrees of freedom. However, this approach is not always satisfactory. A non-nested test is a test for two different models in the sense that they have separate parametric families and one model can not be obtained from the others as a limiting process (Pesaran, 1974).

For example, if we have two models with null hypothesis: $H_0: y = X\beta + \mu$, and if the alternative is $H_1: y = Z\gamma + v$. Then the test of H_0 against H_1 is the test of $H_0: \gamma = 0$ in the augmented regression $y = X\beta + Z\gamma + \mu$ (See McAller and M. Deister, forthcoming).

TABLE 7.4
OLS ESTIMATES OF THE CHANGE IN THE AGRICULTURAL SHARE OF THE LABOUR FORCE,
URBAN+RURAL, MALE+FEMALE, 1971-80 (INCLUDING MINING)

	Dependent Variable: d[ASLF]	
	Model M1	Model M2
Constant	-19.9347 (-3.9056)*	-9.8399 (-1.5812)
Ln[dQ _a]	-2.1135 (-0.7575)	
Ln[dQ _b]	9.9516 (4.2777)*	
Ln[dQ _a E]		26.5369 (1.7842)**
Ln[dQ _b E]		6.4967 (2.1542)*
d[MYS]	-4.9103 (-3.1243)*	-11.0137 (-2.7442)*
d[BSY _{IM}]	-79.9265 (-4.4473)*	-18.5814 (-1.9451)**
ASLF ₇₁	0.2404 (3.5831)*	0.0540 (0.6943)
Sample size	24	24
R-squared	0.6800	0.4482
R-bar-squared	0.5911	0.2949
F	7.6496	2.9241
Diagnostic Tests		
A.Functional Form($\chi^2,1$)	2.0223	0.2173
B.Normality($\chi^2,2$)	0.7867	0.4844
C.Heteroscedasticity($\chi^2,1$)	0.7926	0.3927

Irian Jaya is excluded

Level of significance : * = 0.05; ** = 0.10

A.Ramsey's RESET test using the square of the fitted values

B.Based on a test of skewness and kurtosis of residuals

C.Based on the regression of squared residuals on squared fitted values

TABLE 7.5
OLS ESTIMATES OF THE CHANGE IN THE AGRICULTURAL AND
NON-AGRICULTURAL LABOUR PRODUCTIVITY PER WORKER
URBAN+RURAL, 1971-80 (INCLUDING MINING)

	Agriculture	Non-Agriculture	
		Including Mining	Excluding Mining
	Ln[dQ _a E] (Equation 7.3)	Dependent variable: Ln[dQ _b E _{IM}] (Equation 7.4)	Ln[dQ _b E _{EM}] (Equation 7.4)
Constant	0.038 (0.40)	0.008 (0.04)	0.090 (1.04)
d[MYS _f]	0.331 (1.77)**		
d[MYS _{nf}]		0.271 (1.45)	0.218 (1.31)
Dummy(1)		1.142 (3.07)*	
Dummy(2)			-0.849 (-3.54)*
Sample size	24	24	24
R-squared	0.124	0.350	0.387
R-bar-squared	0.084	0.289	0.329
F	3.116	5.644	6.637
Diagnostic Tests			
A.Functional Form($\chi^2,1$)	0.227	0.814	0.029
B.Normality($\chi^2,2$)	2.019	0.082	1.104
C.Heteroscedasticity($\chi^2,1$)	4.584	0.568	0.222

Dummy(1) : Aceh

Dummy(2) : Jambi and East Kalimantan

Irian Jaya is excluded

Level of significance : * = 0.05; ** = 0.10

A.Ramsey's RESET test using the square of the fitted values

B.Based on a test of skewness and kurtosis of residuals

C.Based on the regression of squared residuals on squared fitted values

TABLE 7.6
ALTERNATIVE TESTS FOR NON-NESTED REGRESSION MODELS,
1971-80 (INCLUDING MINING)

Dependent variable is d[ASLF]
 Regressors for model M1: Constant, Ln[Q_a], Ln[Q_a], d[MYS], d[BSY], ASLF₇₁
 Regressors for model M2: Constant, Ln[Q_aE], Ln[Q_aE], d[MYS], d[BSY], ASLF₇₁

Test Statistic	M1 against M2	M2 against M1
N-Test	-1.9603	-10.0999
NT-Test	-1.1814	-5.7633
W-Test	-1.0970	-4.0586
J-Test	1.7050	4.4479
JA-Test	0.6902	2.8444
Encompassing	F(2,16)=3.0422	F(2,16)=11.0402

Model M1:	R-Bar-Squared	0.5911	Log-likelihood	-50.4383
Model M2:	R-Bar-Squared	0.2949	Log-likelihood	-56.9762
Model M1+M2:	R-Bar-Squared	0.6667	Log-likelihood	-46.5709

Akaike's Information Criterion of M1 versus M2= 6.5379 favours M1

Schwarz's Bayesian Information Criterion of M1 versus M2= 6.5379 favours M1

1971-80: Excluding mining (RGDP only)

Similar results are found when mining is excluded from non-agricultural sectors (Table A7.3 appendix). Agricultural labour productivity significantly explains variations in the ASLF and the association is negative. Alternative tests show that M1 is preferable to Model2 (Table A7.4 appendix).

All models show (with and without mining) that education and the share of non-agriculture in RGDP are negatively associated with the change in the ASLF. They significantly explain variations in the change of the ASLF across province.

1980-85: Including mining (RGDP only)

The results of all models are presented in Table 7.7. The variable ASLF in the initial period is dropped as it is not significant. The table shows that all explanatory variables in Model M1 significantly explain variations in the change of the ASLF. Coefficient parameters of agricultural labour productivity, education and the share of non-agriculture are significant and have a negative sign as expected. Around 59 per cent of variations in the change of the ASLF across province explained by this model. In Model2, education is the only variable that significantly influences the change in the ASLF. The association is negative as hypothesized. Thus, model M1 is preferable to Model2 as indicated by non-nested regression models tests in Table 7.9. Table 7.8 shows that education is a significant factor and is positively associated with the change in labour productivity both in agriculture and non-agriculture.

1980-85: Excluding mining (RGDP only)

Exclusion of mining from non-agricultural sectors does not change the result, in fact coefficient of determination increases (Table A7.5 appendix). Model M1 is preferable still as shown by alternative tests for non-nested regression models in Table A7.6 (appendix).

Consistent results are found from all models both in the first and second periods. That is, education and the share of non-agriculture in RGDP are negatively associated with the change in the ASLF and significant almost in all models. In Model M1, non-agricultural labour productivity is positively associated with the change in the ASLF and significant.

TABLE 7.7
OLS ESTIMATES OF THE CHANGE IN THE AGRICULTURAL SHARE OF THE LABOUR FORCE,
URBAN+RURAL, MALE+FEMALE, 1980-85 (INCLUDING MINING)

	Dependent Variable: d[ASLF]	
	Model M1	Model M2
Constant	3.6697 (2.2901)*	4.3054 (2.1349)*
Ln[dQ _a]	-7.4105 (-2.2897)*	
Ln[dQ _b]	7.2884 (2.8808)*	
Ln[dQ _a E]		-2.4536 (-0.4281)
Ln[dQ _b E]		0.8143 (0.2489)
d[MYS]	-4.8859 (-2.7617)*	-5.6372 (-3.1329)*
d[BSY _{IM}]	-47.2939 (-2.8235)*	-13.4764 (-0.7797)
Sample size	24	24
R-squared	0.5860	0.3718
R-bar-squared	0.4989	0.2396
F	6.7238	2.8118
Diagnostic Tests		
A.Functional Form($\chi^2, 1$)	2.1184	0.0580
B.Normality($\chi^2, 2$)	1.0018	0.2795
C.Heteroscedasticity($\chi^2, 1$)	2.4231	0.6444

Irian Jaya is excluded

Level of significance : * = 0.05; ** = 0.10

A.Ramsey's RESET test using the square of the fitted values

B.Based on a test of skewness and kurtosis of residuals

C.Based on the regression of squared residuals on squared fitted values

TABLE 7.8
OLS ESTIMATES OF THE CHANGE IN THE AGRICULTURAL AND
NON-AGRICULTURAL LABOUR PRODUCTIVITY PER WORKER
URBAN+RURAL, 1980-85

	Agriculture	Non-Agriculture	
		Including Mining	Excluding Mining
	Dependent variable:		
	$\text{Ln}[dQ_aE]$	$\text{Ln}[dQ_bE_{IM}]$	$\text{Ln}[dQ_bE_{EM}]$
	(Equation 7.3)	(Equation 7.4)	(Equation 7.4)
Constant	-0.147 (-1.83)**	-0.069 (-0.83)	-0.025 (-0.28)
dL[MYS _f]	0.683 (1.83)**		
dL[MYS _{nf}]		1.358 (2.68)*	1.156 (2.12)*
Dummy(1)	-0.439 (-3.33)*		
Dummy(2)		-0.752 (-6.17)*	
Sample size	25	25	25
R-squared	0.359	0.683	0.170
R-bar-squared	0.298	0.653	0.133
F	5.878	22.648	4.51
Diagnostic Tests			
A.FunctionalForm($\chi^2,1$)	1.580	1.325	2.541
B.Normality($\chi^2,2$)	0.083	0.393	1.048
C.Heteroscedasticity($\chi^2,1$)	0.699	0.217	1.077

Dummy(1) : East kalimantan

Dummy(2) : Riau

Level of significance : * = 0.05; ** = 0.10

A.Ramsey's RESET test using the square of the fitted values

B.Based on a test of skewness and kurtosis of residuals

C.Based on the regression of squared residuals on squared fitted values

TABLE 7.9
ALTERNATIVE TESTS FOR NON-NESTED REGRESSION MODELS, 1980-85 (INCLUDING MINING)

Dependent variable is d[ASLF]		
Regressors for model M1: Constant, Ln[Q _a], Ln[Q _b], d[MYS], d[BSY], ASLF ₇₁		
Regressors for model M2: Constant, Ln[Q _a E], Ln[Q _b E], d[MYS], d[BSY], ASLF ₇₁		
Test Statistic	M1 against M2	M2 against M1
N-Test	2.2460	-18.3692
NT-Test	1.9335	-4.3884
W-Test	2.2526	-3.6468
J-Test	-5.9026	8.5737
JA-Test	-6.6745	8.2692
Encompassing	F(2,17)=23.6029	F(2,17)=40.2112
Model M1:	R-Bar-Squared 0.4989	Log-likelihood -46.4272
Model M2:	R-Bar-Squared 0.2396	Log-likelihood -51.4308
Model M1+M2:	R-Bar-Squared 0.8517	Log-likelihood -30.4806
Akaike's Information Criterion of M1 versus M2= -5.0036 favours M1		
Schwarz's Bayesian Information Criterion of M1 versus M2= -5.0036 favours M1		

As Model M1 is preferable to others, this model is applied for males and females both in urban+rural and in rural areas. The models for both periods can be written mathematically as follows :

$$d[ASLF^m] = \alpha + \beta_1 \ln[dQ_a] + \beta_2 \ln[dQ_b^i] + \beta_3 d[MYS^m] + \beta_4 d[BSY^i] + \beta_5 ASLF_{71}^m + \beta_6 \ln[dRPOP] + \mu, \quad (7.5)$$

$$d[ASLF^f] = \alpha + \beta_1 \ln[dQ_a] + \beta_2 \ln[dQ_b^i] + \beta_3 d[MYS^f] + \beta_4 d[BSY^i] + \beta_5 ASLF_{71}^f + \beta_6 \ln[dRPOP] + \mu, \quad (7.6)$$

where : f refers to female, and m refers to male

Other variables and notations are as above

The results are as follows:

1971-80: Including mining (RGDP only)

The results for the first period (urban+rural) are presented in Table 7.10. The table shows that rural population growth is not a significant factor. For males, all variables, except rural population, are strongly associated with the change in the ASLF. For females, the only significant factor is education and it has a negative sign. However, the regression fails. This could be due to the fact that the female data are not quite reliable. This will be discussed in more detail in section 7.4.

Rural population significantly explains the change in the ASLF in rural areas (Table 7.11) for both sexes and males. A negative association between the change in rural population and the change in the ASLF indicates that a larger decline in the ASLF occurs in a province with a faster growth of rural population. This suggests that rural population pressure could have an important effect in pushing people out of agriculture. But for rural females, the regression fails to explain variation in the change of the ASLF.

1971-80: Excluding mining (RGDP only)

For females the regression results improve when mining is excluded especially in urban+rural areas (Table A7.7 appendix). In rural areas (Table A7.8), the significant factors are labour productivity in non-agriculture and the share of non-agriculture in RGDP. For rural males, the results also improve as indicated by a higher value of R^2 , and all coefficient parameters are significant (some are mildly significant).

1980-85: Including mining (RGDP only)

The results for the second period are presented in Table 7.12 (urban+rural) and Table 7.13 (rural). Rural population and the initial level of the ASLF are dropped as they are not significant factors in affecting the change in the ASLF, both including mining (Table A7.9 for urban+rural, and Table A7.10 for rural) and excluding mining (Table A7.11 for urban+rural, and Table A7.12 for rural). In some regressions those variables are significant for females.

TABLE 7.10
OLS ESTIMATES OF THE AGRICULTURAL SHARE OF THE LABOUR FORCE,
URBAN+RURAL, 1971-1980 (INCLUDING MINING)

	Dependent Variables : d[ASLF]		
	Both Sexes	Males	Females
Constant	-19.5674 (-3.6731)*	-16.6538 (-3.1416)*	-8.4079 (-0.9966)
dL[Q _a]	-2.2469 (-0.7794)	-6.7726 (-2.3494)*	9.8876 (1.4091)
dL[Q _b]	9.8629 (4.1150)*	9.2442 (3.8267)*	5.3941 (1.0566)
d[MYS]	-4.9682 (-3.0694)*	-5.3180 (-3.8849)*	-10.3763 (-2.4281)*
d[BSY _{IM}]	-49.4692 (-4.2741)*	-43.3039 (-3.7493)*	-31.0343 (-1.3459)
ASLF	0.2408 (3.5014)*	0.2110 (2.8758)*	0.0897 (1.1068)
dL[RPOP]	-2.0454 (-0.3656)	-0.2143 (-0.0414)	-5.4148 (-0.4507)
Sample size	24	24	24
R	0.6825	0.6713	0.4509
R	0.5704	0.5553	0.2571
F	6.0901*	5.7872*	2.3265
Diagnostic Tests			
A.Functional Form($\chi^2,1$)	2.3545	0.1425	1.0302
B.Normality($\chi^2,2$)	1.0047	0.6527	4.1441
C.Heteroscedasticity($\chi^2,1$)	0.8396	1.5033	0.7494

Level of significance : * = 0.05; ** = 0.10

Irian Jaya is excluded

A.Ramsey's RESET test using the square of the fitted values

B.Based on a test of skewness and kurtosis of residuals

C.Based on the regression of squared residuals on squared fitted values

TABLE 7.11
OLS ESTIMATES OF THE AGRICULTURAL SHARE OF THE LABOUR FORCE,
RURAL, 1971-1980 (INCLUDING MINING)

	Dependent Variables : d[ASLF]		
	Both Sexes	Males	Females
Constant	-24.0321 (-3.1625)*	-13.1065 (-1.5036)	-12.9158 (-1.3439)
dL[Q _a]	1.0351 (0.3015)	-1.8794 (-0.5434)	6.9368 (0.9342)
dL[Q _b]	8.5235 (3.3231)*	6.1960 (2.2365)*	7.8173 (1.5030)
d[MYS]	-2.8765 (-1.5681)	-4.3015 (-2.4411)*	-5.4768 (-1.2678)
d[BSY _{IM}]	-35.8016 (-2.9759)*	-23.3507 (-1.8267)**	-35.9024 (-1.5411)
ASLF	0.2925 (3.2516)*	0.1737 (1.6095)	0.1412 (1.5529)
dL[RPOP]	-24.7190 (-3.7219)*	-24.8844 (-3.6020)*	-14.4103 (-1.1783)
Sample size	24	24	24
R	0.6872	0.6026	0.4108
R	0.5763	0.4623	0.2028
F	6.2253*	4.2963*	1.97536
Diagnostic Tests			
A.Functional Form($\chi^2, 1$)	1.4221	5.5649	1.3165
B.Normality($\chi^2, 2$)	0.9901	1.8156	4.6590
C.Heteroscedasticity($\chi^2, 1$)	3.7672	3.2910	0.8850

Level of significance : * = 0.05; ** = 0.10

Irian Jaya is excluded

A.Ramsey's RESET test using the square of the fitted values

B.Based on a test of skewness and kurtosis of residuals

C.Based on the regression of squared residuals on squared fitted values

Table 7.12 shows that for males and females (in urban+rural), education and the share of non-agriculture are significant and negatively associated with the change in the ASLF. For males, the effect of non-agricultural labour productivity on the change in the ASLF is not strong. For females, although the results improve compared to the first period the regression is not good because the functional form is not appropriate as indicated by Chi-square test. Several others functional forms have been attempted but the regressions fail. This may be, to some extent, attributed to the nature of data. The results for rural areas (Table 7.13) are worse than that for urban+rural except for females.

1980-85: Excluding mining (RGDP only)

When the initial level of the ASLF and the change in rural population are dropped, exclusion of mining improves the results for both sexes, males and females (Table A7.13 for urban+rural and Table A7.14 for rural). Non-agricultural labour productivity influences the change in the ASLF significantly. For females, education is not a significant factor in rural areas.

Using the R-bar-squared as a base of comparison, the results in the second period are worse than the first period. This could be due to the fact that the decline in the ASLF was more substantial in the first period.

TABLE 7.12
OLS ESTIMATES OF THE AGRICULTURAL SHARE OF THE LABOUR FORCE,
URBAN+RURAL, 1980-1985 (INCLUDING MINING)

	Dependent Variables : d[ASLF]		
	Both Sexes	Males	Females
Constant	3.6697 (2.2901)*	4.4315 (2.8854)*	7.7855 (1.8819)**
dL[Q _a]	-7.4105 (-2.2897)*	-7.6603 (-2.4523)*	-4.6043 (-0.6419)
dL[Q _b]	7.2884 (2.8808)*	2.8103 (1.1756)	15.1231 (2.4094)*
d[MYS]	-4.8859 (-2.7617)*	-5.4296 (-3.6656)*	-8.7184 (-1.9304)**
d[BSY _{IM}]	-47.2938 (-2.8235)*	-29.7306 (-1.7927)**	-80.0347 (-2.1839)*
Sample size	24	24	24
R	0.5860	0.5586	0.5222
R	0.4989	0.4657	0.4216
F	6.7238	6.0121	5.1911
Diagnostic Tests			
A.Functional Form($\chi^2, 1$)	2.1184	0.9088	8.0631
B.Normality($\chi^2, 2$)	1.0018	0.4216	1.2301
C.Heteroscedasticity($\chi^2, 1$)	2.4231	2.3116	3.4743

Level of significance : * = 0.05; ** = 0.10

Irian Jaya is excluded

A.Ramsey's RESET test using the square of the fitted values

B.Based on a test of skewness and kurtosis of residuals

C.Based on the regression of squared residuals on squared fitted values

TABLE 7.13
OLS ESTIMATES OF THE AGRICULTURAL SHARE OF THE LABOUR FORCE,
RURAL, 1980-1985 (INCLUDING MINING)

	Dependent Variables : d[ASLF]		
	Both Sexes	Males	Females
Constant	12.0766 (2.7145)*	13.1180 (2.3623)*	16.5979 (3.1784)*
dL[Q _a]	-0.55885 (-0.1764)	-3.1791 (-0.9825)	6.5694 (1.1518)
dL[Q _b]	1.2782 (0.5050)	-0.5028 (-0.2135)	3.6127 (0.7004)
d[MYS]	-3.7807 (-1.8815)**	-4.8071 (-2.6674)*	-5.0062 (-1.1628)
d[BSY _{IM}]	-0.1302 (-2.4386)*	-0.1250 (-1.8754)**	-0.1820 (-3.0252)*
Sample size	24	24	24
R	0.4370	0.3838	0.5844
R	0.3185	0.2541	0.4969
F	3.6873	2.9591	6.6783
Diagnostic Tests			
A.Functional Form($\chi^2, 1$)	1.5252	1.2371	4.2433
B.Normality($\chi^2, 2$)	3.5972	0.2647	0.6977
C.Heteroscedasticity($\chi^2, 1$)	0.3600	0.2041	0.0001

Level of significance : * = 0.05; ** = 0.10

Irian Jaya is excluded

A.Ramsey's RESET test using the square of the fitted values

B.Based on a test of skewness and kurtosis of residuals

C.Based on the regression of squared residuals on squared fitted values

7.4 Female Earning Workers

As discussed in section 7.3 the OLS estimates of female ASLF are, in general, worse than those of males. This could partly be due to the nature of the data which are subject to changes in the use of concepts and procedures in different censuses and surveys. This has caused erratic trends in the labour force data particularly when it is broken down by employment status (Korns, 1987). Due to this "noise" Korns argues that trends in numbers of earning workers give a clearer "signal" of labour market conditions than does the time series for the total numbers of employed or the total labour force. The category "earning workers" is less subjects to "noise" so more statistically stable.

TABLE 7.14
THE DIFFERENCE BETWEEN THE AGRICULTURAL SHARE OF LABOR FORCE (ASLF) AND THE
AGRICULTURAL SHARE OF EARNING WORKERS(ASEW) AT NATIONAL LEVEL ^{*},
1971-85

	1971	1980	1985
<i>Urban+Rural</i>			
Male+Female	6.6	5.1	8.0
Male	4.9	3.9	4.5
Female	12.2	8.9	18.3
<i>Rural</i>			
Male +Female	5.4	4.6	7.2
Male	4.1	3.4	4.0
Female	10.3	8.3	18.0

Source : calculated from Censuses of 1971 (Series D) and 1980 (Series S, No.2), and *Supas* (Series No.5).

^{*}) ASLF minus ASEW, excluding Irian Jaya

Table 7.14 shows two distinctive features concerning the difference between the agricultural share of the labour force (ASLF) and the agricultural share of earning workers (ASEW). It is more stable for males over three different surveys, and it is much lower for males than for females especially in 1985. This difference is in large part due to different treatment of unpaid family workers particularly for females. As shown in

Table 7.15 the proportion of unpaid family workers for females is much higher than for males. In 1985 it was three times that of males. Likewise, a very large proportion of unpaid family workers occurred in agriculture compared to that in non-agriculture.

TABLE 7.15
PROPORTION OF UNPAID FAMILY WORKERS
TO TOTAL EMPLOYED PEOPLE AT NATIONAL LEVEL,
1971-85*)

	Agriculture			Non-Agriculture		
	1971	1980	1985	1971	1980	1985
<i>Urban+Rural</i>						
Male+Female	33.2	25.5	34.9	10.6	8.4	10.3
Male	24.3	18.1	20.2	5.7	4.2	4.5
Female	52.1	41.3	61.9	19.9	16.1	19.9
<i>Rural</i>						
Male+Female	33.3	25.8	35.6	12.4	9.4	11.7
Male	24.4	18.4	20.6	6.2	4.5	4.8
Female	52.2	41.7	62.7	23.1	17.6	21.9

Source : as for Table 7.15

*) Excluding Irian Jaya

Variations in the proportion of unpaid family workers in agriculture by province are presented in Table 7.16. They were low in Java and Bali compared with other provinces except in Yogyakarta. This could be attributed to two factors. First, employment opportunities were more readily available for females in the non-agricultural sector, and second interviewers were possibly better educated than that in other provinces which means they are more likely to probe for more accurate information, resulting in lower figures for unpaid family workers. A large increase in the proportion of unpaid family workers in Central Sulawesi between 1980 and 1985 was most likely due to measurement errors. This has resulted in a big decline in the agricultural share of female earning workers from 63.1 to 29.2 and from 68.3 to 33.7 in urban plus rural, and rural areas respectively (Table 7.17).

TABLE 7.16
PROPORTION OF FEMALE UNPAID FAMILY WORKERS
TO TOTAL FEMALE EMPLOYED PEOPLE IN AGRICULTURE
1971-85

	Urban+Rural			Rural		
	1971	1980	1985	1971	1980	1985
<i>Java+Bali</i>						
West Java	35.6	33.0	47.7	35.7	33.5	48.6
Central Java	46.8	44.0	60.2	47.0	44.6	61.0
Yogyakarta	60.5	58.2	71.2	61.0	58.7	72.3
East Java	42.3	36.6	53.9	42.6	37.2	55.2
Bali	79.0	45.4	54.0	79.1	45.4	54.2
<i>Outer Islands</i>						
Aceh	70.8	45.6	68.0	71.1	45.7	68.6
North Sumatra	57.1	36.1	62.3	57.1	35.9	62.7
West Sumatra	46.9	26.3	63.8	46.5	26.4	63.9
Riau	57.6	38.9	57.3	57.7	40.1	56.8
Jambi	54.5	34.2	65.2	54.8	34.1	65.3
South Sumatra	72.6	49.7	73.4	72.0	50.0	73.7
Bengkulu	66.3	40.5	76.6	66.4	40.6	76.7
Lampung	72.1	53.6	73.5	72.1	53.7	73.5
West Nusa Tenggara	71.4	51.1	65.3	71.4	50.9	66.3
East Nusa Tenggara	82.9	49.7	79.5	83.3	49.7	79.7
West Kalimantan	65.0	50.0	83.3	65.1	50.1	83.5
Central Kalimantan	79.6	67.6	79.5	79.9	67.6	79.4
South Kalimantan	66.9	43.5	70.2	67.9	43.5	70.4
East Kalimantan	70.9	51.4	67.8	68.3	53.9	67.9
North Sulawesi	62.8	48.2	68.9	63.1	48.2	69.1
Central Sulawesi	73.8	42.8	84.4	73.8	42.8	84.5
South Sulawesi	65.2	42.4	66.9	65.7	42.7	67.4
Southeast Sulawesi	67.4	44.3	75.8	67.4	44.3	75.8
Maluku	72.4	45.2	68.5	72.7	45.3	68.5
Irian Jaya	--	56.6	83.2	--	56.7	83.3
All Provinces	52.1	41.5	62.2	52.2	41.9	63.0
All Provinces*)	52.1	41.3	61.9	52.2	41.7	62.7

Source : Calculated from: Indonesian Censuses of 1971 (Series E, No.01-25) and 1980 (Series S, No.2), and 1985 *Supas* (Series No.5).

* Excluding Irian Jaya

-- Excluded from calculation

TABLE 7.17
THE AGRICULTURAL SHARE OF FEMALE EARNING WORKERS,
1971-85

	Urban+Rural			Rural		
	1971	1980	1985	1971	1980	1985
<i>Java+Bali</i>						
West Java	62.9	46.2	39.1	69.5	55.6	51.4
Central Java	43.6	36.2	27.4	50.1	44.1	36.5
Yogyakarta	31.5	34.0	27.9	37.4	41.4	36.8
East Java	54.9	42.1	35.1	63.8	50.4	44.0
Bali	22.1	28.2	34.1	26.3	32.3	40.3
<i>Outer Islands</i>						
Aceh	73.9	68.8	57.0	78.2	72.9	60.2
North Sumatra	78.0	72.7	53.3	85.6	82.9	70.1
West Sumatra	69.0	59.8	44.4	74.7	64.4	51.5
Riau	71.8	61.7	51.2	82.6	74.5	69.8
Jambi	86.7	76.8	54.6	93.9	81.4	63.2
South Sumatra	65.7	66.8	48.0	83.8	79.8	64.1
Bengkulu	90.8	87.0	65.7	96.1	90.5	74.0
Lampung	73.9	59.4	48.6	80.9	66.8	55.9
West Nusa Tenggara	28.8	25.8	28.0	31.1	28.3	31.7
East Nusa Tenggara	70.6	58.5	52.5	73.1	61.1	57.4
West Kalimantan	95.3	85.7	62.6	97.6	92.5	76.2
Central Kalimantan	72.7	63.6	41.4	80.8	69.7	49.6
South Kalimantan	63.1	59.8	38.4	79.8	69.2	47.8
East Kalimantan	69.2	43.7	34.3	88.1	64.2	54.5
North Sulawesi	43.1	28.0	20.8	56.0	34.3	26.4
Central Sulawesi	77.2	63.1	29.2	79.4	68.3	33.7
South Sulawesi	26.3	33.0	25.3	32.0	39.9	31.7
Southeast Sulawesi	86.9	69.4	52.8	89.4	74.5	58.8
Maluku	70.1	67.4	45.5	79.7	74.1	54.0
Irian Jaya	--	82.2	57.7	--	88.6	76.8
All Provinces	54.6	46.9	36.5	62.3	55.4	46.6
All Provinces*	54.6	46.7	36.4	62.3	55.2	46.4

Source : as for Table 7.17.

* Excluding Irian Jaya

-- Excluded from calculation

Gregory (1980, pp. 677-688) argues that the number of unpaid family workers is likely to be subject to considerable errors in measurement particularly in rural areas and in the enumeration of women. It was only in Bali and West Nusa Tenggara that agricultural

share of earning workers increased in 1980-85 which was consistent with a high increase in the ASLF (Table 7.17).

A lower proportion of unpaid family workers occurred in 1980. According to Korns (1987, p. 9) the census sample was large and limited time was available for training interviewers. Faced with a heavy load and a long questionnaire, census interviewers may had no time for probing questions. This resulted in a lower proportion of unpaid family workers. Jones (1987, pp. 5-7) also suggests that the 1980 census appeared to categorize some people as "self-employed assisted by family members/temporary workers" who would have been included in the unpaid family workers category in 1971. A decline in the proportion of the self-employed assisted by family members in 1985 was offset by an increase in the proportion of unpaid family members. Apart from that, as discussed in Chapter 1, it could be explained by the better quality of interviewers in *Supas* (Jones, 1987, p. 11). In addition, *Supas* 1985 provided a more comprehensive guidance manual with advice on the definition of "working" which was unavailable in the previous censuses (Korns, 1987, p. 10).

The change in the ASLF between two years can be decomposed into two parts, viz. the change due to earning workers and that due to unpaid family workers. This can mathematically be written as follows :

$$\lambda = \sum e_i v_i \quad (7.7)$$

where :

e is probability of employed people in the agricultural sector by employment status,

v is proportion of employed people by employment status to total employed people,

$i = 1, 2$

1 = agricultural share of earning workers (ASEW),

2 = agricultural share of unpaid family workers (UPFW),

then the change in λ is

$$\lambda' - \lambda = \sum \{[e_i v_i]' - [e_i v_i]\} \quad (7.8)$$

$$d\lambda = d[e_1 v_1] + d[e_2 v_2] \quad (7.9)$$

= due to the change in ASEW + due to the change in UPFW

where:

d indicates the difference between two years,

prime indicates final value.

The change in female ASLF between 1971 and 1980 is given in Table 7.18. It shows that the decline in the ASLF was almost entirely due to the decline in the unpaid family workers (UPFW). Only Java (except Yogyakarta) and North Sulawesi did agricultural share of earning workers (ASEW) contribute to the decline in the ASLF. Of these provinces, in West Java alone was the contribution of ASEW higher than that of UPFW. However, between 1980 and 1985 the situation was reversed (Table 7.19). The ASEW saw a negative contribution to the change in the ASLF, while UPFW gave a positive contribution. It was only in Bali did ASEW make a positive contribution. In Java the decline in the ASLF was more an urban phenomenon. In rural areas the female ASLF increased in Java, Bali and several other provinces. Apart from the data problem this may be also attributed to the sluggishness of the economy in that period. As argued by Gregory (1980, p. 688) an increase in the number of unpaid family workers in agriculture might be indicative of an inadequate absorptive capacity of the economy.

We apply model M1 to estimate the agricultural share of earning workers. The results are presented in Table 7.20. It shows that in the first period it was only education and the initial level of the ASEW which significantly explained variations in the ASEW in urban+rural areas. In rural areas, education had the expected negative sign but was not

significant. Other factors, agricultural labour productivity, non-agricultural labour productivity (with and without mining), the non-agricultural share of RGDP (with and without mining), and the change in rural population are dropped because they are not significant, and in some cases they caused regression to fail.

In the second period, labour productivity in agriculture and in non-agriculture (with and without mining), and the change in rural population are not significant factors; and hence they are dropped. Including mining (Table 7.20), the share of non-agriculture in RGDP explained variations in the change in the female ASEW. The results were only significant in rural areas. However, education has a positive sign but is not significant. The initial level of ASEW influenced the change in the ASEW, in that ASEW tended to decline significantly in a region with higher initial level of ASEW. The results rather different when mining is excluded (Table A7.15 in the appendix). The share of non-agriculture in RGDP does not explain variations in the change in ASEW.

Thus, even though we are using the agricultural share of earning workers as a regressand instead of the agricultural share of the labour force, the results do not improve much. This could be explained by two factors, (1) as discussed in Chapter 1, the share of earning workers is not only influenced by the better coverage of the employed population but also it is related to different treatment of status groups in the censuses; and (2) variations in female ASEW (agricultural share of earning workers) may be explained by other factors than those we have investigated.

TABLE 7.18
DECOMPOSITION OF THE CHANGE IN FEMALES AGRICULTURAL SHARE OF LABOUR FORCE,
1971-80

	Urban+Rural			Rural		
	Due to		Change in	Due to		Change in
	Change in			Change in		
	ASEW	UPFW	ASLF	ASEW	UPFW	ASLF
<i>Java+Bali</i>						
West Java	-9.5	-7.4	-16.9	-7.4	-6.2	-13.6
East Java	-5.4	-8.8	-14.2	-4.5	-8.7	-13.2
Central Java	-3.4	-5.4	-8.9	-2.2	-4.4	-6.6
Yogyakarta	2.1	0.3	2.3	3.0	1.2	4.2
Bali	10.1	-23.5	-13.4	11.7	-25.2	-13.5
<i>Outer Islands</i>						
North Sulawesi	-1.2	-17.4	-18.5	-0.9	-20.4	-21.4
West Nusa Tenggara	2.9	-18.4	-15.5	3.5	-18.9	-15.3
East Kalimantan	3.3	-29.7	-26.4	5.4	-22.4	-17.1
West Sumatra	6.3	-19.4	-13.2	6.7	-19.8	-13.1
Central Kalimantan	7.8	-16.8	-9.0	8.5	-17.1	-8.6
Riau	8.1	-19.7	-11.6	11.3	-18.0	-6.7
South Sulawesi	8.7	-11.4	-2.7	10.8	-12.9	-2.1
Lampung	9.3	-23.3	-14.0	10.9	-22.2	-11.3
Jambi	11.7	-21.8	-10.1	12.1	-23.5	-11.4
West Kalimantan	11.9	-16.5	-4.5	13.8	-15.1	-1.3
South Kalimantan	11.9	-23.7	-11.9	13.9	-27.5	-13.6
North Sumatra	12.6	-21.2	-8.6	16.1	-21.1	-5.0
Southeast Sulawesi	13.0	-27.3	-14.3	14.7	-26.6	-11.8
South Sumatra	16.1	-21.5	-5.4	17.7	-21.9	-4.2
Aceh	16.9	-26.2	-9.4	18.1	-26.4	-8.3
Maluku	17.8	-27.7	-9.9	19.4	-29.0	-9.6
Central Sulawesi	18.9	-30.7	-11.9	20.9	-29.7	-8.8
East Nusa Tenggara	20.5	-34.2	-13.7	21.6	-34.3	-12.7
Bengkulu	21.7	-26.3	-4.6	22.4	-26.9	-4.5
All Provinces*	0.7	-11.6	-10.9	2.3	-11.2	-8.9

Source: calculated from Indonesian Population Censuses of 1971 (Series E, No.01-24) and 1980 (Series S, No.2).

* Excluding Irian Jaya.

TABLE 7.19
DECOMPOSITION OF THE CHANGE IN FEMALES AGRICULTURAL SHARE OF LABOUR FORCE,
1980-85

	Urban+Rural			Rural		
	Due to		Change in	Due to		Change in
	Change in			Change in		
	ASEW	UPFW	ASLF	ASEW	UPFW	ASLF
<i>Java+Bali</i>						
West Java	-8.9	6.4	-2.5	-8.7	9.6	0.8
East Java	-8.7	8.4	-0.3	-9.9	11.0	1.1
Central Java	-8.3	6.2	-2.1	-8.8	8.8	0.0
Yogyakarta	-6.5	6.6	0.1	-7.4	9.5	2.1
Bali	0.7	8.0	8.6	1.0	9.4	10.4
<i>Outer Islands</i>						
Bengkulu	-33.7	28.8	-4.8	-34.2	30.9	-3.3
West Kalimantan	-30.6	28.1	-2.5	-32.1	30.1	-2.0
Central Sulawesi	-30.0	26.9	-3.2	-31.7	28.6	-3.1
Jambi	-26.8	21.2	-5.6	-27.1	23.9	-3.1
West Sumatra	-24.2	23.8	-0.4	-25.2	26.5	1.4
Southeast Sulawesi	-23.9	24.9	1.0	-25.2	25.9	0.7
Irian Jaya	-23.6	22.5	-1.1	-23.9	26.3	2.3
North Sumatra	-23.0	16.0	-7.0	-24.3	21.0	-3.3
Maluku	-20.3	11.7	-8.6	-20.8	13.9	-6.9
South Kalimantan	-20.1	13.2	-6.9	-22.0	15.7	-6.3
South Sumatra	-19.3	15.2	-4.1	-20.9	18.6	-2.4
East Nusa Tenggara	-18.5	28.5	10.0	-19.0	29.8	10.9
Aceh	-18.0	16.2	-1.8	-19.1	17.0	-2.1
Riau	-14.5	10.6	-3.9	-14.1	12.7	-1.4
Lampung	-14.1	14.4	0.3	-15.2	15.1	-0.1
Central Kalimantan	-11.8	0.7	-11.1	-11.7	2.7	-8.9
East Kalimantan	-10.0	7.7	-2.2	-11.3	8.5	-2.8
South Sulawesi	-9.4	12.5	3.1	-11.1	14.9	3.8
North Sulawesi	-7.8	9.0	1.2	-9.3	10.8	1.6
West Nusa Tenggara	-1.3	12.2	10.9	-1.6	14.6	13.1
All Provinces	-11.9	11.1	-0.9	-13.1	14.1	1.0

Source: calculated from Indonesian Population Census of 1980 (Series S, No.2), and *Supas* (Series No.5)

TABLE 7.20
OLS ESTIMATES OF THE CHANGE IN THE AGRICULTURAL SHARE OF
FEMALE EARNING WORKERS, 1980-1985 (INCLUDING MINING)

	Dependent Variable: d[ASEW]			
	1971-80 Urban+rural	1971-80 Rural	1980-85 Urban+rural	1980-85 Rural
Constant	13.4652 (2.2527)*	10.3202 (1.5838)	11.2460 (2.1039)*	12.4960 (1.9053)**
d[BSO _{IM}]			-0.6154 (-1.7076)	-0.8724 (-2.0436)**
d[MYS]	-10.9477 (-2.2618)*	-5.6834 (-1.1164)	2.4206 (0.4824)	3.8546 (0.6425)
ASEW ₇₁	-0.1967 (-3.1110)*	-0.1953 (-3.0046)*		
ASEW ₈₀			-0.4256 (-6.6996)*	-0.3590 (-4.6602)*
Sample size	24	24	25	25
R-squared	0.3956	0.3207	0.6932	0.5294
R-bar-squared	0.3381	0.2560	0.6494	0.4621
F	6.8735	4.9577	15.8186	7.8739
Diagnostic tests				
A.Functional Form($\chi^2,1$)	0.1328	1.2322	2.8141	3.4529
B.Normality($\chi^2,2$)	1.1325	3.1142	2.9581	4.1666
C.Heteroscedasticity($\chi^2,1$)	0.3777	0.7441	0.2037	1.1134

Level of significance : * = 0.05; ** = 0.10

A.Ramsey's RESET test using the square of the fitted values

B.Based on a test of skewness and kurtosis of residuals

C.Based on the regression of squared residuals on squared fitted values

7.5 Summary and Conclusion

- (1) A number of factors hypothesized to explain regional variations in the change of the ASLF in 1971-80 and 1980-85 are the change in agricultural labour productivity per worker, the change in non-agricultural labour productivity per worker, the change in educational attainment of the labour force, the change in the share of non-agriculture in RGDP, the initial level of the ASLF.
- (2) There are two alternative models applied to test the hypotheses. Statistical tests demonstrate that model M1 is preferable to Model2. In model M1, unlike other models, labour productivities in both sectors are exogeneous, they are not dependent on the change in educational level and in other variables.
- (3) The regression results show that the change in agricultural labour productivity, in both periods, is negatively associated with the change in the ASLF and significant in some cases (male, female, urban+rural, rural, with and without mining). The change in non-agricultural labour productivity has a positive association with the change in the ASLF and is highly significant in almost all cases.
- (4) Variations in the change the ASLF across provinces were significantly explained by the change in education in both periods, and the association is negative as expected. The rapid decline in the ASLF occurred in regions with a faster increase in education.
- (5) The change in the share of non-agriculture in RGDP strongly influences variations in the change of the ASLF, and the association is negative. This suggests that the non-agricultural sectors absorbs employment through the demand side.
- (6) The change in rural population explains significantly variations in the ASLF in rural areas only in the first period. The association is negative indicating the faster the

rural population grew in one region, the larger the decline in the ASLF. In the second period, rural population growth did not play a significant role in influencing the change in the ASLF.

- (7) The regression results for females are not quite convincing and worse than those for males. This is, to a large extent, due to the nature of the data. The large changes in numbers of unpaid family workers reflect changes in enumeration procedures as much as actual changes in employment. But the use of earning workers as a regressand does not improve the regression results much. This suggests that other factors which we have not investigated may be important determinants of changes in the female agricultural share of the labour force.

Chapter 8

The Role of Rural Development and Urbanisation in the Change in the Agricultural Share of the Labour Force

This chapter deals with the role of rural development and urbanisation in the decline of the ASLF (agricultural share of the labour force) in the two periods, 1971-80 and 1980-85. The first section examines a decomposition of the change in the ASLF into three parts. The second section discusses the role of rural development. The third section elucidates the impact of urbanisation on the change in the ASLF. Conclusions are presented in the fourth section.

8.1 Decomposition of the Change in the Agricultural Share of the Labour Force

In 1980, 22.4 per cent of Indonesians resided in urban areas (1980 census, Table 02). This figure rose to 26.2 per cent in 1985 (*Supas* 1985, Table 01). However, the average annual growth rate of the urban population has increased from 3.6 per cent between 1960 and 1970 to 4.0 per cent between 1970 and 1980 (World Development Report, 1982, p. 148). The growth rate in the latter period was obtained after taking account of changing boundaries and definitions (Hugo *et al.*, 1987, p. 88). Hence it is useful to examine the effect of urbanisation on the decline in the agricultural share of labour force in the period 1971-80 and 1980-85.

By taking account of urbanisation, the agricultural share of the labour force (ASLF) can be written as follows :

$$\lambda = \alpha\lambda^u + (1-\alpha)\lambda^r \quad (8.1)$$

Then the change in λ from one year to another is,

$$\lambda' - \lambda = d\lambda = [\alpha\lambda^u + (1-\alpha)\lambda^r]' - [\alpha\lambda^u + (1-\alpha)\lambda^r] \quad (8.2)$$

where

λ = ASLF in both urban and rural areas,

λ^u = ASLF in urban areas,

λ^r = ASLF in rural areas,

α = proportion of labour force to total in urban areas,

a prime refers to final values,

d indicates the difference value between the final and initial values.

The change in λ may be decomposed into three components, namely :

$$d\lambda = 1/2 \sum d\lambda^r (2 - \alpha - \alpha') + 1/2 \sum d\lambda^u (\alpha' + \alpha) + 1/2 \sum d\alpha (\lambda^{u'} + \lambda^u - \lambda^r - \lambda^{r'}) \quad (8.3)$$

or

$d\lambda$ = effect of changes within rural areas
 + effect of changes within urban areas
 + effect of urbanisation

A complete derivation of the formula is given in the appendix A8.0.

Urbanisation is defined as that part of the change in the agricultural share of the labour force which is due to a movement out of rural agricultural employment to urban non-agricultural employment. A negative effect implies a movement of workers from agriculture in rural areas to non-agriculture in urban areas, and a positive effect is the reverse. Since the decomposition covers between three points in time (between 1971 and 1980, and between 1980 and 1985) the movement of labour or commuters from rural to urban and the other way around cannot be detected.

The decomposition of the changes of the agricultural share of labour force at the national level in 1971-80 and in 1980-85 is presented in Table 8.1. The table shows that urbanisation explains a large amount of the change in 1980-85 but only a small part of the change in 1971-80. Therefore, the change in the agricultural share of labour force in 1971-80 cannot be attributed mainly to urbanisation. The first period saw rapid

economic growth, stemming from the oil price increases in 1973 and from the huge amount of foreign aid and investment on public and private account injected into the economy (Sundrum, 1986; Booth and Baharsyah, 1986, p. 1; Ananta *et al.*, 1988, p. 67). This impressive performance affected the structure of sectoral employment. However, surprisingly, the decline in the ASLF in the first period was mainly a rural phenomenon. Almost 70 per cent of the total decline occurred in rural areas for both sexes.

TABLE 8.1
DECOMPOSITION OF CHANGES IN THE AGRICULTURAL SHARE OF
LABOUR FORCE AT NATIONAL LEVEL, 1971-80 AND 1980-85.

	Change within Urban Areas	Rural Areas	Effect of Urban isation	Net Observed Effect
	(1)	(2)	(3)	(4=1+2+3)
<i>1971-80</i>				
Male	-0.2 (-3.1)	-6.5 (-67.7)	-2.8 (-29.2)	-9.6 (-100.0)
Female	-0.4 (-3.6)	-8.0 (-71.4)	-2.8 (-25.0)	-11.2 (-100.0)
Male+Female	-0.3 (-3.0)	-7.0 (-69.3)	-2.8 (-27.7)	-10.1 (-100.0)
<i>1980-85</i>				
Male	-0.2 (-10.0)	*	-1.8 (-90.0)	-2.0 (-100.0)
Female	-0.1 (-11.1)	0.9 (100.0)	-1.7 (-188.9)	-0.9 (-100.0)
Male+Female	-0.2 (-11.8)	0.2 (11.8)	-1.7 (-100.0)	-1.7 (-100.0)

Source : Calculated from Indonesian Population Censuses of 1971 (Series D) and 1980 (Series S, No.2) ,
and *Supas* 1985 (Series No.5).

Note : * negligible

Figures in brackets are per cents.

The totals may not add exactly due to rounding.

By way of comparison, in South Asia rural to rural migration accounted for 47.2 per cent of all inter-division migration in Bangladesh in 1974, 61.2 per cent of all migration in India in the period 1966-71, 41.5 per cent of all migration in Pakistan in the period 1965-73, and 32.3 per cent of all migration in the Philippines in the period 1970-75 (Hugo, 1984b, pp. 68-69).

A high figure for females within rural areas in 1980-85 could, as discussed in Chapter 7, be attributed to greater coverage of female unpaid family workers in 1985 compared with 1980. The low contribution of urban areas to the overall decline in the ASLF in Indonesia in the 1970s is to be expected. It is due to the fact that the proportion of agricultural employment in urban areas was quite small: 2.4 per cent, 3.4 per cent and 3.8 per cent respectively for males in 1971, 1980 and 1985, and 1.7 per cent, 2.3 per cent and 2.6 per cent for females in the same period (Table A8.6 in the appendix).

The following section will argue that in the first period the remarkable capacity of the non-agricultural sector to provide employment opportunities in rural areas was in large part attributable to the role of government spending. Rapid agricultural and rural development caused a rapid decline in the agricultural share of the labour force most of which was absorbed by the non-agricultural sector in rural areas. The role of the non-agricultural sector in creating employment in rural areas was thus significant during the decade of rapid growth. In the second period, development expenditure, as a percentage of total budgetary expenditure, was constant on average until 1984, and declined thereafter. Agricultural employment grew faster than in the first period, implying that a greater part of the additional employment was absorbed in agriculture. The large additional employment in agriculture, as discussed in Chapter 1 and Chapter 7, was attributed to a larger inclusion of unpaid family workers in 1985, especially females. The absorptive capacity of the non-agricultural sector in rural areas was more limited. The agricultural share of the labour force fell only slightly, but most of it was attributed to urbanisation.

8.2. The role of Non-Agricultural Sector in Rural Areas

Employment creation in the non-agricultural sectors is closely associated with the development of agriculture. Agricultural development in Indonesia since 1970s has been characterised by a rapid and wide spread adoption of new HYVs in foodcrops, especially rice, and by changes in agricultural institutions. Variations in the capacity of rural areas to provide employment may be examined through micro data sources which are, unfortunately, mostly only available for Java.

Java has experienced a rapid growth in agricultural production, especially in rice. The higher growth of yields in Javanese rice production than the rest of the country in the 1970s was due to the greater use of chemical fertiliser, facilitated by a major rehabilitation of irrigation systems and better extension services to the farmers compared with the rest of the country (Booth and Baharsyah, 1986, pp. 8-10) and a widespread adoption of high yielding varieties resistant to the *wereng* (brown planthopper) (Collier *et al.*, 1982, p. 84).

The resulting agricultural development has not only increased yields but also changes in agricultural institutions, which in turn were partly responsible for the structural change in employment. For example, a study in rural areas in Java by Collier *et al.* (1974) revealed gradual changes in agricultural institutions including new methods of selling crops, called *tebasan*, which began to replace the *traditional bawon* system, in the wet season 1970/71. This tradition-breaking innovation, facilitated by the adoption of new high yielding varieties, had an adverse impact on employment. However, this method was more efficient in the sense that the harvest yields were not damaged, as fewer people were employed, and also the costs of rice harvesting could be lowered. The use of the sickle to harvest rice has released substantial labour especially women for other employment opportunities. Its impact on reducing employment appeared to be quite significant. Collier *et al.* (1974, p. 181) stated that " a major change is that the

absorptive capacity of the Javanese farmers' wet rice fields to always employ one more person has come to a halt".

Some micro studies indicated that the rapid adoption of high yielding varieties, facilitated by better irrigation, brought about a contraction in agricultural employment. A study by Montgomery (1975, pp. 230-231) in Yogyakarta revealed that the use of high yielding varieties tended to reduce labour requirements per harvested hectare. Yet, an expansion of cultivated area resulted in a net increase in labour use. For example, labour used in rice production increased from 35 millions to 39.2 millions work days after an extension of harvested area and an increase in cropping intensity. Also in East Java multiple-cropping is now very common with up to three crops of *padi sawah* per year in areas where water supply is good, and two crops of *padi sawah* and one dry crop in many other areas (Bandiono and Conroy, 1986, p. 355; Collier *et al*, 1982b).

A study conducted by Collier *et al*. (1982b, pp. 25-29) in two lowlands rice villages (Gemarang and Sukasari) also indicated that labour use per crop/hectare declined. Nevertheless, the decline was somewhat offset by the change in cropping patterns which has permitted the cultivation of additional crops. Labour use increased substantially when the cropping pattern changed. It increased considerably (11 per cent) from rice-tobacco-corn cropping pattern to rice-rice pattern; an increase of 35 per cent was encountered when cropping increased from two crops of rice to three crops of rice per annum. So an increase in the number of crops per year which was very common in many areas after 1979 was made possible by the improved irrigation facilities.

According to an ILO report (1989, Table 3.2, p. 27) between 1978 and 1986 *sawah* area outside Java and Bali grew much faster than that in Java and Bali except in Jambi and East Kalimantan which experienced a decline of 3.5 per cent and 9.8 per cent a year. In fact in Java *sawah* area fell in that period by 0.2 per cent in Central Java, 0.6 per cent in Yogyakarta, 0.7 per cent in East Java, 0.2 per cent in Bali. In West Java it rose by 0.3

per cent a year. The contribution of harvested area to the total production growth of *padi sawah* was higher outside Java than in Java (Booth, 1988, p. 41). For example, harvested area growth contributed 21 per cent to total rice production growth in Java, while in Sumatra it contributed 50.0 per cent, in Kalimantan 25 per cent, in Sulawesi 37 per cent, in Nusa Tenggara 37 per cent, and in the Outer Islands as a whole 41 per cent. So it appeared that outside Java and Bali area expansion provided more agricultural employment opportunities than on Java.

In Java, the contribution of cashcrops to additional employment creation was not large bearing in mind that its area share is quite small. In West Java estates contributed 8.0 per cent to the total land use in 1980, while in Central Java and East Java their contribution was 2.3 per cent and 4.1 per cent, and in Yogyakarta less than 1.0 per cent (Statistical Year-book of Indonesia, 1982). In contrast to food crops, where the growth in output, especially rice, has been largely attributed to yields, the increase in output of cashcrop has been due to expansion in planted area, and its impact on employment opportunities in the areas where expansion has occurred has been substantial (ILO, 1989, p. 66). The expansion of cashcrops in provinces outside Java has been much higher than in Java (Statistical Year-book of Indonesia, 1982).

Despite the expansion of *sawah* area outside Java, Deuster (1982) argued that the lower quality of land and irrigation in most Outer Islands limits multiple cropping and may have constrained the ability of foodcrops to absorb more labour even though in some provinces these constraints did not appear to operate, such as in West Sumatra. However, it may be argued that there have been fewer institutional changes in the Outer Islands compared to Java and Bali, and this may act as an offsetting factor in expanding employment opportunities. For example, the use of the sickle for harvesting in most parts of the Outer Islands was much lower than that in Java in 1982/83 (Booth, 1988, Table 5.23, p. 184). As an illustration, the average percentage of households using *ani-ani* for harvest was more than 80.0 per cent in Kalimantan, 43.9 per cent in Sumatra,

while in Java the figure was 16.1 per cent. In Sulawesi the figure was very close to Java at 16.9 per cent. Therefore, this factor coupled with the expansion of *sawah* and cashcrops may have played an important role in providing agricultural employment opportunities in the Outer Islands.

In 1971-80, as shown in Table A8.4 (appendix), agricultural employment outside Java+Bali has grown much faster (2.7 per cent per annum) than on Java+Bali (1 per cent per annum). The decline of the growth rate in Bali (for male) may be explained partly by relatively large outmigration. Its net-migration increased from -1.3 per cent in 1971 to -2.3 per cent in 1980 (Hugo *et al.*, 1987, Table 5.4). The decline in West Nusa Tenggara and relatively low growth in East Nusa Tenggara may be attributed to the low capacity of the agricultural sector to provide jobs. The high rate in Central Kalimantan may, to a large extent, be due to a huge of in-migrants intake. In *Repelita* III it became the chief destination for transmigrants, accounting for 40 per cent of the total (Mubyarto and Baswir, 1989, p. 508). The contribution of the transmigration program to the rapid increase in agricultural employment was also important in Lampung. The net migration was above 30 per cent in 1971 and 1980, the highest in Indonesia (Hugo *et al.*, 1987, Table 5.4). In Jambi and East Kalimantan, the high growth rate of agricultural employment was partly attributed to the change in the urban status (this will be detailed in section 8.3). According to Booth (1988, p. 92) this rural in-migration which has occurred outside Java in 1970s is highly correlated to the rate of growth of new farms, which in turn is the result of government-financed land settlement schemes.

Therefore, it may be argued that agricultural development by province in Indonesia has had very different characteristics which in turn affects the provinces' ability to create productive employment in agriculture. Java and Bali witnessed faster changes in agricultural institutions with consequent reduction in agricultural employment. By contrast, the Outer Islands experienced fewer changes in agricultural institutions and this, coupled with their potential to expand area of *sawah* and dry land, has enabled

them to absorb more agricultural labour. The large capacity of the agricultural sector to provide employment in the second period, during which the economy slowed down, is detailed in Table A8.3 in the appendix. The table shows that the Outer Islands had a greater capacity to create additional employment in agriculture than Java and Bali.

Turning to the capacity of rural areas to provide employment opportunities in the non-agricultural sector, we examine both the demand-side and supply-side factors.

Supply-side. The supply-side explanation lies in the role of the government in providing resources for agricultural and rural development such as improvement of infrastructure (rural transport, irrigation, rural electrification), extension programmes of technology use, etc. The aims of these government programmes was to increase production and to create more employment. A labour intensive programme (*Program Padat Karya*) was launched in 1969. To this was added the Kabupaten Programme which is known as the *Inpres* Programme (*Program Inpres*)¹⁾. The programme in turn is one of several development subsidies to particular levels of government (province, *kabupaten*, village), which were expanded in the mid-1970s to include sectoral programmes as well (primary school, health clinics, reforestation, markets, roads, and bridges and drinking water). The projects are designed to be labour intensive as their main aim is to expand permanent employment opportunities, particularly for those who mostly come from the poor groups in terms of income and ownership of land. In 1974/75 the grants to provinces, *kabupaten* and villages accounted for 85 per cent of all grants which in practice have largely been used for the rehabilitation, maintenance and in many cases extension of infrastructure such as roads, bridges and irrigation (Booth, 1988, p. 11). The overall contribution of the *Kabupaten* programme was significant. In 1972-73 the direct increases in labour on project construction was approximately 43.5 million mandays (Patten *et al.*, 1980, p. 173). However, total development expenditures as a percentage of budgetary expenditures have fallen since the early 1980s.

1) The *Kabupaten* Development programme was established with Instruction of the President no.1 1970 to build on the *Padat Karya* programme. The programme is designed to achieve goals which emphasize employment creation (Patten, *et al.*, 1980).

The ability of the rural economy to create non-agricultural employment varies widely by province. Its variation across provinces may be examined by comparing the proportion of non-agricultural employment to total employment in rural areas (Table A8.5 in the appendix). The table shows that the proportion of non-agricultural employment in rural areas increased between 1971 and 1980 in all provinces except in Riau. Compared to Thailand, for example, the proportion of non-agricultural employment in rural areas in Indonesia is relatively high ²⁾. The figure in Thailand was 7.4 per cent in 1954 and 10.6 per cent in 1970, while in Malaysia it was 38.7 per cent in 1970 and in India 17.2 per cent in 1961 (Jones, 1983b, Table 6).

The decline in government spending may have contributed to the incapacity of the non-agricultural sector to provide employment in rural areas after 1980. Since 1983 total development expenditure as a percentage of budgetary expenditures has been declining. This was due to the falling oil revenues, growing debt servicing obligations and the strict adherence to the balanced budget principle. As a percentage of GDP, development expenditure has tended to fall from 13.0 per cent in 1980/81 to 11.3 per cent in 1985/86. Also regional development subsidies had the same tendency to fall.

Demand-side. The demand side explanation lies in the indirect effect of increasing in agricultural incomes owing to a rise in the agricultural productivity. The rise in purchasing power has resulted in the proportion of income spent on non-food increasing, thus generating additional employment. The additional income generated by *Inpres* projects may also have created additional employment in rural areas (Patten *et al.*, 1980, pp. 157-173). The importance of demand-side factors in creating rural employment was stressed by White (1989, pp. 5-9)³⁾. He argues that the expansion of rural non-agricultural activities is mainly determined by an improvement in the

2) The figures may not be fully comparable as the definition of rural and urban areas may be different in those countries.

3) White (1989, p. 3) defines rural non-farm activity (RNFA) that as activities carried out to seek off-farm income conducted by household members whether they have their own farm activity or not.

agricultural sector itself. Further, he stresses that "the demand-side will be stronger if the benefits from the improvement of the agricultural sector are more equally distributed". Jones (1984, p. 151) has argued that more attention should be paid to increasing the purchasing power of the people which could have important multiplier effects on employment in rural areas. The role of the demand through an increase in the expenditure for non-agricultural products was also noted by Rietveld (1986, p. 110). He pointed out that the income obtained in agriculture is often used for investment in non-agricultural activities. For example, in rural Java, many successful farmers invest in mini-buses for public transport.

Real wages for agricultural labourers in Java, after experiencing little growth from 1967 to 1977 (Makali and Hartoyo, 1978, pp. 35-45), have been shown to be increasing for lowland after 1978 (Collier *et al.*, 1982, pp. 90-93) and along with this rural non-agricultural employment has probably expanded. So, it may be said that the level of agricultural income plays a major role in determining the possibilities of expanding non-agricultural activities in villages. However, Manning (1988, pp.52-54) has argued that rapid agricultural growth did not have strong linkages with non-agricultural activities. Instead such activities were more closely related to increased public sector spending associated with the oil boom. He stated that "Increased rice production in particular has probably stimulated many new jobs outside agriculture. But these linkages may have been much weaker than the macro data imply, and, in any event, a considerable proportion of new jobs can be linked either to government-supported construction projects or to the increased mobility of commuters and circular migrants in search of urban jobs' (Manning, 1988, p. 66).

Activities in the non-agricultural sector in rural areas are in both the service and the manufacturing sectors. In Java it has been argued that the expansion occurred especially in the construction industry, trade and processing (Kasryno, 1986, pp. 292-293). In East Java those who moved from agriculture to off-farm employment were principally in

trade and services, but others were in manufacturing and construction (Bandiono and Conroy, 1986, p. 355)⁴). Another feature of the non-agricultural sector in rural areas is that the growth rate of employment in construction and services was faster than in manufacturing (Jones, 1984, pp. 130-134). Manufacturing has contributed much more to the growth of output than it has to the growth of employment. However, its indirect effect in creating demand for the output of sectors such as transport, utilities, construction, trade and other services may have contributed to additional employment. Thus, it can be hypothesized that employment creation in non-agricultural sectors in rural areas is positively associated with government spending and agricultural development.

Unfortunately, micro data are not available to evaluate the impact of the demand factor on rural employment as data on agricultural wages are not available for all provinces. Hence, agricultural labour productivity is used as a proxy for agricultural income. To evaluate the effect of government spending and agricultural development on non-agricultural rural employment creation a simple regression is run. Agricultural labour productivity per worker, land controlled per agricultural household (in the first period) are used as proxies for agricultural development⁵). Growth rate of average size of land controlled per agricultural household in the first period (1973-83) is used to see if the expansion of agricultural land creates more agricultural employment. *Inpres* expenditure per capita are used as a proxy for government spending in rural areas. The *Inpres* data are available by province in 1978/79 (Bappenas, 1978) and 1985/86 (Booth, 1988, Table 4). The data comprise all *Inpres* grants to provinces (*Dati I*), *kabupaten* (*dati II*), villages, infrastructure, primary school, health clinics, and reafforestation. The dependent variable is the change in the agricultural share of the labour force within rural

4) Off-farm employment refers here to non-farm activities or occupations that are undertaken by any working member of a rural household (Shand, 1986, p. 4).

5) Indonesian Population Census 1980 (Series S, No.2) does not provide agricultural household data. They are estimated as follows : agricultural households in 1985 (*Supas* 1985, Series No.5) divided by total households, multiplied by total household in 1980 to obtain agricultural household in 1980. So, we assume that the proportion of agricultural household to total in 1980 and 1985 are constant.

areas between 1971 and 1980 (for the first period), and between 1980 and 1985 (for the second period) with the opposite sign. The opposite sign is used because the increase in the non-agricultural share of the labour force in rural areas is equal to the decline in the agricultural share of the labour force in rural areas. This variable is presented in Table 8.4 for males, Table 8.5 for female, and Table A8.1 for both sexes (appendix) in the column 'Change within rural areas'.

The equations, in the semi-logarithmic forms, can be written as follows :

1971-80

$$NARE = \alpha + \beta(INPRES_{78}) + \gamma_1 \ln(Q_a') + \pi_1 \ln(dAVLC) + \pi_2 \ln(AVLC') + \epsilon, \quad (8.4)$$

1980-85

$$NARE = \alpha + \beta(dINPRES_{85}) + \gamma_1 \ln(Q_a') + \pi_1 \ln(AVLC') + \epsilon, \quad (8.5)$$

where :

NARE is the change of the agricultural share of the labour force in rural areas between 1971-1980, and between 1980-85.

INPRES is the total *Inpres* per capita in 1978/79 for the first period and in 1985/86 for the second period.

Q_a' is agricultural labour productivity per worker in the initial years.

AVLC' is the average size of land controlled per agricultural household (ha) in the initial years (1973 for the first period, and 1983 for the second period) (the data are taken from *Agricultural Census of 1983*, Central Bureau of Statistics, Series B: 04100.8503).

dAVLC is the growth rate of average size of land controlled per agricultural household between 1973-83, defined as $\ln [AVLC \text{ in } 1983 / AVLC \text{ in } 1973]$.

The data on growth rate of average size of land controlled are not available in the second period.

$\ln$ is natural logarithmic.

$\alpha, \beta, \gamma, \pi$, are coefficient parameters.

ε is an error term.

a prime is used to indicate initial values.

The regression results for the first period are presented in Table 8.2.

TABLE 8.2
OLS ESTIMATES OF THE CHANGE IN THE SHARE OF THE NON-AGRICULTURAL EMPLOYMENT
WITHIN RURAL AREAS, 1971-80

	Dependent Variable: NARE		
	Both sexes	Male	Female
Constant	-22.2583 (-2.9916)*	-18.6926 (-2.5893)*	-23.7000 (-1.9802)*
Ln[INPRES ₇₈]	0.0013 (1.8853)**	0.0015 (2.1841)*	0.0005 (0.4881)
Ln[Q _{a71}]	5.3810 (3.8778)*	4.3631 (3.2406)*	6.4169 (2.8747)*
Ln[AVLC ₇₃]	-4.9767 (-2.9047)*	-4.6015 (-2.7680)*	-3.8360 (-1.3918)
Ln[dAVLC]	-9.8067 (-2.1578)*	-6.1125 (-1.3862)	-13.7702 (-1.8835)**
Sample size	24	24	24
R-squared	0.4847	0.4260	0.3372
R-bar-squared	0.3762	0.3052	0.1977
F	4.4679	3.5252	2.4165
Diagnostic Tests			
A.Functional Form($\chi^2, 1$)	1.4458	0.9226	0.5843
B.Normality($\chi^2, 2$)	0.1044	0.1191	0.3779
C.Heteroscedasticity($\chi^2, 1$)	0.3804	0.4505	0.3530

Note: Irian Jaya is excluded

Level of significance : * = 0.05, ** = 0.10

A.Ramsey's RESET test using the square of the fitted values

B.Based on a test of skewness and kurtosis of residuals

C.Based on the regression of squared residuals on squared fitted values

They show that the variable of government spending (INPRES) has a positive sign as expected and is significant for males and for both sexes (mildly significant). This means that creation of non-agricultural employment in rural areas was positively influenced by the *Inpres* programmes and probably by many other government programmes. The contribution of agricultural development to the rural employment creation in non-agriculture is indicated by the positive sign of the coefficient variable of agricultural labour productivity in 1971. It is significant for males, females and both sexes. This implies that rural non-agricultural employment tends to be higher in a province with higher agricultural labour productivity. The effect of agricultural development on non-agricultural employment is also indicated by the negative signs of the coefficient of the average size of land controlled per agricultural household (AVLC) in 1973 and the coefficient of the land controlled growth variable (dAVLC). This suggests that people are likely to stay in agriculture where land is abundant. However, for females the regression is mildly significant (at 0.10 level). This may be due to the fact that data on the female labour force are not reliable, or that other factors explain female non-agricultural employment.

The use of agricultural labour productivity per worker as a proxy for agricultural development in rural areas may not be appropriate as it does not capture the entire population (both working and not working) who live on agriculture. So, the OLS estimates of equations (8.4) and (8.5) will result in equations bias. To overcome this problem, a Generalised Instrumental Variable Method (IV) is attempted. The agricultural income per capita in rural areas is used as the IV (instrumental variable), that is agricultural RGDP divided by total rural population in 1971 (the data are presented in Table A8.12) ⁶. The results are presented in Table 8.3. They show that the parameter estimates are not much different from the OLS method.

⁶ Correlation coefficient between agricultural labour productivity per worker and IV is 0.9286, and correlation between IV and an error term is 0.0631.

The regression results for the second period are presented in Table A8.8 (appendix). All regressions fail to explain variations in non-agricultural employment in rural areas. This may be due to the fact that employment creation in non-agriculture in rural areas between 1980 and 1985 was comparatively small. The impact of urbanisation in this period was more pronounced. This will be discussed in the following section.

TABLE 8.3
IV(2SLS) ESTIMATES OF THE CHANGE IN THE SHARE OF THE NON-AGRICULTURAL
EMPLOYMENT WITHIN RURAL AREAS, 1971-80

	Dependent Variable: NARE		
	Both sexes	Male	Female
Constant	-23.0791 (-2.90901)*	-18.6005 (-2.4173)*	-26.2741 (-2.0568)*
Ln[INPRES ₇₈]	0.0013 (1.8994)**	0.0015 (2.1779)*	0.0006 (0.5222)
Ln[Q _{a71}]	5.5414 (3.7235)*	4.3452 (3.0102)*	6.9198 (2.8877)*
Ln[AVLC ₇₃]	-5.0458 (-2.9176)*	-4.5937 (-2.7385)*	-4.0528 (-1.4553)
Ln[dAVLC]	-9.9579 (-2.1769)*	-6.0956 (-1.3738)	-14.2442 (-1.9339)**
Sample size	24	24	24
R-squared	0.4843	0.4260	0.3354
R-bar-squared	0.3758	0.3051	0.1955
F	4.4614	3.5252	2.3974
Diagnostic Tests			
A.Functional Form($\chi^2,1$)	0.1208	0.2967	0.8543
B.Normality($\chi^2,2$)	0.0969	0.1153	0.2136
C.Heteroscedasticity($\chi^2,1$)	0.3181	0.4564	0.3780

Note: Irian Jaya is excluded

Level of significance : * = 0.05, ** = 0.10

A.Ramsey's RESET test using the square of the fitted values

B.Based on a test of skewness and kurtosis of residuals

C.Based on the regression of squared residuals on squared fitted values

8.3. The Role of Urbanisation

In the late 1960s, economists focused their attention on the question of why rural-urban migration continued to proceed in spite of the growing open unemployment in urban areas. According to Williamson (1988, pp. 427-428) the sixteen largest cities in the Third World grew at 5.4 per cent per annum on average over 1950-75. The urban share of Third World population rose sharply from 9.3 to 16.7 percent between 1925 and 1950, and increased to 28 percent by 1975. The change over 1950-75 was about the same as the increase which took place in the currently developed countries' urban share between 1875 and 1900, (17.2 to 26.1 percent). But the rate of the city growth in developing countries has been exceptional. Between 1950 and 1975, city populations rose by 188 percent, compared to an increase of about 100 percent in currently developed countries between 1875 and 1900. The faster city growth in developing countries was in part due to overall growth rates of population being faster. The World Bank (1984, p. 97) estimated that between 1925 and 1950 at least 100 million people in the developing countries migrated from the countryside to town and cities, which was equivalent to about 10 percent of their rural population in 1925. The number rose to around 330 million in the following 25 years; this was equivalent to 25 percent of their rural population in 1950.

The factors explaining this urban population growth and urbanisation are still debatable. Kingley Davis (as quoted in Rogers, 1982, pp. 488-489) argues that the main cause is not rural-urban migration but the natural increase of the urban population. The population boom was responsible for the rapid growth of city populations. This is contrary to the Todaro view that the principal reason for the rapid increase in the urban growth is the unprecedented volume and rate of internal rural-urban migration. Rogers argues (1982, pp.504-505) that the cause depends on whether the focus is on periodical net additions to the urban population stock or on the changing projected composition of that stock. During the period of urbanisation transition, the urban population may grow

mainly as a result of net urban in-migration; at other times the main factor may be urban natural increase.

Push factors. The small ratios of industrial employment to urban population in developing countries were used to support the view that developing countries have been experiencing overurbanisation (Williamson, 1988, p. 439). The incidence of poverty, rural population pressure and lack of employment opportunities in rural areas are generally considered the most important factors to push people out of rural areas. For example, Bowles (1970, pp. 356-362) found that poverty positively and significantly affected the number of net out-migrants in the US. Bairoch (1973, pp. 25-46) emphasized population growth as the most important factor to push people to urban areas. As the death rate drops, especially through declining infant mortality, the mean size of family grows and there has always been a greater tendency for members of a family to emigrate, especially the younger one. Jones (1972, pp. 9-12) regarded rural population pressure, combined with the closing of the "land frontier", as an important factor in driving people out of rural areas. He argued that in the long run the absorptive capacity of the rural sector is limited as more marginal land is brought into production. Hoselitz (quoted in Williamson, 1988, p. 440) argues that the high growth rate of urban sector service occupations was mainly due to out-migration of rural labour. Migrants were pushed to the city by unfavourable employment conditions in the countryside. The high-wage modern sectors cannot accommodate the inundated labour markets. As a result, low-wage employment in the 'unproductive' service sector mushroomed, which was often called the 'sponge' sector acting as the last resort for employment. These excess supply paradigms view urban labour force growth as a mere manifestation of an impoverished rural "surplus" (Kannappan, 1985, p. 703).

Pull factors. According to Udall (1976, pp. 765-785) explanations of the rapid growth of tertiary employment in developing countries have often over-emphasized rapid increases in labour supply, while giving too little attention to shifts in patterns of

demand for labour. This is contrary to the service employment hypothesis which views the rate of growth of urban employment outside manufacturing as an accurate indicator of demand and supply conditions for labour.

The impact of increased income has a tendency to pull people into urban areas via demand for service output. The association between an increase in income and the demand for labour is put forward by Kuznets (1966) : (1). an increased in income has caused the changes in the structure of commodity production; (2). the growing urbanisation has meant much greater demand for labour-consuming services of urban governments (in police, sanitation, education, public health, and the like); (3). the rise in per capita consumer income have increased demand for recreation, education and other professional services, demand for which is income elastic; (4). the greater use of consumer durable commodities has meant an enormous increase in the demand for labour-intensive repair and servicing activities.

The expansion of service sector employment is also closely associated with industrial sector growth. As argued by Galenson (1963, p. 514), an additional product generated by the manufacturing sector results in an increase in the effective demand for the goods and services produced by other sectors, and thus permits an increase in employment in those sectors. Also a modern economy seems to require a certain minimum superstructure of commercial, governmental, and other services to support manufacturing; that is, there may well be certain fixed technological relationships between jobs in manufacturing and supporting services elsewhere, and the stability of this relationship gives rise to what may be called the structural effect. He found that annual percentage increases in manufacturing employment is positively related to that in tertiary employment with correlation coefficient of around 0.84.

In the Indonesian case, the role of urbanisation, especially between 1971 and 1980, should be interpreted with caution as the census definitions of urban status have

changed since 1961⁷⁾. As discussed in Evans (1984, pp. 44-53) the figures on the intercensal growth rate of population and the size of the urban population since 1961 published by CBS (Central Bureau of Statistics) suffer from two defects, : first, the figures disregard several boundary changes over the two intercensal periods, and second, the figures refer only to cities having official municipal (*kotamadya*) which is not always consistent with the term 'urban'. Sigit and Sutanto (1983, pp. 125-163) argued that the definition of urban in the 1971 Population census has some weakness in that the difference between urban and rural cannot clearly be traced, and only a very specific difference between the two can be distinguished. This may be attributed to the fact that all wards in *kotamadya* or *ibukota kabupaten* were regarded as urban, while those *kotamadya* or *ibukota kabupaten* were determined for political rather than economic considerations. For the 1980 census, a much more rigorous and meaningful definition was adopted by the CBS (Hugo *et al.*, 1987, p. 86). To determine a ward as urban, three criteria, viz : population density, share of agricultural households and number of facilities, are combined and weighted by 'rank'⁸⁾.

The differences in definitions have caused difficulties in calculating reliable urban growth rates and in making comparison between two censuses. According to Rietveld (1988, p. 75), even though the 1980 definition looks methodically sound, caution should be used in interpreting the second and third criteria. Because of changes in definition of urban areas, the percentage of the total number of wards and villages in Java which were classified as urban increased from 7.8 to 10.3 per cent from 1971 and 1980.

Applying the formula (8.3) in section 8.1 decomposition of changes in the ASLF by province in the first period is presented in Table 8.4 (for males), and Table 8.5 (for females) and Table A8.1 in the appendix (for both sexes). The tables show that in all

7) For the 1971 census a ward (*kelurahan*) is regarded an urban if it has following characteristics (Evans, 1984, p. 54): 1. Fifty per cent or more of population working outside the agricultural sector, and 2. Presence of the following three facilities : hospital or clinic, school and electrical supply.

8) For detail of rank criteria see Sigit and Sutanto (1983)

provinces, except in Yogyakarta for females, the decline in the ASLF mainly occurred within rural areas. Thus the macro data reveals that during the period of rapid economic growth the labour shed from agriculture was, in almost all provinces, primarily absorbed in rural sector.

The impact of urbanisation was relatively small with the exception of the resource rich provinces such as North Sumatra and Riau where the exploitation of their natural resources was just accelerating. Changes within urban areas were also quite low owing to the fact that the proportion of the agricultural employment in urban area was itself very low (Table A8.6 in the appendix). However, it is very striking that the change in the ASLF within urban areas was quite large for males in Jambi and East Kalimantan. This may be attributable mainly to the change in the definition of urban status. In Jambi and East Kalimantan the proportion of agricultural employment in urban areas was relatively high (15.6 and 16.1 per cent respectively) in 1971, and then dropped to only 1.8 in Jambi and 5.7 per cent in East Kalimantan in 1980 (Table A8.6 in the appendix). The change in the definition of "urban status" has caused the percentage of urban villages (*desa perkotaan*) in Jambi to drop from 12.5 per cent in 1971 to only 2.7 per cent in 1980; in East Kalimantan it fell from 12.8 per cent to 4.5 per cent for the same period (Table A8.7 in the appendix). In Java, not surprisingly, the percentage of urban villages increased owing to the fact that economic development was faster than in the rest of the country (Sigit and Sutanto, 1983, p. 144).

In the Outer Islands there were several provinces where urbanisation made a large contribution to the observed net decline in agricultural share of the labour force. One such province was Riau where it is likely that people were drawn out of agricultural by job opportunities in urban enclaves associated with the petroleum industries.

TABLE 8.4
DECOMPOSITION OF CHANGES IN THE AGRICULTURAL SHARE OF
THE LABOUR FORCE, 1971-80

Male

	Change within		Effect of	Net
	Urban	Rural	Urban	Observed
	Areas	Areas	isation	Effect
<i>Java+Bali</i>				
West Java	0.5	-7.8	-4.0	-11.3
Central Java	0.7	-5.1	-4.4	-8.8
Yogyakarta	-0.1	-5.4	-2.7	-8.2
East Java	0.5	-7.8	-2.7	-10.0
Bali	-0.5	-14.9	-2.4	-17.8
<i>Outer Islands</i>				
Aceh	-0.5	-6.5	0.2	-6.9
North Sumatra	0.4	-2.9	-5.5	-8.0
West Sumatra	-1.7	-7.5	2.2	-6.9
Riau	1.3	-2.3	-7.9	-8.9
Jambi	-5.8	-9.8	9.3	-6.3
South Sumatra	-1.9	-4.6	0.3	-6.2
Bengkulu	-0.3	-7.8	1.0	-7.2
Lampung	0.1	-2.3	-1.2	-3.4
West Nusa Tenggara	-0.4	-9.1	-3.1	-12.6
East Nusa Tenggara	-1.4	-2.2	-0.9	-4.4
West Kalimantan	-1.3	-4.9	-4.0	-10.2
Central Kalimantan	-2.9	-9.2	1.7	-10.4
South Kalimantan	-3.2	-10.0	2.6	-10.6
East Kalimantan	-6.6	-8.9	1.9	-13.6
North Sulawesi	-2.5	-8.5	1.6	-9.4
Central Sulawesi	-0.7	-2.6	-2.0	-5.3
South Sulawesi	-2.4	-6.8	-0.2	-9.4
Southeast Sulawesi	-2.5	-9.5	-1.9	-13.8
Maluku	-0.6	-8.8	1.6	-7.8

Source : Calculated from Indonesian Population Censuses of 1971 (Series E, No.01-25) and 1980 (Series S, No.2).

Note: Irian Jaya is excluded

TABLE 8.5
DECOMPOSITION OF CHANGES IN THE AGRICULTURAL SHARE OF
THE LABOUR FORCE, 1971-80

Female

	Change within		Effect of	Net
	Urban	Rural	Urban	Observed
	Areas	Areas	Urban	Effect
			isation	
<i>Java+Bali</i>				
West Java	0.4	-11.9	-5.4	-16.9
Central Java	0.5	-5.7	-3.7	-8.9
Yogyakarta	0.2	3.6	-1.5	2.3
East Java	-0.1	-11.3	-2.8	-14.2
Bali	0.0	-12.0	-1.4	-13.4
<i>Outer Islands</i>				
Aceh	-1.2	-7.9	-0.2	-9.4
North Sumatra	-0.1	-4.6	-4.0	-8.6
West Sumatra	-1.8	-12.2	0.8	-13.2
Riau	1.3	-5.9	-7.1	-11.6
Jambi	-3.9	-10.3	4.2	-10.1
South Sumatra	-3.7	-3.6	1.9	-5.4
Bengkulu	-0.2	-4.3	-0.1	-4.6
Lampung	-0.7	-10.6	-2.7	-14.0
West Nusa Tenggara	0.2	-14.0	-1.7	-15.5
East Nusa Tenggara	-1.2	-12.4	-0.1	-13.7
West Kalimantan	-0.9	-1.2	-2.5	-4.5
Central Kalimantan	-1.6	-8.1	0.7	-9.0
South Kalimantan	-3.5	-11.8	3.4	-11.9
East Kalimantan	-9.2	-12.9	-4.2	-26.4
North Sulawesi	-0.9	-17.8	0.2	-18.5
Central Sulawesi	-0.4	-8.5	-2.9	-11.9
South Sulawesi	-0.4	-1.8	-0.5	-2.7
Southeast Sulawesi	-1.2	-11.4	-1.7	-14.3
Maluku	-1.3	-9.0	0.5	-9.9

Source : as for Table 8.4

In addition, the shrinkage in urban-villages (*desa perkotaan*) has resulted in the proportion of agricultural employment in urban areas dropping which in turn affected the change in the share of ASLF within urban areas. Another consequence of the changes in the definition of urban status is they have tended to distort the impact of urbanisation on the changes in the ASLF. In some provinces the impact of urbanisation

had positive signs implying the movement of agricultural employment to rural areas (Table 8.4). The figure was very high in Jambi and was moderate in some provinces in Kalimantan and Sulawesi.

In the second period, the situation was reversed. The decline in the ASLF in most provinces was almost entirely attributed to urbanisation (Table 8.6 and Table 8.7). It must be borne in mind that, as discussed in section 8.1, here urbanisation is defined as the decline in the agricultural share of the labour force as a movement out of rural agricultural employment to urban non-agricultural employment. Unlike in the first period, the urbanisation does not seem to be much affected by the changes in the definition of urban status. Its important contribution during the course of the slow-down in the economy may be interpreted as reflecting the lack of capacity of the rural economy to create more non-agricultural employment. However, in some provinces outside Java+Bali, the effect of urbanisation was relatively low and in fact the change in the ASLF mainly occurred within rural areas in provinces such as Aceh, Bengkulu, Lampung, West and Central Kalimantan, and Southeast Sulawesi. This may indicate that urbanisation is largely a Java phenomenon. This phenomenon is more striking for females, where in Java the change in the ASLF was almost entirely due to urbanisation, while outside Java the contribution of urbanisation was relatively lower, except in some provinces such as West and East Nusa Tenggara, West Sumatra, Riau, North Sulawesi and Irian Jaya. In 1980-85, the proportion of non-agricultural employment in rural areas fell in most provinces compared to that in 1971-80, especially for males. In most provinces, the percentage of additional employment absorbed in agriculture was quite large, especially in Java and Bali (Table A8.3 in the appendix).

The "revolution of the colt" that penetrated rural areas in the mid-1970s in Java and parts of Outer Islands (Booth and McCawley, 1981, p. 8; Dick, 1982, pp. 34-35) and a continued improvement in all forms of transportation has made it possible for villagers to travel to cities to find more work than was available in rural areas. Jones (1984, p.

134) argues that some activities of hawkers and market sellers in rural areas were taken over by the expansion of permanent market complexes, shopping centres and super markets, and activities of the small and cottage-type enterprises were replaced by the expansion of larger and more technologically advanced firms.

TABLE 8.6
DECOMPOSITION OF CHANGES IN THE AGRICULTURAL SHARE OF
THE LABOUR FORCE, 1980-85

Male

	Change within		Effect of	Net
	Urban	Rural	Urban	Observed
	Areas	Areas	isation	Effect
<i>Java+Bali</i>				
West Java	0.0	1.1	-2.3	-1.2
Central Java	-0.2	-1.1	-2.9	-4.2
Yogyakarta	0.3	-0.9	-1.5	-2.1
East Java	-0.3	-0.9	-1.3	-2.5
Bali	0.0	-0.5	-1.1	-1.7
 <i>Outer Islands</i>				
Aceh	0.1	-4.3	-0.6	-4.9
North Sumatra	-0.9	0.4	-2.5	-3.0
West Sumatra	-0.5	1.1	-0.9	-0.3
Riau	0.0	1.8	-1.4	0.4
Jambi	-0.2	-0.5	-2.5	-3.2
South Sumatra	-0.2	0.2	-0.6	-0.7
Bengkulu	-0.1	-3.8	-1.6	-5.5
Lampung	-0.3	-1.3	-1.0	-2.6
West Nusa Tenggara	0.6	3.0	-1.6	2.1
East Nusa Tenggara	0.1	2.5	-0.8	1.8
West Kalimantan	-0.4	-3.2	-1.0	-4.6
Central Kalimantan	-0.3	-2.0	-1.3	-3.6
South Kalimantan	0.0	0.9	0.4	1.3
East Kalimantan	-0.3	-0.8	-1.3	-2.4
North Sulawesi	-0.2	4.6	-0.7	3.7
Central Sulawesi	0.2	1.5	0.2	1.9
South Sulawesi	0.1	0.5	-0.2	0.4
Southeast Sulawesi	0.2	-2.4	1.0	-1.3
Maluku	-0.2	2.7	-0.5	2.1
Irian Jaya	-1.4	0.5	-0.4	-1.3

Source : Calculated from Indonesian Population Census of 1980 (Series S, No.2) and *Supas* 1985 (Series No.5).

TABLE 8.7
DECOMPOSITION OF CHANGES IN THE AGRICULTURAL SHARE OF
THE LABOUR FORCE, 1980-85

Female

	Change within		Effect of	Net
	Urban	Rural	Urban	Observed
	Areas	Areas	isation	Effect
<i>Java+Bali</i>				
West Java	-0.1	0.7	-3.1	-2.5
Central Java	0.1	0.0	-2.2	-2.1
Yogyakarta	0.2	1.8	-1.9	0.1
East Java	-0.1	0.9	-1.0	-0.3
Bali	0.3	9.0	-0.7	8.6
<i>Outer Islands</i>				
Aceh	0.2	-2.0	0.0	-1.8
North Sumatra	-0.6	-2.9	-3.5	-7.0
West Sumatra	-0.1	1.2	-1.6	-0.4
Riau	-1.2	-1.2	-1.5	-3.9
Jambi	-0.2	-2.9	-2.4	-5.6
South Sumatra	-0.2	-2.1	-1.9	-4.1
Bengkulu	0.1	-3.2	-1.8	-4.8
Lampung	0.2	-0.1	0.2	0.3
West Nusa Tenggara	-0.1	11.5	-0.5	10.9
East Nusa Tenggara	0.3	10.5	-0.8	10.0
West Kalimantan	0.1	-1.9	-0.7	-2.5
Central Kalimantan	-0.6	-8.3	-2.2	-11.1
South Kalimantan	-0.2	-5.6	-1.1	-6.9
East Kalimantan	-0.7	-2.1	0.5	-2.2
North Sulawesi	-0.1	1.3	-0.1	1.2
Central Sulawesi	0.0	-3.0	-0.2	-3.2
South Sulawesi	-0.3	3.1	0.2	3.1
Southeast Sulawesi	0.0	0.7	0.3	1.0
Maluku	0.3	-6.4	-2.5	-8.6
Irian Jaya	0.2	2.2	-3.0	-0.7

Source : as for Table 8.6.

A study in Central Java, Boyolali by Sandee and Weijland (1989) revealed that the use of more advanced technology in roof tile enterprises had a contractionary effect on employment. For example, the transition from a household based production mode (in Ketoyan village) to production by more specialised and productive units (in

Karanganeng village) has resulted in a decline in employment. This in turn may have induced people leaving agriculture to seek work in urban areas.

Factors which appear to be associated with the decline in the agricultural share of the labour force within rural areas due to movement to urban areas are, in general, categorised into two groups: First, pull factors, that is the urban-rural income differential; and second, push factors, that is poverty, population pressure, agricultural mechanisation and education ⁹⁾.

As is discussed in Chapter 3, movement to urban areas could be encouraged by a significant urban-rural income differential, as postulated in the Todaro model. Manning (1987, p. 72; 1988, pp. 60-66) has argued that in Java the tendency of more rural households to seek work in urban areas was attributed to the poor performance of rural manufacturing industries. According to Manning (1987) in 1970s around 40 per cent of employment growth in small and cottage industries occurred in urban areas. This figure is predicted to have increased to about 66 per cent in the period 1980-85 due to the slowdown in rural manufacturing.

The expansion of small firms and cottage industries in the early 1980s was made possible by several factors. One is the role of government in promoting these industries, such as provision of industrial training, demonstration programmes, and *Kredit Investasi Kecil* and *Kredit Modal Kerja Permanen* (Hill, forthcoming, pp. 43-49). In the service sector productivity is not as low as is often perceived; in fact it is relatively high which indicates that service sector employment is not entirely residual. According to Alexander and Booth (forthcoming, pp. 13-15) labour productivity in each part of the service sector is higher than the national average, and much more productive than labour in agriculture. For example, labour productivity in the trade sector in 1985 was 12 per cent above the national average and over twice that in agriculture. A study by Speare and Harris (1986, pp. 231-233) also revealed that the income earned by the self-

9) This category, 'pull' and 'push', is made for convenience to compare two alternative models, that is to distinguish the Todaro model (called Model M1) from an alternative model (called Model M2). In fact, 'pull' and 'push' factors are not separable as they are operating simultaneously.

employed in the so-called "informal sector" was about the same as earned by employees in either small-scale or large-scale business. It was found that the income earned by small shopkeepers and other self-employed persons with fixed premises was significantly higher than employees. So, rural migrants who are absorbed in the service sector could well be "pulled" in by the attraction of higher remuneration.

On the other hand, demographers generally emphasize population pressure as a dominant factor to pushing people out of rural areas. In addition to population pressure, factors that may be responsible for urbanisation are : (1) poverty; (2) mechanisation; and (3) education. These variables have already been discussed in Chapter 5 (education), and Chapter 6 (poverty, mechanisation, and education).

To evaluate the influence of these variables some simple regressions are run using the change in the agricultural share of the labour force due to urbanisation or movement to urban areas as the dependent variable. This is equivalent to the change in the agricultural share of the labour force in rural areas due to urbanisation with an opposite sign (for the second period they are presented in Table 8.6 for male, Table 8.7 for female, and Table A8.2 for both sexes in the column 'Effect of Urbanisation'. The first regression is to test the "pull" hypothesis (called Model 1) of the Todaro model which states that rural-urban migration will continue as long as the expected urban income exceeds the real agricultural income. Education is also included in this model. The higher the educational level the higher the tendency of people to move into urban areas. So, the coefficient signs of these variables are expected to be positive. The second regression (called Model 2) is to test the "push" hypothesis. The coefficient signs of variables of poverty, education, rural population pressure and mechanisation in the agricultural sector are also expected to be positive. These two models will be tested to see if one of them is preferable on econometric grounds.

The model, mathematically, can be written as follows :

Model 1,

$$U = \alpha + \beta_1 \text{Ln}(YUR) + \beta_2 \text{Ln}(D_i YUR) + \gamma(MYS) + \epsilon, \quad (8.6)$$

Model 2,

$$U = \alpha + \beta_1 \text{Ln}(POVER) + \beta_2 \text{Ln}(D_i POVER) + \gamma(MYS) + \delta \text{Ln}(RPOP) + \pi \text{Ln}(TRAKL) + \epsilon, \quad (8.7)$$

where :

U is the change in the agricultural share of the labour force due to urbanisation between 1980 and 1985.

YUR is the expected urban-rural income differential in 1980, defined as, $\{(YU.p) - (YR)\}$

where :

YU is average per capita monthly expenditure (*Rp*) in urban areas as a proxy for urban income.

YR is average per capita monthly expenditure (*Rp*) in rural areas as a proxy for rural income (the data, YU and YR, are taken from *Pengeluaran Untuk Konsumsi Penduduk per Provinsi 1984*, Central Bureau of Statistics (1986), Susenas: 04340.8605).

ρ is an employment rate in urban areas as a proxy of the numbers successfully finding an urban job.

POVER is incidence of poverty in rural area that is the proportion of people below poverty line in 1984.

dMYS is the change in education of the total labour force (in mean years of schooling) between 1980 and 1985.

RPOP is the growth rate of rural population between 1980 and 1985,
 $= \text{Ln}[\text{rural population in 1985} / \text{rural population in 1980}]$

TRAKL is the total number of tractors employed in agriculture in 1983 divided by the numbers of workers employed in agriculture (in thousands) in 1985.

D_i is dummy variable, where $i=1$ for Java and 0 for outer Java

$\alpha, \beta, \gamma, \delta, \pi$ are coefficient parameters,

ε is an error term

a prime indicates final value (1985),

The data on mean years of schooling, poverty and the numbers of tractors used in agriculture are presented in Chapter 6.

The regression result of the Model 1 is presented in Table 8.8. The result shows that, for both sexes and for males, all statistical requirements are satisfied. The income differential has a positive sign as expected for Java only, and significantly explain variations in the dependent variable. However, this is not the case for provinces outside Java. This may indicate that the existence of urban-rural income differentials has been more important in Java and reflects that urbanisation is a Java phenomenon. Education is positively associated with the dependent variable and it is significant. For females the explanatory variable which significantly explain variations in the dependent variable is education. However, the regression fails at 0.05 confidence level.

The regression result of the Model 2 is presented in Table 8.9. The table shows that poverty significantly explains variations in Java only. Outside Java the incidence of poverty does not appear to be a significant factor pushing people out of rural areas. The education variable is a significant factor in influencing urbanisation for males. For both sexes it is not significant at 0.10. For female, regression fails at 0.10 confidence level.

The results also show that population pressure in rural areas and tractorization in the agricultural sector are not significant (Table A8.9 in the appendix). The low impact of tractorization (the number of tractors per agricultural workers) on urbanisation may be due to the fact that the use of machinery in agriculture was low. As discussed in Chapter 6, the levels of tractorization was very low by Asian standards (Booth, 1988, pp. 181-85). The slow pace of mechanisation in Java is also due to structural characteristics of rice farming such as small farm size which is an obstacle to tractorization (Manning, 1988, pp. 55-57). These two variables are dropped from Model 2.

Alternative tests for regression models (Table 8.10) show that Model 1 is preferable to Model 2 for both sexes and for male. The models for female are not tested as the regressions fail.

The two variables income differential (DYUR) and poverty (POVER) are not used simultaneously in one model as both variables represent a similar effect, in that a high income differential between urban and rural areas, may imply a higher incidence of poverty in rural areas. The use of both variables was attempted, but the results are not significant.

TABLE 8.8
OLS ESTIMATES OF URBANISATION, 1980-85
(MODEL M1)

	Dependent Variable: U		
	Both sexes	Male	Female
Constant	1.1773 (0.4177)	1.8648 (0.6642)	2.5678 (0.6386)
dLn[YUR]	-0.1899 (-0.5601)	-0.2685 (-0.7973)	-0.3488 (-0.7209)
dLn[YUR] _{Java}	0.1344 (2.6261)*	0.1357 (2.6826)*	0.1129 (1.5505)
d[MYS]	1.5865 (2.4401)*	1.4433 (2.5210)*	1.7894 (1.9486)**
Sample size	25	25	25
R-squared	0.4074	0.4119	0.2477
R-bar-squared	0.3228	0.3279	0.1402
F	4.8125	4.9029	2.3043
Diagnostic Tests			
A.Functional Form($\chi^2,1$)	0.1591	0.2127	0.0003
B.Normality($\chi^2,2$)	0.3483	0.8809	0.1180
C.Heteroscedasticity($\chi^2,1$)	0.1922	0.0544	0.0002

Level of significance : * = 0.05, ** = 0.10

A.Ramsey's RESET test using the square of the fitted values

B.Based on a test of skewness and kurtosis of residuals

C.Based on the regression of squared residuals on squared fitted values

TABLE 8.9
OLS ESTIMATES OF URBANISATION, 1980-85
(MODEL M2)

	Dependent Variable: U		
	Both sexes	Male	Female
Constant	0.2154 (0.1491)	0.1030 (0.0853)	0.3568 (0.1514)
dLn[POVER]	-0.1241 (-0.4406)	-0.0984 (-0.4021)	-0.1300 (-0.2900)
dLn[POVER] _{Java}	0.3452 (2.6104)	0.3418 (2.6493)*	0.2676 (1.4076)
d[MYS]	1.3119 (1.4126)	1.2927 (1.8063)**	1.4979 (1.0244)
Sample size	25	25	25
R-squared	0.4071	0.4081	0.2285
R-bar-squared	0.3224	0.3244	0.1182
F	4.8068	4.8070	2.0727
Diagnostic Tests			
A.Functional Form($\chi^2, 1$)	0.0847	0.1777	0.2651
B.Normality($\chi^2, 2$)	0.1568	0.4641	0.2047
C.Heteroscedasticity($\chi^2, 1$)	0.3164	0.0076	0.0573

Level of significance : * = 0.05, ** = 0.10

A.Ramsey's RESET test using the square of the fitted values

B.Based on a test of skewness and kurtosis of residuals

C.Based on the regression of squared residuals on squared fitted values

TABLE 8.10
ALTERNATIVE TESTS FOR NON-NESTED REGRESSION MODELS
(MODEL M1 AND MODEL M2)

Both Sexes

Regression for model M1:	Constant	DYUR	DYURJ	DMYS
Regression for Model M2:	Constant	POVER	POVERJ	DMYS

Test Statistic	M1 against M2	M2 against M1
N-Test	-0.6976	-0.4998
NT-Test	0.4248	0.4899
W-Test	0.4315	0.4988
J-Test	0.6055	0.5065
JA-Test	0.1615	-0.2420
Encompassing	F(2,19)=0.1745	F(2,19)=0.1792

Model M1: R-Bar-Squared	0.3228	Log-likelihood	-26.5881
Model M2: R-Bar-Squared	0.3224	Log-likelihood	-26.5941
Model M1+M2:R-Bar-Squared	0.2650	Log-likelihood	-26.3606
Akaike's Information Criterion M1 versus M2= 0.0061 Favours M1			
Schwarz's Bayesian Information Criterion of M1 versus M2= 0.0061 favours M1			

Males

Regression for model M1:	Constant	DYUR	DYURJ	DMYS
Regression for Model M2:	Constant	POVER	POVERJ	DMYS

Test Statistic	M1 against M2	M2 against M1
N-Test	-0.9660	-0.7652
NT-Test	0.3288	0.4111
W-Test	0.3328	0.4174
J-Test	0.8121	0.6465
JA-Test	0.4352	-0.6210
Encompassing	F(2,19)=0.3571	F(2,19)=0.4371

Model M1: R-Bar-Squared	0.3279	Log-likelihood	-26.3998
Model M2: R-Bar-Squared	0.3224	Log-likelihood	-26.5009
Model M1+M2:R-Bar-Squared	0.2841	Log-likelihood	-25.9386
Akaike's Information Criterion M1 versus M2= 0.1010 Favours M1			
Schwarz's Bayesian Information Criterion of M1 versus M2= 0.1010 favours M1			

In addition to those factors specified in Model M1 and Model M2, urbanisation could be associated with rural development. The success of rural development in the sense of rural employment creation may restrain people from moving to urban areas. Thus, we may expect a negative association between rural development and urbanisation. The proxy for rural development is the employment creation in non-agricultural sector in rural areas, as discussed in section 8.2. The employment creation in non-agriculture in rural areas ($NARE$) is influenced by government spending ($INPRES$), agricultural labour productivity per worker, and land controlled per agricultural household. The model (called Model M3), can be written as follows :

Model M3

$$U = \alpha + \beta_1(YUR) + \beta_2(D_i YUR) + \gamma(MYS) + \delta[NARE_{71-80}] + \pi[NARE_{80-85}] + \epsilon, \quad (8.8)$$

$$NARE_{71-80} = \alpha + \beta(INPRES_{78}) + \gamma_1 Ln(Q_a') + \pi_1 Ln(dAVLC) + \pi_2 Ln(AVLC') + \epsilon, \quad (8.4)$$

$$NARE_{80-85} = \alpha + \beta(dINPRES_{85}) + \gamma_1 Ln(Q_a') + \pi_1 Ln(AVLC') + \epsilon, \quad (8.5)$$

All variables and notations are as expressed in Section 8.2 (Equations 8.4 and 8.5) and in Section 8.3 (Equation 8.6). Equations (8.4) and (8.5) are rewritten for convenience. The regression results are presented in Table 8.11. The table shows that the coefficient sign of the non-agricultural rural employment variable in the first period $\{[NARE_{71-80}]\}$ is negative as expected, suggesting that the decline in the ASLF due to urbanisation was lower where non-agricultural employment creation in rural areas increased. However, it is not significant in explaining variations in the dependent variable. This indicates that employment creation in rural areas in 1971-80 was not strong enough to deter people who engaged in agriculture from moving to urban areas in 1980-85. In the second period, coefficient sign of $[NARE_{80-85}]$ positive and is not significant in all cases (both

sexes, male, and female). This is due to the fact that non-agricultural employment in rural areas in that period was low. The income differential is significant in Java and but is not significant in the Outer Islands. Education is significant in all cases in explaining variations in urbanisation. For females, regression fails.

TABLE 8.11
OLS ESTIMATES OF URBANISATION, 1980-85
(MODEL M3)

	Dependent Variable: U		
	Both sexes	Male	Female
Constant	1.9831 (0.6364)	3.9323 (1.1602)	1.1102 (0.2807)
dLn[YUR]	-0.2600 (-0.6893)	-0.4908 (-1.1267)	-0.1818 (-0.3884)
dLn[YUR] _{Java}	0.1647 (2.2908)*	0.1373 (2.4228)*	0.1370 (1.4190)
d[MYS]	1.5491 (2.1555)*	1.6623 (2.7016)*	2.0625 (2.2116)*
NARE ₇₁₋₈₀	-0.0357 (-0.4771)	-0.0621 (-0.6213)	-0.0291 (-0.3691)
NARE ₈₀₋₈₅	0.1973 (0.8026)	0.2639 (0.8414)	0.0432 (0.3390)
Sample size	24	24	24
R-squared	0.4393	0.4822	0.3466
R-bar-squared	0.2836	0.3384	0.1651
F	2.8208	3.3527	1.9098
Diagnostic Tests			
A.Functional Form($\chi^2, 1$)	0.6416	1.8022	0.0148
B.Normality($\chi^2, 2$)	0.3969	0.5337	0.1241
C.Heteroscedasticity($\chi^2, 1$)	0.0083	0.0255	0.5860

Level of significance : * = 0.05, ** = 0.10

A.Ramsey's RESET test using the square of the fitted values

B.Based on a test of skewness and kurtosis of residuals

C.Based on the regression of squared residuals on squared fitted values

8.4 Summary and Conclusion

- (1) The previous sections show that the decline in the ASLF can be decomposed into three parts : First, that part which is due to people shifting to non-agricultural occupations in urban areas; second, that part which is due to people leaving agriculture but staying in rural areas; and third, that part which occurs within urban areas.
- (2) The decline of the ASLF which occurred within urban areas was low both in the first and second periods due to the fact that the ASLF in urban areas was low.
- (3) The large decline in the ASLF in the first period was absorbed mainly in non-agricultural sectors in rural areas. This can be explained by two main factors. First, it can be attributed to the role of government spending not only in agriculture but also in infrastructure development initiatives intended to create employment opportunities and to provide facilities conducive to agricultural development. Second, agricultural labour productivity and land controlled per agricultural household, as proxies for agricultural income, played a significant role in explaining the capacity of the non-agricultural sector to create rural employment.
- (4) The effect of urbanisation was low in the first period when the economy grew rapidly. However, in the second period when the economy slowed down the effect of urbanisation was substantial although it appeared to be a Java phenomenon. This could be attributed to several causes. Model M1 shows that the urban-rural income differential and education were significant factors in explaining the urban drift of those leaving of the agricultural labour force. Model M2 suggests that the main causes of urbanisation were poverty and education. Both high urban-rural income differentials and poverty were more a Java phenomenon. The results also show that rural population pressure and mechanisation had little impact on numbers moving to urban areas. Model M3 shows that education was the most significant factor in

influencing urbanisation. Non-agricultural employment creation in rural areas in the second period did not play a significant role in affecting urbanisation. In the first period, non-agricultural employment creation is not strong to deter people in agricultural employment in rural areas from drifting to urban areas and into non-agricultural employment.

Chapter 9

Conclusions

This chapter consists of three sections. Section one presents a summary of the study. Section two presents the conclusions and major findings of the study. Section three suggests areas for further research in the light of the limitations highlighted in this study.

9.1 Summary

This thesis examines reasons for the decline in the agricultural share of the labour force in Indonesia in the period 1971-1985, at both national and provincial levels. The main focuses of the study are: first, to examine factors affecting variations in the agricultural share of the labour force by province; second, to examine factors affecting variations in the change in the agricultural share of the labour force by province between 1971 and 1980, and between 1980 and 1985; and third, to examine the effects of rural development and "urbanisation" on agricultural employment (here urbanisation refers to the decline in the agricultural share of the labour force due to a movement of agricultural workers to urban areas) on the change in the agricultural share of the labour force. The agricultural share of the *labour force* in this study refers to the agricultural share of *employed people*.

The period under study, in terms of economic growth, may be divided into two distinct periods: first, the 1971-80 period which was marked by rapid growth of economy, and second, the 1980-85 period which was marked by slow growth of economy (Sundrum, 1986, 1988). The first period was characterised by the oil boom resulting from a rise in world oil prices in 1973. Agricultural development in particular and rural development in general were given high priority in this period. The great attention paid to education by the government was manifested in the rapid growth of real expenditure on education,

well above the growth rate of real total expenditure. In the second period, the economy slowed down. Real GDP grew at an average rate of 4.8 per cent per annum compared to 8.1 per cent per annum in the first period. As a result, the growth rate of real development expenditure fell to 9 per cent per annum (compared to 19 per cent in the first period). This was due to the declining world oil price, which in turn adversely affected government revenues and investment in most sectors of economy.

The first period was also characterised by a substantial decline in the agricultural share of the labour force, from 66 per cent in 1971 to 56 per cent in 1980. In the second period, the decline was relatively small. The figure fell to around 55 per cent. A small fall in the agricultural share of the labour force between 1980 and 1985 could be attributed to two factors: first, the slow down of the economy in 1980-85 may have reduced the capacity of the non-agricultural sector to create additional employment; second, the inclusion of a larger proportion of unpaid family workers in the agricultural sector in 1985, due to the improved interviewing techniques adopted in the 1985 *Supas* may be in part responsible for the growth in the agricultural labour force. Care should therefore be taken in interpreting the changes in the agricultural share of the labour force as differences in time reference, enumeration procedures occurred in the two population censuses and the 1985 *Supas*.

The decline in the agricultural share of the labour force in the course of economic development was analysed in an international perspective in Chapter 3. Several studies show that the role of agriculture in terms of its share of total employment declines as countries progress economically. An inverse relationship is found between the change in the agricultural share of the labour force and the change in income per capita. Cross-sectional country studies also reveal a negative association between the agricultural share of the labour force and income per capita.

The decline in the agricultural share of the labour force may be associated with the expansion of other sectors. The interaction of agriculture and other sectors is developed in a two sector model by Lewis (1954), which in turn has been applied to the development of a backward Asian economy by Fei and Ranis (1961b), Jorgenson (1961), and extended by Todaro (1969), Harris-Todaro (1970) and other scholars.

The decline in the agricultural share of the labour force over time is also analysed in the Booth-Sundrum model. This is discussed in Chapter 4. The model decomposes the change in the agricultural share of the labour force to two main factors: the change due to demand factors and the change due to supply factors. The demand factor is manifested through the income elasticity of demand for sectoral output, and the supply factor is manifested by sectoral labour productivities.

Education, as discussed in Chapter 1, has been given high priority by the government since *Repelita I*. As a result, the educational attainment of the labour force has increased rapidly which in turn can affect the agricultural share of the labour force. This is discussed in Chapter 5. Several studies also reveal that education has a positive effect on productivity and growth of income, and on migration. This in turn may indirectly affect the agricultural share of the labour force.

The change in the agricultural share of the labour force in Indonesia, as discussed in Chapter 3, is not entirely due to the change in income per capita. There is only a weak correlation between per capita income and the ASLF by province in Indonesia. Chapter 6 offers several hypotheses which might explain the regional differences in the agricultural share of the labour force. Those factors are: (1) agricultural labour productivity per worker, (2) non-agricultural labour productivity per worker, (3) landlessness, (4) agricultural land distribution, (5) agricultural mechanisation (the use of tractors in agriculture per worker), and (6) the educational attainment of the labour

force. Unfortunately, variables of landlessness, land distribution, and agricultural mechanisation are available only in 1985.

The decline in the agricultural share of the labour force in the periods under study, 1971-80 and 1980-85, varied considerably across provinces. Chapter 7 proposes a number of hypotheses to explain regional differences in the change in the agricultural share of the labour force in those periods, that is: (1) the change in agricultural labour productivity per worker, (2) the change in non-agricultural labour productivity per worker, (3) the change in educational attainment of the labour force, (4) the change in the share of non-agriculture in RGDP, (5) the initial level of the ASLF, and (6) the growth rate of rural population. Using those variables, two alternative models are applied to test the hypotheses: first, Model M1, which treats education as an exogenous variable; and second, Model M2, which treats education as an endogenous variable.

The change in the agricultural share of the labour force between two years, 1971-80 and 1980-85, can be decomposed into three parts : first, that part which is due to people shifting to non-agricultural occupations in urban areas; second, that part which is due to people leaving agriculture but staying in non-agricultural occupations in rural areas; and third, that part which occurs within urban areas.

Chapter 8 offers several hypotheses which might explain the change in the agricultural share of the labour force which occurred within rural areas in the first period. Those factors are, first, agricultural development. The proxy for agricultural development is agricultural labour productivity, and agricultural land controlled per agricultural households; second there is the role of government. The proxy for the role of government is *Inpres* grants per capita.

Chapter 8 also examines the decline in the agricultural share of the labour force due to a movement of people away from agriculture in rural areas to non-agriculture in urban areas. Three models are developed to explain this, that is: (1) Model M1, with

explanatory variables: (a) the expected rural-urban income differential, and (b) education; (2) Model M2, with explanatory variables: (a) the incidence of poverty in rural areas, and (b) education; and, Model M3, with explanatory variables (a) the expected rural-urban income differential, (b) education, and (c) rural development, that is those factors that explain the change in the agricultural share of the labour force which occurred within rural areas in 1971-80 and 1980-85.

9.2 Conclusion and Major Findings

- (1) The time series study in Indonesia at national level over the period 1971-87 shows that Indonesia followed the general pattern of the development process as proposed by Kuznets, Chenery and Syrquin and many others. That is, as real income per capita increased (with and without mining), the agricultural share of the labour force declined. However, the cross-sectional analysis at the provincial level in Indonesia in 1971-85 reveals that Indonesia did not follow the general pattern of the development. Income per capita, in general, did not explain significantly variations in the agricultural share of the labour force by province. Hence, we investigated what other factors may be responsible for the decline in the agricultural share of the labour force by province over these years.
- (2) At national level we apply the Booth-Sundrum model to explain the change in the agricultural share of the labour force. The results show that the decline in the agricultural share of labour force in period 1971-80 and 1980-85 was largely due to the demand factor. In the first period, the contribution of the supply factor was positive due to the fact that the growth rate of non-agricultural labour productivity was higher than that of agricultural labour productivity. In the second period, the contribution of the supply factor was negative as labour productivity in non-agriculture grew slightly more slower than in agriculture. But this model assumes constant relative prices of agricultural to non-agricultural output, which was not valid in Indonesia. The data in the periods under study show that agricultural prices

declined significantly relative to non-agricultural prices, especially in the M sector (mining and quarrying, manufacturing, utilities, and construction). The model in its basic form ignores foreign trade, which was important in Indonesia. The adjustment of the demand elasticities to allow for the impact of foreign trade show that in the first period the contribution of the supply factor to the decline in the agricultural share of the labour force increased by around 10 percentage point compared with the result when foreign trade effects are ignored. However, care should be taken in interpreting the results as the foreign trade data on imports and exports are subjects to changes in definitions. The model assumes full-employment, which was almost certainly not valid in Indonesia. However, no adjustment has been made to correct for this assumption because the data on unemployment are not reliable.

- (3) At the national level we examine the evidence in the educational attainment of the labour force. Over the period under study, it appears that educational expansion in Indonesia has been mainly a government responsibility. The introduction of compulsory primary education policy in the 1970s in part contributed to the rapid improvement in educational attainment at primary and secondary levels after 1971. In spite of this policy, educational attainment of the labour force remains low, as measured by the mean years of schooling, although it expanded rapidly from 2.8 to 4.8 years between 1971 and 1985.

The data show that males are better educated than females, and those in urban areas are better educated than in rural areas. For example, as measured by the mean years of schooling, the educational attainment of the labour force in 1985 was, on average, 7.3 years for urban males, and 4.3 years for rural males, and 5.6 years for urban females, and 3.0 years for rural females. The educational attainment of the agricultural labour force was lower than that of the M and S labour force. For example, in 1985 mean years of schooling in the A sector was 3.3 years compared to 5.0 years for the M sector and 6.3 years for the S sector. The improvement in

educational attainment of the agricultural labour force between 1971 and 1980 was indicated by a decline in the share of those with primary qualification and below .

Our finding is that the distribution of the agricultural share of the labour force by age depicts a U-curve, with the lowest point at age 20-34 for both sexes in all periods under study. The sharp fall in the U-curve in this age group between 1971 and 1980 indicated that a rapid decline in the agricultural share of the labour force occurred within the younger groups, reflecting the fact that those who moved away from agriculture were mainly youngsters.

To see the effect of education on the distribution of the agricultural share of the labour force we constructed a hypothetical U-curve. The difference between the actual U-curve (the actual distribution of the agricultural share of the labour force) and the hypothetical one in 1985 shows that the U-shape distribution of the agricultural share of the labour force by age for both sexes was largely due to education especially at the younger age groups. The U-shaped distribution of the agricultural share of the labour force by age is more marked for males. Using the decomposition method described in Chapter 5, it is found that between 1971 and 1980 education contributed 21 per cent to the total decline in the agricultural share of the labour force for both sexes at the national level. The contribution of education in 1980-85 for both sexes was higher still.

At the provincial level, in 1985, our regression results show that the association between education and the agricultural share of the labour force was negative. Education significantly affects variations in the agricultural share of the labour force in rural areas, both for males (aged 20-34) and females (aged 15-24 and aged 20-34).

- (4) As discussed in Chapter 6, we proposed several variables that could explain regional differences in the agricultural share of the labour force. Our regression results (a recursive model) show that :
- (a) Labour productivity is positively associated with educational attainment of the labour force in the periods under study. The results support the findings discussed in Chapter 5. In agriculture we use the educational attainment of farmers, and in non-agriculture we use the educational attainment of the non-agricultural labour force.
 - (b) In all periods under study, agricultural labour productivity per worker was, as expected, negatively associated with the agricultural share of the labour force. It was significant in almost all cases (urban+rural and rural areas for both sexes, males and females). This reflects that, as expounded in our model in Chapter 6, when agricultural labour productivity increases, the agricultural share of the labour force tends to decline as the proportion of people required to produce the same amount of output declines due to, in part, the use of advanced technology.
 - (b) Non-agricultural labour productivity, with and without mining, was positively associated with the agricultural share of the labour force, and the association was significant in some cases in 1980 and 1985. Thus, the increase in labour productivity in the non-agricultural sector tended to increase the agricultural share of the labour force. This result may reflect that non-agricultural sectors, in general, did not provide many employment opportunities in 1980 and 1985. In 1971, the association between non-agricultural labour productivity and the ASLF was negative.
 - (c) The regression results, in 1985, show that landlessness and the distribution of land were, as expected, negatively associated with the agricultural share of the labour force, and in some cases they were significant. The results imply that the more unequal distribution of cultivated agricultural land and the higher the

proportion of people who not owning land, the lower will be the ASLF. Thus, the people are pushed out of agriculture because of lack of access to land.

(d) Agricultural mechanisation, that is the use of tractors per worker in agriculture, did not explain regional variations in the ASLF. This is probably due to the fact that agricultural mechanisation was relatively low everywhere in Indonesia and indeed very low in comparison with other Asian countries.

(e) The educational attainment of the total labour force, as measured by mean years of schooling, significantly affects the agricultural share of the labour force. The association was negative as expected. Thus, an increase in education has tended to reduce the agricultural share of the labour force in all periods under study for all sexes in urban and rural areas.

(5) The regression results for the changes in the agricultural share of the labour force between 1971 and 1980, and between 1980 and 1985, show:

(a) That the change in agricultural labour productivity per worker, in both periods, was negatively associated with the change in the agricultural share of the labour force and significant in some cases (male, female, urban+rural, rural, with and without mining).

(b) The change in non-agricultural labour productivity per worker was positively associated with the change in the agricultural share of the labour force and was highly significant in almost all cases.

(c) The changes in the agricultural share of the labour force across provinces were significantly explained by the change in education in both periods, and the association was negative as expected. Thus a rapid decline in the agricultural share of the labour force occurred in a region with a faster increase in educational attainment.

- (d) The change in the agricultural share of the labour force was significantly influenced by the change in the share of non-agriculture in RGDP in almost all cases. The association between the two variables was negative. This may indicate that the non-agricultural sectors absorb employment through the demand side.
- (e) Growth of rural population significantly explained the change in the agricultural share of the labour force in the first period and in rural areas only. The association was negative indicating that the faster the growth of rural population in a region, the larger the decline in the agricultural share of the labour force. In the second period, rural population growth did not play a significant role in influencing the change in the ASLF.
- (6) The decline in the agricultural share of the labour force which occurred within urban areas was low both in the first and second periods. This was due to the fact that the agricultural share of the labour force was low in urban areas.
- (7) The large decline in the agricultural share of the labour force in the first period, 1971-80, was absorbed mainly in non-agricultural sectors in rural areas. The regression results reveal that the change in the non-agricultural share of the labour force within rural areas was:
- (a) positively and significantly associated with the *Inpres* grants per capita in 1978. Thus, the capacity of rural areas to create more employment opportunities in non-agricultural sector depended on, to some extent, the role of government as discussed in Chapter 2 and Chapter 6.
 - (b) positively associated with agricultural labour productivity per worker in 1971 and significant for both sexes and for males. As a proxy for agricultural income, this may indicate that employment creation in non-agricultural sectors in rural areas is determined partly by level of income of those in the agricultural sector. Thus, in

part, demand factors influenced employment creation in rural areas in the first period.

- (c) was negatively associated with agricultural land controlled per agricultural household. This indicates that in the first period agricultural employment was generated to a greater extent in the land abundant provinces.

(8) The decline in the agricultural share of the labour force due to a movement away from agricultural employment in rural areas to non-agriculture in urban areas in the second period may be explained by several factors. The regression results show that: First, the expected urban-rural income differential significantly explains the dependent variable. The association was positive, and implies that the higher the expected rural-urban differential the higher the tendency of agricultural workers to move to urban areas. However this was significant for Java only. This may be due to the fact that urbanisation was in the main a Java phenomenon. Second, education was significantly and positively associated with dependent variable. Thus, the more educated the labour force, the higher the tendency to leave agriculture and move to urban areas. Third, non-agricultural employment creation in rural areas, in the second period, did not play a significant role in affecting the shift of agricultural workers to urban areas. In the first period, non-agricultural employment creation was not significant in preventing agricultural workers in rural areas from drifting to urban areas to non-agricultural employment.

(9) The regression results for females, in general, are not quite convincing and worse than those for males. This is, to a large extent, may be attributed to the nature of the data. The large changes in numbers of unpaid family workers reflect changes in enumeration procedures as much as actual changes in employment. However, the use of "earning workers" does not improve results. Thus, in addition to the problem of data, there may be other factors which may explain variations in the female

agricultural share of the labour force which we have not adequately captured in our estimation procedures.

9.3 Suggestions for Further Research.

As discussed in Chapter 1, the data are subject to definitions used, enumeration procedures, and methodology which were different in the two censuses. Thus, care should be taken in analysing the time series data. Especially for females, cross-examination of the data by status, occupation, and industry may give a clearer picture. In addition to the data problem, it may be other factors which are more relevant than those factors proposed in this study in explaining regional differences in the female agricultural share of the labour force, and changes in that share over time.

The study covers three points of time, with a rather long gap in the first period. Several factors that may be important in determining changes between these two years cannot fully be detected. This problem could to some extent be overcome by including other sets of data obtained from surveys such as *Sakernas* and *Susen*. However, adjustment of data may be required to make the data more comparable. As for methodology, the use of more data sets might allow us to utilize other econometric method, such as pooling cross-section and time series data, which could increase the degrees of freedom.

The framework of our model consists of two sectors, agriculture and non-agriculture. The results show that in 1980 and 1985, non-agricultural labour productivity was positively associated with the agricultural share of the labour force implying that the non-agriculture sector did not perform well in providing employment opportunities. However, non-agriculture in turn consists of two main sectors that is M and S sectors. Further analyses of each of these sectors in relation to the agricultural sector may give us more clues on their capacity to generate employment opportunities.

TABLE A2.1
THE SHARE OF EARNING WORKERS TO TOTAL EMPLOYED PEOPLE
IN URBAN AND RURAL AREAS, 1971-85

	Male			Female		
	1971	1980	1985	1971	1980	1985
<i>Urban Areas</i>						
A	81.0	89.1	89.7	52.2	74.6	64.8
M	96.9	97.7	97.3	92.5	99.7	86.2
Manufacturing and Quarrying Utilities	96.1	97.1	96.1	92.4	99.8	85.8
	99.3	99.3	100.0	100.0	97.6	100.0
Construction	98.0	98.7	99.4	95.0	95.7	99.8
S	95.0	96.3	95.8	89.0	87.2	84.4
Trade	90.2	92.5	90.4	82.9	84.2	75.5
Transport and Communications Services	98.3	98.2	99.0	97.9	96.9	98.9
	96.9	97.9	98.6	93.9	89.7	94.0
All Sectors (A+M+S)	93.7	95.9	95.6	85.9	88.4	83.3
<i>Rural Areas</i>						
A	75.9	81.6	79.3	47.8	58.1	36.9
M	93.7	94.7	94.2	73.1	78.3	72.2
Manufacturing and Quarrying Utilities	92.4	93.3	91.4	72.9	78.1	71.9
	99.0	99.3	97.7	85.1	93.1	80.2
Construction	97.4	97.2	98.6	92.7	90.1	92.3
S	92.4	95.7	95.8	78.7	84.2	80.7
Trade	91.2	93.9	91.9	82.3	83.7	77.2
Transport and Communications Services	97.1	97.6	98.8	90.3	93.5	89.4
	92.2	96.6	98.1	71.7	84.9	88.7
All Sectors (A+M+S)	79.8	85.9	84.2	55.8	67.0	51.4

Source : as for Table A2.1

TABLE A2.2
GROSS DOMESTIC PRODUCT BY SECTOR
AT 1973 CONSTANT PRICES 1971-88
(Rp.BILLION)

	A	(%)	M	(%)	S	(%)
1971	2441.0	44.0	1236.7	22.3	1867.0	33.7
1972	2479.0	40.9	1486.2	24.5	2102.0	34.6
1973	2710.0	40.1	1773.4	26.3	2270.0	33.6
1974	2811.0	38.7	1971.0	27.1	2487.0	34.2
1975	2811.2	36.8	2082.0	27.3	2737.6	35.9
1976	2943.7	36.1	2313.1	28.4	2899.5	35.5
1977	2981.3	33.6	2640.5	29.7	3260.2	36.7
1978	3134.8	32.8	2870.2	30.0	3561.5	37.2
1979	3255.6	32.0	3073.6	30.2	3835.7	37.7
1980	3424.9	30.7	3456.4	30.9	4287.9	38.4
1981	3593.5	29.8	3757.0	31.2	4704.1	39.0
1982	3669.8	29.8	3703.8	30.1	4951.8	40.2
1983	3845.6	29.9	3816.3	29.7	5180.3	40.3
1984	4005.3	29.4	4124.2	30.3	5452.8	40.0
1985	4174.3	30.0	4146.5	29.8	5602.4	40.2
1986	4280.8	27.3	5035.3	32.1	6189.9	39.5
1987	4375.9	26.6	5297.7	32.2	6546.1	39.8
1988	4565.2	26.3	5583.2	32.1	6993.9	40.3

Source : calculated from *Nota Keuangan dan Rancangan Anggaran Pendapatan dan Belanja Negara*: various issues.

Table A3.1
Agricultural share of the labour force (ASLF) and
Income per Capita at 1975 International Prices, 1960-1980

	ASLF ^{a)}			Income per Capita ^{b)}		
	1960	1970	1980	1960	1970	1980
Tanzania	89.3	86.0	83.0	285	394	492
Ethiopia	88.1	84.1	80.0	278	336	337
Kenya	85.8	82.1	78.0	378	431	460
Sudan	85.7	82.0	72.0	753	750	860
Zaire	83.4	79.3	75.0	284	413	296
Nigeria	70.8	62.1	54.0	856	936	1476
Algeria	66.8	60.7	25.4	1209	1403	2043
Marocco	62.5	56.9	52.0	596	956	1261
Egypt	58.4	54.4	50.0	541	755	1177
Nepal	94.6	93.9	93.0	345	359	405
Bangladesh	86.8	85.9	74.0	355	370	432
Afganistan	85.3	82.0	79.0	366	365	306
Thailand	83.8	79.9	76.0	486	791	1181
Turkey	78.5	67.7	53.5	1044	1408	2069
Indonesia	74.8	66.3	55.0	370	391	734
India	74.1	64.0	69.3	428	450	498
Burma	68.4	69.9	67.1	248	320	359
Korea, Republic of	66.4	51.0	34.0	631	1112	2007
Malaysia	63.1	55.5	50.0	888	1242	2204
Pakistan	60.8	58.9	57.0	404	564	663
The Philippines	61.1	53.2	46.0	644	781	1022
Sri Lanka	56.3	55.1	54.0	961	765	838
Iran	53.9	46.0	39.0	1015	1749	1796
Mexico	55.1	45.2	35.6	1401	2005	2547
Peru	52.5	44.8	39.8	1200	1626	1746
Brazil	51.9	45.6	29.9	912	1225	2152
Columbia	51.4	37.9	25.8	1070	1355	1882
Venezuela	34.9	25.6	18.0	2839	3667	3310
Argentina	20.0	16.4	13.1	2214	2750	3209
Spain	42.1	26.0	14.4	1737	3231	4264
Japan	33.0	20.0	12.0	1674	4215	5996
Italy	30.8	18.8	10.7	2313	3655	4861
France	22.1	13.7	8.1	3163	5041	6678
Germany	14.2	7.5	3.8	3711	5356	6967
Canada	13.3	8.2	4.9	4079	5703	7521
Australia	11.4	8.1	5.6	3894	5552	6308
Netherlands	11.0	8.1	6.1	3198	4767	5856
US	6.6	3.7	2.0	5195	6629	8089
UK	4.0	2.8	1.9	3388	4216	4990

Source : a) ILO (1977), *Labour Force Estimates*, Vol.I-IV (for 1960 and 1970), ILO; and World Bank (1983), *World Tables*, Vol. II (for 1980), World Bank.

b) Summers and Heston (1984), 'Improved International Comparisons of Real Product and Its Composition: 1950-80'. Note :the figures are expressed in 1975 international prices (international dollars).

TABLE A3.2
THE AGRICULTURAL SHARE OF THE LABOUR FORCE, 1971-87
BOTH SEXES, URBAN+RURAL

	1971	1977	1980	1982	1985	1987
Aceh	78.4	75.7	71.0	72.0	68.0	71.7
North Sumatra	75.5	62.8	67.3	65.5	62.9	65.8
West Sumatra	71.5	70.4	62.4	67.0	62.2	58.7
Riau	69.5	67.2	60.1	59.7	59.7	62.4
Jambi	78.7	65.4	71.5	60.4	68.0	72.2
South Sumatra	71.5	72.6	65.4	63.8	64.2	64.4
Bengkulu	87.4	85.0	81.2	79.0	76.5	81.4
Lampung	82.3	76.1	76.1	73.8	73.9	69.6
West Java	61.1	57.2	48.2	45.7	46.8	45.3
Central Java	63.6	60.7	54.6	51.5	50.9	49.4
Yogyakarta	56.7	64.1	53.1	52.0	52.0	48.3
East Java	68.3	65.5	56.8	55.1	54.8	56.2
Bali	69.2	57.2	51.0	57.5	52.3	50.9
West Nusa Tenggara	69.1	67.8	54.4	60.4	58.5	62.2
East Nusa Tenggara	85.2	81.3	77.1	84.9	81.9	84.4
West Kalimantan	88.3	74.0	80.3	80.1	76.6	76.6
Central Kalimantan	83.0	83.4	73.8	61.4	67.5	66.0
South Kalimantan	71.0	49.4	60.3	58.9	58.9	51.2
East Kalimantan	65.8	49.7	49.2	46.8	47.5	48.7
North Sulawesi	68.2	64.3	55.8	55.1	57.9	56.6
Central Sulawesi	79.1	86.0	71.8	74.9	72.0	75.2
South Sulawesi	68.8	58.1	59.6	56.8	59.5	59.5
Southeast Sulawesi	85.2	79.2	70.4	72.5	70.7	76.7
Maluku	79.8	--	71.5	69.2	70.3	69.0
Irian Jaya	--	--	74.8	47.0	75.0	82.3

Source: calculated from:

1971: Indonesian Population Census of 1971 (Series D).

1977: *Sakernas* 1977 (VUS79-28).

1980: Indonesian Population Census of 1980 (Series S, No.2).

1982: *Susenas* 1982 (04320.8406).

1985: *Supas* 1985 (Seri No.5).

1987: *Sakernas* 1987 (04320-8806).

note: -- excluded from calculation

TABLE A3.3
INCOME PER CAPITA AT CURRENT PRICES
INCLUDING MINING, 1971-87
(RP THOUSAND)

	1971	1977	1980	1982	1985	1987
Aceh	28.0	122.4	790.8	867.0	1726.4	1991.3
North Sumatra	46.2	132.3	301.5	361.0	477.6	643.2
West Sumatra	26.0	101.8	172.8	283.7	434.3	561.2
Riau	192.3	985.9	2928.3	2412.0	2657.4	3747.2
Jambi	43.7	125.8	272.8	294.3	408.4	467.6
South Sumatra	61.9	204.0	503.5	538.5	747.3	864.2
Bengkulu	26.5	85.0	187.9	256.8	348.7	516.2
Lampung	26.7	103.2	248.6	305.6	223.4	332.5
West Java	23.4	95.6	202.3	265.5	474.7	577.6
Central Java	21.5	74.7	141.6	198.0	340.6	433.1
Yogyakarta	22.0	76.5	145.1	201.5	339.1	431.8
East Java	25.7	98.1	201.3	270.7	449.5	573.3
Bali	29.6	99.6	192.7	284.8	543.7	715.9
West Nusa Tenggara	13.6	65.5	110.6	157.5	236.7	273.5
East Nusa Tenggara	13.8	55.4	102.4	140.2	215.4	258.9
West Kalimantan	29.4	112.2	214.8	253.3	387.1	544.6
Central Kalimantan	33.9	130.6	418.2	418.9	556.5	764.3
South Kalimantan	32.2	110.4	208.0	297.5	475.6	615.2
East Kalimantan	79.8	1209.5	3682.2	3596.0	4343.5	4112.6
North Sulawesi	35.6	140.2	243.4	310.7	352.5	424.1
Central Sulawesi	16.4	90.2	190.9	243.5	315.2	383.1
South Sulawesi	23.1	94.8	181.8	207.3	349.8	416.5
Southeast Sulawesi	28.9	77.9	155.2	247.6	332.9	401.8
Maluku	30.9	152.2	283.4	308.9	395.7	529.8
Irian Jaya	--	--	681.1	739.3	698.7	781.7

Source: calculated from :

1971: Pendapatan Regional Propinsi-Propinsi di Indonesia, 1971-1977, LYR 80-84: Table II.1, BPS; and Indonesian Population Census of 1971 (Series D); BPS,

1977: Pendapatan Regional Provinsi-Provinsi di Indonesia, 1975-1982, Buku II (0440.8601): Table 133, BPS;

1980: as for 1977; and Indonesian Population Census of 1980 (Series S, No.2),

1982: as for 1977,

1985: Pendapatan Regional Provinsi-Provinsi di Indonesia, 1983-86, Buku II (04440.8901): Table 1-26, BPS; and Supas 1985 (Series No.5).

1987: Pendapatan Regional Provinsi-Provinsi di Indonesia, 1983-87, (04440.8902): Table 39-64; and Proyeksi Penduduk Indonesia 1985-2005, Supas 1985 (Series Supas No.33): Table D, BPS.

Population in 1977 and 1982 are estimated using annual rate of growth estimates by BPS: Penduduk Indonesia 1985 Menurut Provinsi, Supas 1985 (Series Supas No.3): Table 1, BPS.

note: -- excluded from calculation

TABLE A3.4
INCOME PER CAPITA AT CURRENT PRICES
EXCLUDING MINING, 1971-87
(Rp THOUSAND)

	1971	1977	1980	1982	1985	1987
Aceh	28.0	112.1	222.3	337.6	569.6	1209.6
North Sumatra	44.4	123.5	250.1	315.7	452.0	622.8
West Sumatra	25.9	101.2	171.4	280.9	428.4	555.1
Riau	42.0	146.4	366.7	396.8	610.5	781.6
Jambi	42.5	120.0	249.7	273.8	369.7	434.6
South Sumatra	52.2	165.1	415.2	407.1	575.6	705.0
Bengkulu	26.1	84.4	187.0	255.3	346.3	497.7
Lampung	26.7	103.0	248.2	305.0	222.8	331.8
West Java	23.4	84.5	166.8	226.6	401.8	521.2
Central Java	21.4	74.4	141.2	197.2	338.7	430.6
Yogyakarta	21.9	76.3	144.7	200.4	336.9	429.4
East Java	25.7	97.7	200.5	270.2	447.5	571.1
Bali	29.5	98.9	191.4	282.7	540.6	713.6
West Nusa Tenggara	13.6	64.7	108.8	154.6	233.0	269.7
East Nusa Tenggara	13.8	55.3	102.1	139.8	214.3	257.5
West Kalimantan	29.4	112.0	214.1	252.0	386.1	541.2
Central Kalimantan	33.9	130.2	416.4	416.6	553.7	761.2
South Kalimantan	30.9	109.9	206.8	295.6	472.9	611.9
East Kalimantan	73.0	350.3	1008.8	1086.9	1270.1	2241.8
North Sulawesi	35.6	139.6	239.4	308.6	350.9	421.5
Central Sulawesi	16.3	89.4	188.1	240.1	306.9	374.9
South Sulawesi	22.8	94.8	179.9	206.2	346.6	412.9
Southeast Sulawesi	17.6	55.2	134.7	225.4	313.0	386.6
Maluku	30.6	150.3	262.7	295.4	380.4	486.3
Irian Jaya	--	--	235.3	324.3	377.8	489.8

Source : as for Table A3.3

note: -- excluded from calculation

TABLE A3.5
INCOME PER CAPITA AT 1975 CONSTANT PRICES
INCLUDING MINING, 1971-87
(Rp THOUSAND)

	1971	1977	1980	1982	1985	1987
Aceh	78.2	97.0	277.9	228.8	356.5	395.0
North Sumatra	71.9	105.0	132.5	137.6	148.6	162.1
West Sumatra	55.4	78.7	84.7	112.4	132.9	136.0
Riau	475.0	902.7	874.0	599.9	450.2	628.4
Jambi	108.0	90.7	112.4	111.0	94.4	99.1
South Sumatra	153.0	160.7	192.6	203.8	209.6	228.4
Bengkulu	56.0	62.3	91.3	107.5	116.3	122.0
Lampung	60.6	70.3	108.8	124.1	75.9	82.8
West Java	57.7	79.4	94.3	106.4	125.7	139.0
Central Java	42.1	55.2	66.4	73.5	103.8	112.1
Yogyakarta	24.3	58.6	66.4	71.5	80.8	88.2
East Java	63.6	78.5	96.1	104.5	124.2	136.1
Bali	73.2	78.1	109.2	134.4	173.8	194.7
West Nusa Tenggara	37.7	46.3	53.1	62.4	68.1	73.6
East Nusa Tenggara	34.2	41.3	52.6	57.6	65.6	68.1
West Kalimantan	69.4	86.4	109.5	107.6	124.8	144.5
Central Kalimantan	62.6	97.6	163.5	169.8	157.6	167.4
South Kalimantan	79.6	80.8	88.7	95.2	111.2	120.4
East Kalimantan	313.2	970.3	1102.7	958.4	1117.6	807.7
North Sulawesi	88.0	106.7	112.7	133.9	129.8	139.3
Central Sulawesi	33.9	63.1	82.3	92.3	86.7	91.0
South Sulawesi	57.1	75.7	87.2	85.3	110.5	117.8
Southeast Sulawesi	71.3	56.6	81.4	87.5	101.6	109.4
Maluku	76.5	102.3	123.0	129.8	133.3	154.9
Irian Jaya	--	--	262.5	253.7	185.0	183.1

Source: calculated from :

1971: Pendapatan Regional Propinsi-Propinsi di Indonesia, 1971-1977, LYR 80-84: Table III.1.1-III.26.2, BPS; and Indonesian Population Census of 1971 (Series D); BPS.

1977: Pendapatan Regional Provinsi-Provinsi di Indonesia, 1975-1982, Buku II (0440.8601): Table 141, BPS;

1980: as for 1977; and Indonesian Population Census of 1980 (Series S, No.2),

1982: as for 1977,

1985: Pendapatan Regional Provinsi-Provinsi di Indonesia, 1979-84, Bagian II (04400.8801): Table 141, Pendapatan Regional Provinsi-Provinsi di Indonesia, 1983-86, Buku II (04440.8901): Table 28-53, BPS; and *Supas* 1985 (Series No.5).

1987: Pendapatan Regional Provinsi-Provinsi di Indonesia, 1979-84, Bagian II (04400.8801): Table 141, Pendapatan Regional Provinsi-Provinsi di Indonesia, 1983-87, (04440.8902): Table 66-91; and Proyeksi Penduduk Indonesia 1985-2005, *Supas* 1985 (Series *Supas* No.33): Table D, BPS.

Population in 1977 and 1982 are estimated using annual rate of growth estimates by BPS: Penduduk Indonesia 1985 Menurut Provinsi, *Supas* 1985 (Series *Supas* No.3): Table 1, BPS.

note: -- excluded from calculation

TABLE A3.6
INCOME PER CAPITA AT 1975 CONSTANT PRICES
EXCLUDING MINING, 1971-87
(Rp THOUSAND)

	1971	1977	1980	1982	1985	1987
Aceh	78.2	87.5	95.7	115.7	138.8	182.7
North Sumatra	64.6	97.3	119.1	127.8	141.6	156.1
West Sumatra	55.0	78.3	84.2	111.3	131.6	134.3
Riau	103.8	116.7	146.9	127.0	132.2	226.5
Jambi	104.9	85.4	106.4	105.9	88.5	94.2
South Sumatra	129.1	127.4	171.6	174.9	178.0	183.1
Bengkulu	55.8	61.9	90.8	106.8	115.5	116.6
Lampung	60.6	70.2	108.6	123.9	75.7	82.7
West Java	57.7	69.2	85.3	97.8	118.3	130.0
Central Java	41.8	55.0	66.2	73.3	103.4	111.5
Yogyakarta	24.2	58.4	66.2	71.1	80.2	87.6
East Java	63.5	78.2	95.6	104.3	123.4	135.4
Bali	72.7	77.6	108.5	133.4	172.8	194.0
West Nusa Tenggara	37.7	45.3	51.6	60.5	66.2	71.7
East Nusa Tenggara	34.2	41.2	52.5	57.4	65.2	67.6
West Kalimantan	69.3	86.2	109.1	107.2	124.3	143.3
Central Kalimantan	62.6	97.3	162.8	168.7	156.9	166.8
South Kalimantan	76.2	80.4	88.2	94.6	110.6	119.6
East Kalimantan	266.8	282.4	361.3	396.1	304.1	276.9
North Sulawesi	87.9	106.3	111.1	133.3	129.0	138.2
Central Sulawesi	33.9	62.5	81.2	91.1	84.8	88.9
South Sulawesi	56.3	75.7	86.0	84.7	109.4	116.3
Southeast Sulawesi	43.4	45.2	64.6	79.5	87.8	104.6
Maluku	75.8	100.6	113.8	120.0	126.4	146.3
Irian Jaya	--	--	139.6	154.7	126.3	141.0

Source: as for Table A3.5

note: -- excluded from calculation

TABLE A4.1
GDP INDEX (1973=100)

	Agriculture	Non-Agri culture	Total GDP
1971	90.1	76.8	82.1
1972	91.5	88.7	89.8
1973	100.0	100.0	100.0
1974	103.7	110.3	107.6
1975	103.7	119.2	113.0
1976	108.6	128.9	120.8
1977	110.0	145.9	131.5
1978	115.7	159.1	141.7
1979	120.1	170.9	150.5
1980	126.4	191.5	165.4
1981	132.6	209.3	178.5
1982	135.4	214.1	182.5
1983	141.9	222.5	190.2
1984	147.8	239.2	203.0
1985	154.0	243.9	208.0

Source: calculated from *Nota Keuangan* 1990/91

TABLE A5.1
THE AGRICULTURAL SHARE OF THE LABOUR FORCE AND
MEAN YEARS OF SCHOOLING OF TOTAL LABOUR FORCE,
RURAL-MALE AND RURAL-FEMALE AGED 20-34
1985

	The Agricultural Share of Labour Force		Mean Years of Schooling	
	Male	Female	Male	Female
Aceh	62.5	75.3	6.6	5.4
North Sumatra	71.4	80.2	6.2	5.4
West Sumatra	63.9	64.0	5.5	5.3
Riau	67.0	72.7	5.5	4.5
Jambi	67.6	73.6	5.7	4.4
South Sumatra	71.2	81.2	5.5	4.3
Bengkulu	70.2	86.7	5.9	3.7
Lampung	78.1	73.0	5.0	4.1
West Java	48.1	56.4	5.2	4.7
Central Java	57.1	49.8	5.0	3.8
Yogyakarta	46.4	52.6	6.3	4.9
East Java	60.7	57.2	4.7	3.6
Bali	51.2	50.1	5.7	3.6
West Nusa Tenggara	66.5	52.3	4.1	2.5
East Nusa Tenggara	86.3	78.1	4.6	4.1
West Kalimantan	77.5	91.5	4.1	2.4
Central Kalimantan	69.5	71.3	5.6	4.9
South Kalimantan	66.5	65.3	5.2	4.0
East Kalimantan	57.9	65.4	6.0	3.8
North Sulawesi	74.2	40.8	5.9	6.6
Central Sulawesi	73.5	67.9	5.9	5.2
South Sulawesi	68.5	49.3	5.0	4.7
Southeast Sulawesi	60.9	76.6	5.7	3.6
Maluku	77.0	68.9	5.7	5.3
Irian Jaya	76.2	92.9	4.1	2.2
All Provinces	61.4	61.6	5.2	4.2

Source: calculated from *Supas* 1985 (unpublished)

TABLE A5.2
THE AGRICULTURAL SHARE OF THE LABOUR FORCE AND
MEAN YEARS OF SCHOOLING OF TOTAL LABOUR FORCE,
RURAL-FEMALE AGED 15-24
1985

	The Agricultural Share of Labour Force	Mean Years of Schooling
Aceh	78.1	5.9
North Sumatra	80.1	5.7
West Sumatra	63.6	5.3
Riau	73.7	5.0
Jambi	75.9	4.5
South Sumatra	79.5	4.6
Bengkulu	86.8	4.5
Lampung	72.5	4.7
West Java	51.4	4.9
Central Java	48.3	4.4
Yogyakarta	54.9	5.7
East Java	55.2	4.3
Bali	43.3	4.5
West Nusa Tenggara	51.7	3.3
East Nusa Tenggara	77.9	4.5
West Kalimantan	91.7	3.2
Central Kalimantan	74.9	5.2
South Kalimantan	64.6	4.3
East Kalimantan	65.7	4.6
North Sulawesi	42.7	6.3
Central Sulawesi	69.2	5.4
South Sulawesi	44.3	5.0
Southeast Sulawesi	73.0	4.7
Maluku	74.0	5.2
Irian Jaya	95.8	2.0
All Provinces	60.1	4.7

Source: as for Table A5.1

TABLE A5.3
OLS ESTIMATES OF THE AGRICULTURAL SHARE OF
THE LABOUR FORCE, RURAL FEMALES AGED 20-34, 1985

Explanatory variables	Independent Variable : ASLF	
	(Equation 5.7)	(Equation 5.8)
Constant	0.8828 (7.5046)*	0.9055 (8.4505)*
Ln[MYS]	-0.0479 (-1.7929)**	-0.0472 (-1.9491)**
D{Ln[MYS] _{JAVA} }		-0.0375 (-2.4347)*
Sample size	25	25
R-squared	0.1226	0.3089
R-bar-squared	0.0845	0.2460
F	3.2145	4.9156
Diagnostic tests:		
A.Functional Form($\chi^2, 1$)	0.0014	0.0836
B.Normality($\chi^2, 2$)	2.1362	3.2233
C.Heteroscedasticity($\chi^2, 1$)	2.9656	3.0322

Figures in brackets are t values

Level of significance : * = 0.05; ** = 0.10

A.Ramsey's RESET test using the square of the fitted values

B.Based on a test of skewness and kurtosis of residuals

C.Based on the regression of squared residuals on squared fitted values

D: Dummy for Java[West Java, Central Java, Yogyakarta, East Java]

TABLE A6.1
AGRICULTURAL SHARE OF THE LABOUR FORCE,
1985

	Urban+Rural			Rural		
	MF	M	F	MF	M	F
<i>Java+Bali</i>						
West Java	46.8	45.7	49.2	58.3	56.8	61.5
Central Java	50.9	55.4	43.8	62.0	67.1	54.0
Yogyakarta	52.0	53.0	50.7	62.2	63.7	60.6
Bali	52.4	56.8	47.0	59.3	64.0	53.6
East Java	54.9	58.3	49.1	65.2	69.1	58.8
<i>Outer Islands</i>						
East Kalimantan	47.6	44.7	54.4	69.4	68.3	71.8
North Sulawesi	58.0	65.5	40.6	67.6	76.0	48.3
West Nusa Tenggara	58.5	64.6	47.1	64.8	71.9	51.8
South Kalimantan	58.9	57.7	60.6	69.7	70.5	68.5
South Sulawesi	59.5	64.9	45.6	69.7	75.9	53.6
Riau	59.7	57.4	65.5	75.1	73.3	79.0
West Sumatra	62.3	61.1	63.9	69.4	69.1	70.0
North Sumatra	62.9	57.7	70.8	79.2	76.4	82.9
South Sumatra	64.2	59.2	72.5	79.2	76.4	83.4
Central Kalimantan	67.5	66.8	68.9	74.3	74.2	74.4
Aceh	68.0	63.5	75.9	72.3	68.5	78.6
Jambi	68.0	64.9	74.4	76.4	74.3	80.3
Maluku	70.3	71.7	67.1	77.3	79.1	73.4
Southeast Sulawesi	70.7	66.4	77.6	75.3	71.4	81.4
Central Sulawesi	72.0	74.0	67.8	76.6	78.9	72.0
Lampung	74.0	75.1	71.7	80.8	83.0	76.7
Irian Jaya	75.0	67.5	86.8	87.3	82.6	93.8
Bengkulu	76.5	70.3	85.4	82.5	77.5	89.5
West Kalimantan	76.6	69.5	88.0	86.1	81.4	92.9
East Nusa Tenggara	82.1	84.3	78.7	86.4	90.0	81.8

Source : Supas 1985, Series No.5 : Table 45.1-45.9.

note : MF : Male+Female
M : Male
F : Female

TABLE A6.2
AGRICULTURAL SHARE OF THE LABOUR FORCE,
1980

	Urban+Rural			Rural		
	MF	M	F	MF	M	F
<i>Java+Bali</i>						
West Java	48.2	46.9	51.7	56.8	55.4	60.6
Bali	51.0	58.5	38.4	56.6	64.6	43.1
Yogyakarta	53.1	55.1	50.7	61.9	64.9	58.4
Central Java	54.6	59.7	45.9	63.1	68.4	54.0
East Java	56.8	60.7	49.4	65.7	70.0	57.5
<i>Outer Islands</i>						
East Kalimantan	49.2	47.1	56.7	70.8	69.6	74.6
West Nusa Tenggara	54.4	62.6	36.2	59.3	68.4	38.7
North Sulawesi	55.8	61.8	39.5	64.2	70.6	46.6
South Sulawesi	59.6	64.6	42.5	69.7	75.3	49.9
Riau	60.1	57.0	69.4	73.4	70.9	80.4
South Kalimantan	60.3	56.5	67.6	71.4	69.3	74.8
West Sumatra	62.4	61.4	64.3	68.0	67.8	68.5
South Sumatra	65.4	59.8	76.6	79.6	76.1	85.7
North Sumatra	67.3	60.8	77.8	80.1	75.8	86.1
Southeast Sulawesi	70.4	67.6	76.6	76.2	74.1	80.5
Aceh	71.0	68.3	77.6	75.5	73.2	80.7
Jambi	71.5	68.0	80.0	77.5	74.8	83.5
Maluku	71.5	69.6	75.7	77.4	76.1	80.3
Central Sulawesi	71.8	71.2	71.0	76.7	77.3	75.0
Central Kalimantan	73.8	70.4	80.0	78.9	76.4	83.3
Lampung	76.1	77.7	71.3	82.4	84.4	76.7
East Nusa Tenggara	77.1	82.5	68.7	80.6	87.2	70.7
Irian Jaya	78.8	68.8	87.5	85.4	81.9	91.5
West Kalimantan	80.3	74.1	90.5	89.0	85.1	94.9
Bengkulu	81.2	75.8	90.2	86.0	81.7	92.8

Source : calculated from Indonesian Population Census of 1980, Series S, No.2 : Table 45.1-45.9

note : MF : Male+Female
M : Male
F : Female

TABLE A6.3
AGRICULTURAL SHARE OF THE LABOUR FORCE,
1971

	Urban+Rural			Rural		
	MF	M	F	MF	M	F
<i>Java+Bali</i>						
Yogyakarta	56.7	63.3	48.3	63.7	71.2	54.3
West Java	61.1	58.2	68.6	67.2	64.5	74.2
Central Java	63.6	68.4	54.8	69.4	74.2	60.6
East Java	68.3	70.8	63.5	76.3	79.2	70.7
Bali	69.2	76.3	51.7	74.2	81.3	56.6
<i>Outer Islands</i>						
East Kalimantan	65.8	60.7	83.0	86.1	83.9	91.6
North Sulawesi	68.2	71.2	58.0	77.8	80.8	67.9
South Sulawesi	68.8	73.9	45.2	77.8	83.4	52.0
West Nusa Tenggara	69.1	75.2	51.7	72.1	78.4	54.1
Riau	69.5	65.9	81.1	76.9	73.6	87.1
South Kalimantan	71.0	67.1	79.4	84.3	82.2	88.5
West Sumatra	71.5	68.3	77.4	78.3	76.4	81.6
South Sumatra	71.5	66.0	82.0	85.0	82.2	89.9
North Sumatra	75.5	68.8	86.4	84.1	79.3	91.2
Aceh	78.4	75.2	87.0	82.7	80.3	89.0
Jambi	78.7	74.3	90.1	89.4	86.9	94.8
Central Sulawesi	79.1	77.4	82.8	81.2	80.1	83.7
Maluku	79.8	77.5	85.6	87.1	86.0	89.9
Lampung	82.3	81.1	85.3	87.2	86.9	88.0
Central Kalimantan	83.0	80.8	89.0	88.2	86.7	91.9
East Nusa Tenggara	85.2	87.0	82.5	87.1	89.5	83.4
Southeast Sulawesi	85.2	81.5	90.9	87.6	84.4	92.4
Bengkulu	87.4	83.0	94.8	93.0	90.3	97.2
West Kalimantan	88.3	84.3	94.9	92.8	90.7	96.0

Source : calculated from Indonesian Population Census of 1971, Series E, No.01-025:Table 39-39a.

note : MF : Male+Female
 M : Male
 F : Female

TABLE A6.4
PRODUCTIVITY OF LABOUR IN AGRICULTURE (QA) AND
NON-AGRICULTURE (QB) AT CURRENT PRICES (Rp.000),
1980

	Agriculture		Non-Agriculture	
	Qa	Index (Ind=100)	Qb	Index (Ind=100)
<i>Java+Bali</i>				
Yogyakarta	266	69	405	30
Central Java	304	79	517	38
East Java	357	93	768	57
West Java	365	95	940	69
Bali	453	118	572	42
<i>Outer Islands</i>				
East Nusa Tenggara	221	57	455	34
West Kalimantan	284	74	1531	113
Bengkulu	308	80	1110	82
West Sumatra	313	81	1071	79
West Nusa Tenggara	340	88	332	25
Lampung	342	89	860	64
Southeast Sulawesi	344	89	950	70
Central Sulawesi	359	93	918	68
South Kalimantan	385	100	909	67
Riau	409	106	19497	1441
Jambi	449	117	1164	86
South Sumatra	452	117	3015	223
Irian Jaya	455	118	6360	470
North Sumatra	457	119	1609	119
Aceh	532	138	7090	524
Central Kalimantan	571	148	2036	150
South Sulawesi	612	159	908	67
North Sulawesi	689	179	918	68
Maluku	715	186	1541	114
East Kalimantan	1989	516	16526	1222
All Provinces	385	100	1353	100

Source : Calculated from Provincial Income in Indonesia 1979-1984, Part II, 04400.0081: Table 1-26;
and Indonesian Population Census of 1980, Series S, No.2 : Table 45.9.

note : Qa = RGDP in Agriculture divided by workers employed in agriculture,
Qb = RGDP in non-agriculture divided by workers employed in non-agriculture.

TABLE A6.5
LAND PRODUCTIVITY AND LAND-MAN RATIO,
1980

	Y/Land	Land/LF	Index(Ind=100)	
			Y/Land	Land/LF
<i>Java+Bali</i>				
West Java	510	0.71	143	67
Bali	557	0.81	156	76
Yogyakarta	655	0.41	184	38
Central Java	671	0.45	188	42
East Java	770	0.46	216	43
<i>Outer Islands</i>				
East Nusa Tenggara	108	2.04	30	191
Riau	112	3.64	31	341
Central Kalimantan	115	4.95	32	464
Jambi	127	3.54	36	332
Central Sulawesi	153	2.35	43	220
Aceh	196	2.71	55	254
Southeast Sulawesi	199	1.73	56	162
South Kalimantan	215	1.79	60	167
West Kalimantan	222	1.28	62	120
South Sulawesi	257	2.38	72	223
South Sumatra	267	1.69	75	159
West Sumatra	271	1.15	76	108
Bengkulu	299	1.03	84	97
West Nusa Tenggara	301	1.13	84	106
East Kalimantan	303	6.58	85	615
Lampung	335	1.02	94	96
North Sulawesi	370	1.86	104	174
North Sumatra	375	1.22	105	114
All Provinces	357	1.07	100	100

Source : Calculated from Provincial Income in Indonesia 1979-1984, Part II, 04400.0081: Table 1-26; Indonesian Census of 1980, Series S, No.2: Table 45.9; and Statistical Yearbook of Indonesia, 1982: Table 5.1.1. (Land includes *sawah*/wet land, estates, house compounds and surroundings, bareland/garden/shifting cultivation and steppe pasture).

TABLE A6.6
PRODUCTIVITY OF LABOUR IN AGRICULTURE (QA) AND
NON-AGRICULTURE (QB) AT CURRENT PRICE,
1971

	Agriculture		Non_agriculture	
	Qa	Index (Ind=100)	Qb	Index (Ind=100)
<i>Java+Bali</i>				
Yogyakarta	36	61	81	48
Central Java	48	82	83	50
East Java	53	90	115	69
West Java	62	106	130	78
Bali	76	130	133	79
<i>Outer Islands</i>				
East Nusa Tenggara	29	49	78	46
West Nusa Tenggara	37	64	58	35
Central Sulawesi	43	73	82	49
West Kalimantan	49	84	273	163
Southeast Sulawesi	51	88	332	198
Bengkulu	56	95	293	175
Lampung	60	104	223	133
West Sumatra	62	106	154	92
South Kalimantan	65	112	185	110
Riau	68	116	1982	1183
South Sumatra	70	121	498	297
Central Kalimantan	72	124	404	241
South Sulawesi	72	124	134	80
North Sumatra	73	125	373	222
Aceh	77	132	173	103
North Sulawesi	85	147	220	131
Jambi	93	159	327	195
Maluku	107	183	198	118
East Kalimantan	179	307	591	353
All Provinces	58	100	168	100

Source : Calculated from Regional Income in Indonesia by Province 1971-1977, LYR80-84: Table II.1; and Indonesian Population Census of 1971, Series D: Table 44-44a.

note : Qa = RGDP in Agriculture divided by workers employed in agriculture,

Qb = RGDP in non-agriculture divided by workers employed in non-agriculture.

TABLE A6.7
EDUCATIONAL ATTAINMENT OF TOTAL LABOUR FORCE
IN MEAN YEARS OF SCHOOLING,
1985

	Urban+Rural			Rural		
	MF	M	F	MF	M	F
<i>Java+Bali</i>						
East Java	3.9	4.5	2.9	3.3	3.9	2.5
Bali	3.9	4.7	3.0	3.6	4.3	2.7
Central Java	4.1	4.7	3.1	3.6	4.2	2.7
Yogyakarta	4.5	5.4	3.4	4.0	4.9	3.0
West Java	4.7	5.1	4.0	4.1	4.4	3.3
<i>Outer Islands</i>						
West Nusa Tenggara	3.2	3.7	2.1	2.9	3.4	1.9
West Kalimantan	3.2	3.9	2.2	2.8	3.4	2.0
Irian Jaya	3.2	4.0	1.9	2.3	3.0	1.4
East Nusa Tenggara	3.7	4.0	3.3	3.5	3.7	3.2
Southeast Sulawesi	4.0	4.8	2.7	3.7	4.4	2.5
Lampung	4.2	4.6	3.3	3.9	4.4	3.1
South Sulawesi	4.2	4.4	3.8	3.7	3.8	3.2
Bengkulu	4.4	5.2	3.2	4.1	4.9	3.0
South Kalimantan	4.4	5.1	3.4	3.9	4.5	3.0
Jambi	4.7	5.3	3.5	4.3	4.9	3.2
South Sumatra	4.8	5.4	3.8	4.2	4.8	3.4
Central Kalimantan	4.8	5.3	4.1	4.5	4.9	3.8
West Sumatra	5.0	5.3	4.6	4.7	4.9	4.2
Riau	5.0	5.4	4.1	4.4	4.8	3.4
Central Sulawesi	5.0	5.3	4.3	4.7	5.1	4.1
Maluku	5.2	5.4	4.7	4.8	5.1	4.4
Aceh	5.3	5.9	4.2	5.0	5.6	4.1
East Kalimantan	5.5	6.2	3.8	4.3	4.9	3.0
North Sumatra	5.6	6.2	4.7	5.0	5.5	4.3
North Sulawesi	5.8	5.7	5.8	5.4	5.4	5.5

Source: Calculated from Supas 1985, Series S No.5

TABLE A6.8
EDUCATIONAL ATTAINMENT OF TOTAL LABOUR FORCE
IN MEAN YEARS OF SCHOOLING,
1980

	Urban+Rural			Rural		
	MF	M	F	MF	M	F
<i>Java+Bali</i>						
East Java	3.1	3.6	2.2	2.7	3.1	1.9
Central Java	3.2	3.8	2.3	2.9	3.4	2.0
Bali	3.3	3.8	2.4	3.0	3.4	2.2
West Java	3.8	4.1	3.0	3.3	3.6	2.5
Yogyakarta	3.8	4.7	2.6	3.3	4.2	2.3
<i>Outer Islands</i>						
West Kalimantan	2.4	2.9	1.4	2.0	2.5	1.2
Irian Jaya	2.6	3.2	1.3	1.8	2.2	1.0
West Nusa Tenggara	2.7	3.1	1.8	2.4	2.8	1.6
East Nusa Tenggara	3.3	3.6	2.8	3.1	3.3	2.6
Bengkulu	3.4	4.1	2.3	3.2	3.9	2.2
South Sulawesi	3.4	3.5	3.1	2.9	3.0	2.5
Lampung	3.6	4.0	2.7	3.4	3.7	2.5
Southeast Sulawesi	3.6	4.3	2.2	3.4	4.1	2.0
Jambi	3.7	4.2	2.4	3.4	3.9	2.2
South Kalimantan	3.8	4.3	2.7	3.3	3.8	2.4
Aceh	3.9	4.4	2.9	3.7	4.1	2.7
South Sumatra	4.0	4.6	2.9	3.5	4.0	2.6
Riau	4.1	4.4	2.9	3.4	3.7	2.4
Central Kalimantan	4.1	4.6	3.1	3.8	4.3	3.0
West Sumatra	4.2	4.5	3.8	3.9	4.2	3.5
East Kalimantan	4.4	4.8	3.0	3.2	3.5	2.0
North Sumatra	4.5	5.1	3.6	4.0	4.5	3.3
Central Sulawesi	4.5	4.7	3.9	4.2	4.4	3.6
Maluku	4.8	5.1	4.0	4.4	4.8	3.7
North Sulawesi	5.1	5.0	5.3	4.7	4.7	4.8

Source : Calculated from Indonesian Census of 1980: Table IV.27

TABLE A6.9
EDUCATIONAL ATTAINMENT OF TOTAL LABOUR FORCE
IN MEAN YEARS OF SCHOOLING,
1971

	Urban+Rural			Rural		
	MF	M	F	MF	M	F
<i>Java+Bali</i>						
East Java	2.3	2.9	1.3	2.1	2.5	1.1
Bali	2.4	2.8	1.6	2.2	2.6	1.4
Central Java	2.5	3.0	1.5	2.2	2.7	1.4
Yogyakarta	2.6	3.4	1.6	2.2	3.0	1.3
West Java	3.1	3.5	2.0	2.8	3.2	1.8
<i>Outer Islands</i>						
West Nusa Tenggara	1.7	2.0	0.8	1.5	1.8	0.7
West Kalimantan	1.8	2.3	1.0	1.7	2.2	1.0
Southeast Sulawesi	2.1	2.7	1.0	2.0	2.6	1.0
East Nusa Tenggara	2.7	3.1	2.2	2.7	3.0	2.2
South Sulawesi	2.7	2.8	2.4	2.3	2.4	2.0
Bengkulu	2.8	3.6	1.6	2.6	3.3	1.5
East Kalimantan	2.9	3.3	1.5	2.1	2.4	1.4
Lampung	3.0	3.4	1.9	2.8	3.2	1.8
Riau	3.2	3.5	1.9	2.8	3.2	1.6
South Kalimantan	3.2	3.8	1.9	2.8	3.4	1.7
Jambi	3.3	3.8	1.8	3.0	3.6	1.7
South Sumatra	3.3	3.9	2.2	3.0	3.5	2.1
Aceh	3.4	3.8	2.1	3.1	3.6	1.9
Central Sulawesi	3.5	3.9	2.6	3.4	3.8	2.5
North Sumatra	3.8	4.4	2.7	3.5	4.1	2.6
Central Kalimantan	3.8	4.1	2.8	3.6	3.9	2.7
West Sumatra	3.9	4.3	3.1	3.6	4.0	2.8
Maluku	4.0	4.1	3.6	3.7	3.8	3.4
North Sulawesi	4.5	4.5	4.7	4.2	4.1	4.4

Source : Calculated from Indonesian Census of 1971, Series E, No.01-25: Table 37-37a.

TABLE A6.10
EDUCATIONAL LEVEL OF FARMERS AND NON-FARMERS
IN MEAN YEARS OF SCHOOLING FOR BOTH SEXES
URBAN+RURAL, 1971-85

	Farmers			Non-Farmers		
	1971	1980	1985	1971	1980	1985
Aceh	2.7	3.0	4.3	5.2	6.0	7.2
North Sumatra	3.1	3.6	4.5	5.7	6.3	7.4
West Sumatra	3.1	3.3	3.9	5.6	5.7	6.9
Riau	2.2	2.7	3.7	5.0	6.0	7.1
Jambi	2.7	2.9	3.6	4.9	5.7	6.9
South Sumatra	2.7	3.1	3.8	4.6	5.8	6.6
Bengkulu	2.3	2.7	3.4	5.7	6.3	7.4
Lampung	2.5	3.1	3.5	4.5	5.3	6.1
West Java	2.3	2.7	3.4	4.1	4.7	5.9
Central Java	1.9	2.5	3.1	3.4	4.1	5.1
Yogyakarta	1.8	2.7	3.2	3.6	5.0	5.9
East Java	1.8	2.3	2.9	3.5	4.2	5.1
Bali	1.9	2.4	2.9	3.6	4.3	5.1
West Nusa Tenggara	1.4	2.1	2.5	2.3	3.3	4.1
East Nusa Tenggara	2.4	2.8	3.1	3.7	4.9	6.2
West Kalimantan	1.6	1.7	2.4	3.0	4.8	6.0
Central Kalimantan	3.3	3.3	4.0	5.3	6.2	6.7
South Kalimantan	2.5	2.7	3.3	4.7	5.3	6.0
East Kalimantan	1.8	2.4	3.3	4.9	6.3	7.5
North Sulawesi	3.7	4.0	4.7	5.9	6.4	7.2
Central Sulawesi	3.0	3.7	4.1	5.0	6.3	7.2
South Sulawesi	1.9	2.3	3.0	4.5	5.1	6.0
Southeast Sulawesi	1.5	2.7	3.0	4.8	5.8	6.3
Maluku	3.3	3.7	4.3	5.5	7.3	7.5
Irian Jaya	-	1.3	1.6	-	6.2	7.9
Average for Indonesia	2.3	2.8	3.4	4.4	5.5	6.4

Source : calculated from Indonesian Population Census of 1971, Series E, No.01-25: Table 37-37a;
Indonesian Population Census of 1980: Table IV.27; Supas 1985: Table 02 (Unpublished)

TABLE A6.11
 NON-AGRICULTURAL LABOUR PRODUCTIVITY PER WORKER
 WITH (Q_b) AND WITHOUT MINING (Q_{bWM}), 1971-85
 AT CURRENT PRICES
 (Rp. THOUSANDS)

	1971		1980		1985	
	Q_b	Q_{bWM}	Q_b	Q_{bWM}	Q_b	Q_{bWM}
Aceh	173	173	7090	1070	12447	2620
North Sumatra	373	349	1609	1178	2453	2262
West Sumatra	154	153	1071	1058	2237	2192
Riau	1982	312	19497	1909	19145	3594
Jambi	327	307	1165	973	2258	1905
South Sumatra	498	393	3015	2338	4781	3466
Bengkulu	293	283	1110	1098	1947	1921
Lampung	223	223	860	857	1337	1330
West Java	130	130	940	716	2097	1693
Central Java	83	82	517	514	1102	1093
Yogyakarta	81	81	405	403	1090	1080
East Java	115	115	768	763	1614	1603
Bali	133	131	572	565	1333	1319
West Nusa Tenggara	58	58	332	320	755	729
East Nusa Tenggara	78	78	455	453	1271	1256
West Kalimantan	273	272	1531	1523	2796	2785
Central Kalimantan	404	404	2036	2021	2991	2969
South Kalimantan	185	170	909	901	1940	1924
East Kalimantan	591	511	16526	3142	22361	5641
North Sulawesi	220	219	918	889	1592	1581
Central Sulawesi	82	82	918	891	1756	1676
South Sulawesi	134	130	908	890	1562	1536
Southeast Sulawesi	332	86	950	718	1678	1498
Maluku	198	192	1541	1299	2379	2222
Irian Jaya			6360	1322	5624	2356
Average for Indonesia	297	206	2880	1112	4022	2090
Coefficient of variation	1.30	0.60	1.69	0.59	1.38	0.50

Source : as for Table 6.2.

note : Q_b (non-agricultural labour productivity with mining) in 1971-85 are represented for convinience.

TABLE A6.12
OLS ESTIMATES OF THE AGRICULTURAL SHARE OF
THE LABOUR FORCE, 1985
URBAN+RURAL
(RGDP AT CURRENT PRICES AND INCLUDING MINING)

Explanatory variables	Independent Variable : Ln (ASLF)		
	Both Sexes	Males	Females
Constant	4.1226 (12.9455)*	4.4043 (11.2411)*	3.7619 (7.8488)*
Ln(Q _a E)	-0.3458 (-2.9998)*	-0.3149 (-2.4915)*	-0.3333 (-1.8358)**
Ln(Q _b E)	0.1621 (2.8918)*	0.0827 (1.3987)	0.3284 (4.0609)*
Ln(MYS)	-0.3669 (-2.2227)*	-0.4681 (-2.1724)*	-0.4377 (-3.1179)*
Ln(Landlessness)	-0.0794 (-1.6133)	-0.0831 (-1.5968)	-0.0494 (-0.6411)
Ln(GINI land distribution)	-0.5450 (-2.2649)*	-0.5824 (-2.2813)*	-0.6881 (-1.7359)**
Ln(Mechanisation)	-0.0217 (-1.0918)	-0.0104 (-0.4910)	-0.0438 (-1.3337)
Sample size	25	25	25
R-squared	0.7885	0.7169	0.7481
R-bar-squared	0.7181	0.6226	0.6641
F	11.1869*	7.5984*	8.9077
Diagnostic tests:			
A.Functional Form ($\chi^2,1$)	2.1516	1.9825	6.7815
B.Normality ($\chi^2,2$)	0.6155	1.3572	0.2859
C.Heteroscedasticity ($\chi^2,1$)	0.1498	1.2701	0.0459

Figures in brackets are t values

Level of significance : * = 0.05; ** = 0.10

A. Ramsey's RESET test using the square of the fitted values

B. Based on a test of skewness and kurtosis of residuals

C. Based on the regression of squared residuals on squared fitted values

TABLE A6.13
OLS ESTIMATES OF THE AGRICULTURAL SHARE OF
THE LABOUR FORCE, 1985
RURAL
(RGDP AT CURRENT PRICES AND INCLUDING MINING)

Explanatory variables	Independent Variable : Ln (ASLF)		
	Both Sexes	Males	Females
Constant	4.4117 (18.8602)*	4.7501 (16.9002)*	3.9567 (9.8200)*
Ln(Q _a E)	-0.0806 (-0.9517)	-0.0295 (-0.3259)	-0.1437 (-0.9416)
Ln(Q _b E)	0.1953 (4.7421)*	0.1316 (3.1021)*	0.3112 (4.5769)*
Ln(MYS)	-0.4193 (-3.4586)*	-0.5333 (-3.4501)*	-0.3913 (-3.3156)*
Ln(Landlessness)	-0.0075 (-0.2081)	-0.0100 (-0.2684)	0.0037 (0.0578)
Ln(GINI land distribution)	-0.3431 (-1.9412)**	-0.3428 (-1.8716)**	-0.4818 (-1.4457)
Ln(Mechanisation)	-0.0303 (-2.0770)*	-0.0238 (-1.5726)	-0.0457 (-1.6545)
Sample size	25	25	25
R-squared	0.7930	0.6839	0.7383
R-bar-squared	0.7241	0.5786	0.6511
F	11.4960*	6.4912*	8.4636*
Diagnostic tests:			
A.Functional Form ($\chi^2,1$)	5.6604	1.7906	8.7337
B.Normality ($\chi^2,2$)	0.3576	0.0521	0.2271
C.Heteroscedasticity ($\chi^2,1$)	0.0036	2.0926	0.1359

Figures in brackets are t values

Level of significance : * = 0.05; ** = 0.10

A. Ramsey's RESET test using the square of the fitted values

B. Based on a test of skewness and kurtosis of residuals

C. Based on the regression of squared residuals on squared fitted values

TABLE A6.14
OLS ESTIMATES OF THE AGRICULTURAL SHARE OF
THE LABOUR FORCE, 1985
URBAN+RURAL
(RGDP AT CURRENT PRICES AND EXCLUDING MINING)

Explanatory variables	Independent Variable : Ln (ASLF)		
	Both Sexes	Males	Females
Constant	4.2033 (13.8046)*	4.4429 (12.0765)*	4.4238 (27.6634)*
Ln(Q _a E)	-0.3364 (-2.9115)*	-0.3112 (-2.5172)*	-0.4570 (-3.4181)*
Ln(Q _b E)	0.2836 (2.9915)*	0.1420 (1.4515)	1.0698 (9.2759)*
Ln(MYS)	-0.3960 (-2.4187)*	-0.4778 (-2.2723)*	-0.9385 (-6.9539)*
Ln(Landlessness)	-0.0894 (-1.8398)**	-0.0889 (-1.7903)**	
Ln(GINI land distribution)	-0.5280 (-2.1878)*	-0.5708 (-2.2919)*	
Sample size	25	25	24 ^{a)}
R-squared	0.7745	0.7131	0.8134
R-bar-squared	0.7152	0.6377	0.7855
F	13.0539*	9.4472	29.0681*
Diagnostic tests:			
A.Functional Form ($\chi^2,1$)	2.8718	2.2694	7.5717
B.Normality ($\chi^2,2$)	1.1717	1.3219	0.5527
C.Heteroscedasticity ($\chi^2,1$)	0.3638	1.3512	0.0478
D.Predictive Failure (,1)			23.5346*

Level of significance : * = 0.05; ** = 0.10

a) Irian Jaya is excluded

A. Ramsey's RESET test using the square of the fitted values

B. Based on a test of skewness and kurtosis of residuals

C. Based on the regression of squared residuals on squared fitted values

TABLE A6.15
OLS ESTIMATES OF THE AGRICULTURAL SHARE OF
THE LABOUR FORCE, 1985
RURAL
(RGDP AT CURRENT PRICES AND EXCLUDING MINING)

Explanatory variables	Independent Variable : Ln (ASLF)		
	Both Sexes	Males	Females
Constant	4.4679 (21.2324)*	4.7976 (18.2523)*	4.3628 (25.2701)*
Ln(Q _a E)	-0.0778 (-0.8838)	-0.0319 (-0.3507)	-0.0792 (-0.5413)
Ln(Q _b E)	0.3715 (6.7552)*	0.2574 (4.6155)*	0.5812 (6.1263)*
Ln(MYS)	-0.4958 (-4.4767)*	-0.6004 (-4.2830)*	-0.4165 (-3.7674)*
Ln(GINI land distribution)	-0.3719 (-2.2756)*	-0.3716 (-2.2629)*	
Sample size	25	25	25
R-squared	0.7392	0.6332	0.6543
R-bar-squared	0.6871	0.5599	0.6050
F	14.1741*	8.6331*	13.2511*
Diagnostic tests:			
A.Functional Form ($\chi^2,1$)	5.4197	1.5428	13.1634*
B.Normality ($\chi^2,2$)	1.1359	0.7778	3.9935
C.Heteroscedasticity ($\chi^2,1$)	0.0016	1.2043	1.5723

Figures in brackets are t values

Level of significance : * = 0.05; ** = 0.10

A. Ramsey's RESET test using the square of the fitted values

B. Based on a test of skewness and kurtosis of residuals

C. Based on the regression of squared residuals on squared fitted values

TABLE A6.16
OLS ESTIMATES OF THE AGRICULTURAL SHARE OF
THE LABOUR FORCE, 1980
URBAN+RURAL
(RGDP AT CURRENT PRICES AND EXCLUDING MINING)

Explanatory variables	Independent Variable : Ln (ASLF)		
	Both Sexes	Males	Females
Constant	4.3863 (16.9636)*	4.5850 (12.8681)*	4.0403 (21.0889)*
Ln(Q _a E)	-0.4968 (-4.8533)*	-0.3723 (-3.3417)*	-0.7719 (-5.0977)*
Ln(Q _b E)	0.5523 (5.1856)*	0.3577 (2.9942)*	1.0125 (7.1714)*
Ln(MYS)	-0.4812 (-2.5701)*	-0.5178 (-2.1011)*	-0.5152 (-3.5445)*
Sample size	24	24	24
R-squared	0.6037	0.4151	0.7214
R-bar-squared	0.5442	0.3274	0.6797
F	10.1542*	4.7311*	17.2666*
Diagnostic tests:			
A.Functional Form ($\chi^2,1$)	0.9458	5.3124	1.1863
B.Normality ($\chi^2,2$)	0.5268	0.1501	1.1910
C.Heteroscedasticity ($\chi^2,1$)	0.3815	0.0543	1.1842

Figures in brackets are t values

Level of significance : * = 0.05; ** = 0.10

Irian Jaya is excluded

A. Ramsey's RESET test using the square of the fitted values

B. Based on a test of skewness and kurtosis of residuals

C. Based on the regression of squared residuals on squared fitted values

TABLE A6.17
OLS ESTIMATES OF THE AGRICULTURAL SHARE OF
THE LABOUR FORCE, 1980
RURAL
(RGDP AT CURRENT PRICES AND EXCLUDING MINING)

Explanatory variables	Independent Variable : Ln (ASLF)		
	Both Sexes	Males	Females
Constant	4.6765 (25.4596)*	4.8619 (20.1574)*	4.2488 (26.3592)*
Ln(Q _a E)	-0.3203 (-4.4051)*	-0.2072 (-2.7469)*	-0.5918 (-4.6454)*
Ln(Q _b E)	0.5019 (6.6337)*	0.3234 (3.9987)*	0.9022 (7.5947)*
Ln(MYS)	-0.4936 (-3.7109)*	-0.5138 (-3.0802)*	-0.4690 (-3.8352)*
Sample size	24	24	24
R-squared	0.6881	0.4561	0.7499
R-bar-squared	0.6413	0.3745	0.7124
F	14.7045*	5.5904*	19.9937*
Diagnostic tests:			
A.Functional Form ($\chi^2, 1$)	1.1513	1.1531	2.8740
B.Normality ($\chi^2, 2$)	0.7933	5.2569	1.4163
C.Heteroscedasticity ($\chi^2, 1$)	1.6612	0.3620	2.0208

Figures in brackets are t values

Level of significance : * = 0.05; ** = 0.10

Irian Jaya is excluded

A. Ramsey's RESET test using the square of the fitted values

B. Based on a test of skewness and kurtosis of residuals

C. Based on the regression of squared residuals on squared fitted values

TABLE A6.18
OLS ESTIMATES OF THE AGRICULTURAL SHARE OF
THE LABOUR FORCE, 1971
URBAN+RURAL
(RGDP AT CURRENT PRICES AND EXCLUDING MINING)

Explanatory variables	Independent Variable : Ln (ASLF)		
	Both Sexes	Males	Females
Constant	-1.2590 (-1.1077)	1.3937 (1.1550)	-2.7773 (-1.1436)
Ln(Q _a E)	-8.0172 (-6.4901)*	-4.4200 (-3.5664)*	-8.0733 (-3.8250)*
[Ln(Q _a E)] ²	-1.7257 (-6.4343)*	-0.9206 (-3.4589)*	-1.7467 (-3.8760)*
Ln(Q _b E)	1.2717 (3.4826)*	0.6136 (1.3570)	0.9701 (1.1470)
[Ln(Q _b E)] ²	0.2324 (2.5314)*	0.0888 (0.7660)	0.1639 (0.7580)
Ln(MYS)	-1.6618 (-7.1855)*	-1.1642 (-4.0240)*	-0.8779 (-5.0012)*
Sample size	24	24	24
R-squared	0.7791	0.556	0.6841
R-bar-squared	0.7177	0.4331	0.5963
F	12.6969*	4.5139*	7.7949*
Diagnostic tests:			
A.Functional Form ($\chi^2,1$)	6.6520	0.6869	6.5274
B.Normality ($\chi^2,2$)	0.2488	2.7239	3.9627
C.Heteroscedasticity ($\chi^2,1$)	5.2218	0.1141	1.7105

Figures in brackets are t values

Level of significance : * = 0.05; ** = 0.10

Irian Jaya is excluded

A. Ramsey's RESET test using the square of the fitted values

B. Based on a test of skewness and kurtosis of residuals

C. Based on the regression of squared residuals on squared fitted values

TABLE A6.19
OLS ESTIMATES OF THE AGRICULTURAL SHARE OF
THE LABOUR FORCE, 1971
RURAL
(RGDP AT CURRENT PRICES AND EXCLUDING MINING)

Explanatory variables	Independent Variable : Ln (ASLF)		
	Both Sexes	Males	Females
Constant	0.7568 (0.7211)	2.7471 (3.4573)*	-1.4185 (-0.6960)
Ln(Q _a E)	-5.7664 (-5.0551)*	-2.5891 (-3.2012)*	-6.6102 (-3.7314)*
[Ln(Q _a E)] ²	-1.2686 (-5.1222)*	-0.5647 (-3.2513)*	-1.4391 (-3.8049)*
Ln(Q _b E)	0.8864 (2.6288)*	0.0624 (0.2057)	0.6779 (0.9551)
[Ln(Q _b E)] ²	0.1439 (1.6977)	-0.0293 (-0.3796)	0.0916 (0.5051)
Ln(MYS)	-1.3105 (-6.1364)*	-0.7650 (-4.0405)*	-0.7332 (-4.9767)*
Dummy		-0.2200 (-3.9767)*	
Sample size	24	24	24
R-squared	0.7423	0.6874	0.7133
R-bar-squared	0.6708	0.5770	0.6337
F	10.3714*	6.2297*	8.9585*
Diagnostic tests:			
A.Functional Form ($\chi^2, 1$)	6.5545	0.0159	7.7641
B.Normality ($\chi^2, 2$)	1.4164	0.6948	3.6715
C.Heteroscedasticity ($\chi^2, 1$)	0.3369	1.2339	2.0287

Dummy : West Java

Figures in brackets are t values

Level of significance : * = 0.05; ** = 0.10

Irian Jaya is excluded

A. Ramsey's RESET test using the square of the fitted values

B. Based on a test of skewness and kurtosis of residuals

C. Based on the regression of squared residuals on squared fitted values

TABLE A7.1
LABOUR PRODUCTIVITY PER WORKER IN AGRICULTURE AND
NON-AGRICULTURE AT CONSTANT 1975 PRICES, 1971-85
(Rp 1000)

	1971*		1980		1985	
	Q _a	Q _b	Q _a	Q _b	Q _a	Q _b
Aceh	179	611	221	2445	245	2508
North Sumatra	148	473	210	702	249	689
West Sumatra	138	311	163	514	196	679
Riau	172	4885	154	5841	161	3182
Jambi	236	783	195	466	165	477
South Sumatra	179	1218	186	1145	186	1272
Bengkulu	124	576	143	579	183	663
Lampung	144	474	134	435	137	406
West Java	157	315	191	426	203	518
Central Java	105	143	128	262	152	344
Yogyakarta	44	84	113	199	101	243
East Java	134	277	174	366	182	423
Bali	192	317	240	346	242	513
West Nusa Tenggara	120	125	154	172	158	244
East Nusa Tenggara	73	180	105	267	96	409
West Kalimantan	115	639	137	831	130	905
Central Kalimantan	175	547	197	883	182	873
South Kalimantan	166	446	152	410	147	455
East Kalimantan	415	2869	381	5203	263	5841
North Sulawesi	217	531	305	449	227	556
Central Sulawesi	97	139	150	415	131	502
South Sulawesi	183	320	279	461	267	507
Southeast Sulawesi	130	799	148	584	136	588
Maluku	271	463	282	749	243	790
Irian Jaya	-	-	286	2148	169	5368
All Provinces	139	371	176	545	184	605

Source : as for Table 6.2

* Splicing technique to construct the 1975 as a base of index cannot be applied to all provinces in 1971. Those provinces are Riau, Jambi, South Sumatra, West Java, East Java, Bali, West Nusa Tenggara, East Nusa Tenggara, South Kalimantan, North Sulawesi, South Sulawesi, Southeast Sulawesi, Maluku and Irian Jaya. To overcome this, in the regions where splicing method cannot be run, RGDP 1971 at 1975 constant prices are calculated by using wholesale price index (WPI) as follows :

RGDP at current 1971 prices

RGDP '71 at '75 constant prices=

(WPI '71/WPI '75)

where :

1971 is base year

WPI for Agriculture and General are 254 and 259 respectively

TABLE A7.2
NON-AGRICULTURAL LABOUR PRODUCTIVITY
AT 1975 CONSTANT PRICES (Rp.'000),
GROWTH RATE OF INCOME AND LABOUR FORCE
1980-85

	1	2	3	4	5	6	7	8	9
<i>Labour Productivity per Worker, 1980</i>									
Bali	136	131	1370	510	253	1220	1355	370	292
WNT	446	31	220	319	144	523	2128	184	162
ENT	82	54	1124	203	693	552	1977	335	143
NS	1137	144	881	225	818	875	2137	307	369
CS	308	171	1715	618	562	638	3503	313	224
SES	2608	44	1719	226	337	1050	4845	492	247
<i>Labour Productivity per Worker, 1985</i>									
Bali	152	162	3823	465	427	1802	2317	747	372
WNT	641	57	401	420	162	457	3238	314	194
ENT	626	88	14830	415	706	932	4504	483	153
NS	840	423	1788	232	495	1691	5254	478	366
CS	1173	242	---	1150	469	969	2985	387	235
SES	3326	122	1296	210	304	1085	20141	735	269
<i>Annual Growth Rate of Income 1980-85</i>									
Bali	9.7	16.0	29.8	2.9	16.6	15.0	15.3	14.8	10.8
WNT	6.8	6.1	18.5	13.9	7.2	4.3	7.4	12.2	7.2
ENT	26.8	8.7	23.9	18.1	10.7	15.3	8.0	6.6	6.8
NS	-10.0	25.4	23.9	4.5	-0.3	12.2	10.1	11.2	4.4
CS	17.8	12.3	14.2	10.9	7.7	10.0	6.9	11.3	7.1
SES	13.5	29.2	30.4	3.6	11.4	16.1	7.0	16.1	11.1
<i>Annual Growth Rate of Labour Force 1980-85</i>									
Bali	7.3	11.2	5.7	4.8	4.9	6.3	3.6	-0.2	5.6
WNT	-0.7	-5.8	5.1	7.7	4.8	7.2	-1.2	0.8	3.4
ENT	-15.6	-1.4	-26.0	2.4	10.3	3.8	-8.4	-1.0	5.3
NS	-4.4	1.0	7.6	3.9	10.2	-1.6	-8.1	1.8	4.6
CS	-9.8	4.9	0.0	-2.0	11.6	1.2	10.4	6.7	6.1
SES	8.1	5.4	38.0	5.2	13.7	15.3	-19.6	7.1	9.3

note :

WNT : West Nusa Tenggara

ENT : East Nusa Tenggara

NS : North Sulawesi

CS : Central Sulawesi

SES : Southeast Sulawesi

1. Mining and Quarrying, 2. Industry, 3. Utility, 4. Construction, 5. Trade, 6. Transportation, 7. Finance, 8. Services, 9. All Sectors

--- no labour force engaged in this sector

TABLE A7.3
OLS ESTIMATES OF THE CHANGE IN THE AGRICULTURAL SHARE OF THE LABOUR FORCE,
URBAN+RURAL, MALE+FEMALE, 1971-80 (EXCLUDING MINING)
(MODEL M2)

	Dependent Variable: d[ASLF]	
	Model M1	Model M2
Constant	-14.8401 (-7.3465)*	-15.2182 (-2.2839)*
Ln[dQ _a]	-18.8417 (-10.2269)*	
Ln[dQ _b]	21.8148 (14.7456)*	
Ln[dQ _a E]		21.7995 (1.3375)
Ln[dQ _b E]		3.8209 (1.2499)
d[MYS]	-1.7130 (-2.6297)*	-7.5839 (-1.7452)**
d[BSY _{EM}]	-0.8996 (-15.5888)*	-0.2008 (-2.1054)*
ASLF ₇₁	0.2165 (8.5278)*	0.1190 (1.4177)***
Sample size	24	24
R-squared	0.9529	0.4291
R-squared	0.9399	0.2705
F	72.8798	2.7054
Diagnostic Tests		
A.Functional Form($\chi^2, 1$)0.5384	1.0258	
B.Normality($\chi^2, 2$)	1.2540	1.3451
C.Heteroscedasticity($\chi^2, 1$)	1.7713	0.0054

Level of significance : * = 0.05; ** = 0.10

A.Ramsey's RESET test using the square of the fitted values

B.Based on a test of skewness and kurtosis of residuals

C.Based on the regression of squared residuals on squared fitted values

TABLE A7.4
ALTERNATIVE TESTS FOR NON-NESTED REGRESSION MODELS,
URBAN+RURAL, MALE+FEMALE, 1971-80 (EXCLUDING MINING)

Dependent variable is d[ASLF]				
Regressors for model M1:	Constant	Ln[Q _a]	Ln[Q _b]	d[MYS] d[BSY] ASLF ₇₁
Regressors for model M2:	Constant	Ln[Q _a E]	Ln[Q _b E]	d[MYS] d[BSY] ASLF ₇₁

Test Statistic	M1 against M2	M2 against M1
N-Test	0.0716	-28.0470
NT-Test	0.1890	-17.0235
W-Test	0.1900	-6.1252
J-Test	-0.0561	13.7791
JA-Test	-0.0650	3.0700
Encompassing	F(2,16)=0.0259	F(2,16)=89.3487

Model M1:	R-Bar-Squared	0.9399	Log-likelihood	-27.4379
Model M2:	R-Bar-Squared	0.2705	Log-likelihood	-57.3854
Model M1+M2:	R-Bar-Squared	0.9326	Log-likelihood	-27.3991

Akaike's Information Criterion of M1 versus M2= -29.9475 favours M1

Schwarz's Bayesian Information Criterion of M1 versus M2= -29.9475 favours M1

TABLE A7.5
OLS ESTIMATES OF THE CHANGE IN THE AGRICULTURAL SHARE OF THE LABOUR FORCE,
URBAN+RURAL, MALE+FEMALE, 1980-85 (EXCLUDING MINING)
(MODEL M2)

	Dependent Variable: d[ASLF]	
	Model M1	Model M2
Constant	0.7150 (1.0358)	1.1836 (0.6383)
Ln[dQ _a]	-14.8655 (-9.1329)*	
Ln[dQ _b]	18.2163 (11.8358)*	
Ln[dQ _a E]		-4.4952 (-0.9289)
Ln[dQ _b E]		22.1208 (2.8323)*
d[MYS]	-1.8684 (-2.4127)*	-7.7705 (-4.3053)*
d[BSY _{EM}]	-0.6773 (-8.6212)*	-0.0176 (-0.1235)
Sample size	24	24
R-squared	0.9269	0.5479
R-bar-squared	0.9115	0.4527
F	60.1911	5.7560
Diagnostic Tests		
A.Functional Form($\chi^2,1$)	0.0006	3.4670
B.Normality($\chi^2,2$)	0.2027	0.4529
C.Heteroscedasticity($\chi^2,1$)	0.0851	1.6359

Level of significance : * = 0.05; ** = 0.10

A.Ramsey's RESET test using the square of the fitted values

B.Based on a test of skewness and kurtosis of residuals

C.Based on the regression of squared residuals on squared fitted values

TABLE A7.6
ALTERNATIVE TESTS FOR NON-NESTED REGRESSION MODELS,
URBAN+RURAL, MALE+FEMALE, 1980-85 (EXCLUDING MINING)

Dependent variable is d[ASLF]					
Regressors for model M1:	Constant	Ln[Q _a]	Ln[Q _a]	d[MYS]	d[BSY] ASLF ₇₁
Regressors for model M2:	Constant	Ln[Q _a E]	Ln[Q _a E]	d[MYS]	d[BSY] ASLF ₇₁

Test Statistic	M1 against M2		M2 against M1	
N-Test	1.1771		-19.1454	
NT-Test	1.1185		-13.4390	
W-Test	1.1967		-5.8155	
J-Test	-0.8181		11.7704	
JA-Test	-1.5402		8.1838	
Encompassing	F(2,17)=6.1100		81.8091	

Model M1:	R-Bar-Squared	0.9115	Log-likelihood	-25.6263
Model M2:	R-Bar-Squared	0.4527	Log-likelihood	-47.4846
Model M1+M2:	R-Bar-Squared	0.9424	Log-likelihood	-19.1266

Akaike's Information Criterion of M1 versus M2= -21.8584 favours M1

Schwarz's Bayesian Information Criterion of M1 versus M2= -21.8584 favours M1

TABLE A7.7
OLS ESTIMATES OF THE CHANGE IN THE AGRICULTURAL SHARE OF THE LABOUR FORCE,
URBAN+RURAL, 1971-1980 (EXCLUDING MINING)
(MODEL M1)

	Dependent Variables : d[ASLF]		
	Both Sexes	Males	Females
Constant	-14.7310 (-7.1234)*	-12.7552 (-3.9115)*	-1.2060 (-0.1543)
dL[Q _a]	-18.7850 (-9.9887)*	-20.7790 (-6.5209)*	-9.7597 (-0.9793)
dL[Q _b]	21.6577 (14.1270)*	19.1815 (7.4261)*	20.4847 (2.7187)*
d[MYS]	-1.7401 (-2.6139)*	-2.4476 (-2.4634)*	-9.1480 (-2.6645)*
d[BSY _{EM}]	-0.8966 (-15.1841)*	-0.7852 (-7.6880)*	-0.7174 (-2.6606)*
ASLF ₇₁	0.2182 (8.3780)*	0.1958 (4.3497)*	0.0445 (0.6173)
dL[RPOP]	-1.2448 (-0.5689)	0.8617 (0.1655)	-1.5867 (-0.1464)
Sample size	24	24	24
R-squared	0.9538	0.8617	0.5802
R-bar-squared	0.9375	0.8129	0.4320
F	58.5051*	17.6496*	3.9158*
Diagnostic Tests			
A.Functional Form($\chi^2, 1$)	0.4995	1.0665	0.0223
B.Normality($\chi^2, 2$)	1.0031	0.3601	0.6945
C.Heteroscedasticity($\chi^2, 1$)	1.8475	2.6249	0.4509

Level of significance : * = 0.05; ** = 0.10

A.Ramsey's RESET test using the square of the fitted values

B.Based on a test of skewness and kurtosis of residuals

C.Based on the regression of squared residuals on squared fitted values

TABLE A7.8
OLS ESTIMATES OF THE CHANGE IN THE AGRICULTURAL SHARE OF THE LABOUR FORCE,
RURAL, 1971-1980 (EXCLUDING MINING)
(MODEL M1)

	Dependent Variables : d[ASLF]		
	Both Sexes	Males	Females
Constant	-19.6707 (-4.0508)*	-11.3580 (-1.6079)**	-8.0614 (-0.8587)
dL[Q _a]	-15.2532 (-4.1961)*	-14.4257 (-2.8478)*	-8.5918 (-0.7792)
dL[Q _b]	20.8675 (7.1848)*	16.1402 (3.8505)*	18.9571 (2.3223)*
d[MYS]	-0.5042 (-0.4155)	-2.6471 (-1.6904)**	-3.3070 (-0.8970)
d[BSY _{EM}]	-0.7596 (-7.0087)*	-0.5345 (-3.3989)*	-0.6703 (-2.2884)*
ASLF ₇₁	0.2792 (4.8748)*	0.1812 (2.0448)*	0.1087 (1.2599)
dL[RPOP]	-21.9057 (-5.0546)*	-22.0486 (-3.7711)*	-11.2593 (-0.9589)
Sample size	24	24	24
R-squared	0.8738	0.7263	0.4899
R-bar-squared	0.8292	0.6297	0.3098
F	19.6102*	7.5186*	2.7206*
Diagnostic Tests			
A.Functional Form($\chi^2,1$)	4.2916	0.5086	1.5598
B.Normality($\chi^2,2$)	0.7630	1.3040	0.1723
C.Heteroscedasticity($\chi^2,1$)	0.0172	0.3650	0.2256

Level of significance : * = 0.05; ** = 0.10

A.Ramsey's RESET test using the square of the fitted values

B.Based on a test of skewness and kurtosis of residuals

C.Based on the regression of squared residuals on squared fitted values

TABLE A7.9
OLS ESTIMATES OF THE CHANGE IN AGRICULTURAL SHARE OF THE LABOUR FORCE,
URBAN+RURAL, 1980-1985 (INCLUDING MINING)
(MODEL M1)

	Dependent Variables : d[ASLF]		
	Both Sexes	Males	Females
Constant	7.5202 (2.0980)*	9.5680 (2.3800)*	14.4147 (2.9239)*
dL[Q _a]	-3.9284 (-1.2858)	-4.5649 (-1.6235)	-4.3320 (-0.6927)
dL[Q _b]	6.3614 (2.2443)*	2.5116 (1.0154)	9.7251 (1.5654)
d[MYS]	-5.3565 (-2.8410)*	-6.3590 (-3.8904)*	-8.4387 (-1.9984)*
d[BSY _{IM}]	-36.2161 (2.0294)*	-20.4455 (-1.2089)	-70.9507 (-2.0316)*
ASLF ₈₀	-0.0575 (-1.1439)	-0.0714 (-1.2614)	-0.1005 (-1.5787)***
dL[RPOP]	-1.7210 (-0.2499)	-1.6641 (-0.2510)	-1.1032 (-0.0818)
Sample size	25	25	25
R-squared	0.5974	0.5784	0.5963
R-bar-squared	0.4632	0.4379	0.4617
F	4.4522*	4.1158*	4.4312*
Diagnostic Tests			
A.Functional Form($\chi^2,1$)	7.6351	0.1826	5.7543
B.Normality($\chi^2,2$)	1.95452	0.5771	0.7448
C.Heteroscedasticity($\chi^2,1$)	1.6087	1.1884	0.3378

Level of significance : * = 0.05; ** = 0.10

A.Ramsey's RESET test using the square of the fitted values

B.Based on a test of skewness and kurtosis of residuals

C.Based on the regression of squared residuals on squared fitted values

TABLE A7.10
OLS ESTIMATES OF THE CHANGE IN THE AGRICULTURAL SHARE OF THE LABOUR FORCE,
RURAL, 1980-1985 (INCLUDING MINING)
(MODEL M1)

	Dependent Variables : d[ASLF]		
	Both Sexes	Males	Females
Constant	10.9021 (2.3095)*	12.3314 (2.0429)*	18.8315 (3.6235)*
dL[Q _a]	-5.5990 (-1.8023)**	-4.6515 (-1.4819)	-3.8737 (-0.6316)
dL[Q _b]	3.2639 (1.0970)	0.8048 (0.2766)	6.4909 (1.0630)
d[MYS]	-3.9071 (-2.0093)*	-4.8605 (-2.6740)*	-6.9277 (-1.5940)
d[BSY _{IM}]	-34.4541 (-1.8858)**	-18.0855 (-0.9371)	-68.0988 (-1.9925)*
ASLF ₈₀	-0.0852 (-1.3573)	-0.0984 (-1.2408)	-0.1458 (-2.0576)*
dL[RPOP]	-6.3204 (-0.8355)	-4.3991 (-0.5550)	-5.1765 (-0.3787)
Sample size	25	25	25
R-squared	0.5131	0.4213	0.6009
R-bar-squared	0.3508	0.2284	0.4678
F	3.1618*	2.1838	4.5164*
Diagnostic Tests			
A.Functional Form($\chi^2,1$)	1.0540	2.0583	5.3712
B.Normality($\chi^2,2$)	0.3875	1.7181	0.3240
C.Heteroscedasticity($\chi^2,1$)	0.0430	0.5201	0.0305

Level of significance : * = 0.05; ** = 0.10

A.Ramsey's RESET test using the square of the fitted values

B.Based on a test of skewness and kurtosis of residuals

C.Based on the regression of squared residuals on squared fitted values

TABLE A7.11
OLS ESTIMATES OF THE CHANGE IN THE AGRICULTURAL SHARE OF THE LABOUR FORCE,
URBAN+RURAL, 1980-1985 (EXCLUDING MINING)
(MODEL M1)

	Dependent Variables : d[ASLF]		
	Both Sexes	Males	Females
Constant	0.6113 (0.3303)	6.4600 (1.7745)**	2.8260 (0.6786)
dL[Q _a]	-13.5095 (-6.1471)*	-10.2886 (-2.9132)*	-12.4626 (1.9045)**
dL[Q _b]	19.5487 (8.8934)*	8.4221 (2.4365)*	33.3679 (4.3901)*
d[MYS]	-1.8128 (-1.8536)**	-4.5471 (-2.9613)*	-3.7388 (-1.1690)
d[BSY _{EM}]	-0.7090 (-6.5116)*	-0.4347 (-2.4934)*	-0.6653 (-2.0749)*
ASLF ₈₀	-0.0056 (-0.2031)	-0.1793 (-0.0242)	-0.0739 (-1.3954)
dL[RPOP]	3.1105 (0.7648)	-0.0441 (-0.7665)	19.1751 (1.5594)***
Sample size	25	25	25
R-squared	0.9093	0.7050	0.7588
R-bar-squared	0.8791	0.6066	0.6784
F	30.0729*	7.1690*	9.4373*
Diagnostic Tests			
A.Functional Form($\chi^2,1$)	0.0024	0.3935	2.1154
B.Normality($\chi^2,2$)	0.2297	0.9435	0.9289
C.Heteroscedasticity($\chi^2,1$)	0.0795	1.9494	0.0966

Level of significance : * = 0.05; ** = 0.10

A.Ramsey's RESET test using the square of the fitted values

B.Based on a test of skewness and kurtosis of residuals

C.Based on the regression of squared residuals on squared fitted values

TABLE A7.12
OLS ESTIMATES OF THE CHANGE IN THE AGRICULTURAL SHARE OF THE LABOUR FORCE,
RURAL, 1980-1985 (EXCLUDING MINING)
(MODEL M1)

	Dependent Variables : d[ASLF]		
	Both Sexes	Males	Females
Constant	1.4962 (0.4426)	9.1156 (1.6735)***	5.4593 (1.1283)
dL[Q _a]	-14.0469 (-4.7315)*	-10.7719 (-2.8376)*	-12.6899 (-1.8850)**
dL[Q _b]	17.1356 (4.9678)*	5.5342 (1.3044)	30.6276 (3.7059)*
d[MYS]	-0.4696 (-0.3348)	-3.1409 (-1.8757)**	-2.4712 (-0.7023)
d[BSY _{EM}]	-0.6058 (-4.1615)*	-0.4651 (-2.4446)*	-0.6713 (-2.0546)*
ASLF ₈₀	-0.0100 (-0.2223)	-0.0612 (-0.8424)	-0.0848 (-1.3688)
dL[RPOP]	-1.0284 (-0.1783)	-5.1289 (-0.6324)	11.5854 (0.9013)
Sample size	25	25	25
R-squared	0.7751	0.5445	0.7241
R-bar-squared	0.7002	0.3927	0.6322
F	10.3407*	3.5867**	7.8751*
Diagnostic Tests			
A.Functional Form($\chi^2,1$)	0.8233	0.00003	4.4798
B.Normality($\chi^2,2$)	0.2971	0.9641	0.7286
C.Heteroscedasticity($\chi^2,1$)	0.9055	0.1576	0.0529

Level of significance : * = 0.05; ** = 0.10

A.Ramsey's RESET test using the square of the fitted values

B.Based on a test of skewness and kurtosis of residuals

C.Based on the regression of squared residuals on squared fitted values

TABLE A7.13
OLS ESTIMATES OF THE CHANGE IN THE AGRICULTURAL SHARE OF THE LABOUR FORCE,
URBAN+RURAL, 1980-1985 (EXCLUDING MINING)
(MODEL M1)

	Dependent Variables : d[ASLF]		
	Both Sexes	Males	Females
Constant	0.8582 (1.1062)	3.2051 (2.5898)*	2.7132 (0.9161)
dL[Q _a]	-13.8515 (-7.7847)*	-11.4506 (-3.9698)*	-16.0719 (-2.5824)*
dL[Q _b]	18.6812 (10.8405)*	9.3023 (3.3188)*	31.9273 (5.1223)*
d[MYS]	-1.8599 (-2.1297)*	-3.8481 (-3.0990)*	-5.2210 (-1.6587)***
d[BSY _{EM}]	-0.7252 (-8.4338)*	-0.4960 (-3.4502)*	-0.8810 (-3.0159)*
Sample size	25	25	25
R-squared	0.9058	0.6862	0.7194
R-bar-squared	0.8870	0.6235	0.6633
F	48.1008*	10.9345*	12.8215*
Diagnostic Tests			
A.Functional Form($\chi^2,1$)	0.0299	0.8718	1.1114
B.Normality($\chi^2,2$)	0.0211	1.0709	1.3496
C.Heteroscedasticity($\chi^2,1$)	0.1866	1.4478	0.8705

Level of significance : * = 0.05; ** = 0.10

A.Ramsey's RESET test using the square of the fitted values

B.Based on a test of skewness and kurtosis of residuals

C.Based on the regression of squared residuals on squared fitted values

TABLE A7.14
OLS ESTIMATES OF THE CHANGE IN THE AGRICULTURAL SHARE OF THE LABOUR FORCE,
RURAL, 1980-1985 (EXCLUDING MINING)
(MODEL M1)

	Dependent Variables : d[ASLF]		
	Both Sexes	Males	Females
Constant	0.4778 (0.4113)	3.1997 (2.0062)*	2.5345 (0.8201)
dL[Q _a]	-14.2010 (-5.3300)*	-10.8001 (-2.9054)*	-15.1403 (-2.3313)*
dL[Q _b]	18.0038 (6.9771)*	8.6550 (2.3960)*	32.7961 (5.0423)*
d[MYS]	-0.3520 (-0.2692)	-2.6028 (-1.6265)***	-4.1353 (-1.2590)
d[BSY _{EM}]	-0.6155 (-4.7804)*	-0.4837 (-2.6110)*	-0.8343 (-2.7369)*
Sample size	25	25	25
R-squared	0.7731	0.4831	0.6941
R-bar-squared	0.7277	0.3798	0.6329
F	17.0324*	4.6737**	11.3430*
Diagnostic Tests			
A.Functional Form($\chi^2,1$)	0.1736	1.3548	1.9524
B.Normality($\chi^2,2$)	0.3159	0.0237	1.1463
C.Heteroscedasticity($\chi^2,1$)	0.7776	0.0071	0.2219

Level of significance : * = 0.05; ** = 0.10

A.Ramsey's RESET test using the square of the fitted values

B.Based on a test of skewness and kurtosis of residuals

C.Based on the regression of squared residuals on squared fitted values

TABLE A7.15
OLS ESTIMATES OF THE CHANGE IN THE AGRICULTURAL SHARE OF FEMALE EARNING
WORKERS,
1980-1985 (EXCLUDING MINING)
(MODEL M1)

	Dependent Variable: d[ASEW]	
	Urban+rural	Rural
Constant	8.9927 (1.6707)	10.3561 (1.6742)
d[BSO _{EM}]	-0.4562 (-1.1038)	-0.7736 (-1.6936)
d[MYS]	4.4629 (0.8290)	9.4376 (1.5395)
ASEW ₈₀	-0.4185 (-5.8057)*	-0.3946 (-4.8147)*
Sample size	24	24
R-squared	0.6498	0.5563
R-bar-squared	0.5973	0.4897
F	12.3708	8.3582
Diagnostic tests		
A.Functional Form($\chi^2,1$)	2.0288	2.0785
B.Normality($\chi^2,2$)	1.9590	2.2141
C.Heteroscedasticity($\chi^2,1$)	0.1901	1.3206

Level of significance : * = 0.05; ** = 0.10

Irian Jaya is excluded

A.Ramsey's RESET test using the square of the fitted values

B.Based on a test of skewness and kurtosis of residuals

C.Based on the regression of squared residuals on squared fitted values

Appendix A8.0: derivation of Equation (8.3)

Let:

λ the agricultural share of the labour force in urban+rural areas,

λ^u the agricultural share of the labour force in urban areas (agricultural labour force in urban areas divided by total labour force in urban areas),

λ^r the agricultural share of the labour force in rural areas (agricultural labour force in rural areas divided by total labour force in rural areas),

α proportion of total labour force in urban areas,

β proportion of total labour force in rural areas,

$$\text{where: } \alpha + \beta = 1$$

d indicates the difference value between the final and initial values.

$'$ refers to final values,

then,

$\lambda^u \cdot \alpha$ = proportion of the agricultural share of the labour force in urban areas

(agricultural labour force in urban areas divided by total labour force in urban+rural areas),

$\lambda^r \cdot \beta$ = proportion of the agricultural share of the labour force in rural areas (agricultural labour force in rural areas divided by total labour force in urban+rural areas),

$$\text{so, } \lambda = (\lambda^u \cdot \alpha) + (\lambda^r \cdot \beta)$$

the change in λ^u between two years, $d\lambda^u$, is :

$$d\lambda^u = (\lambda^{u'} - \lambda^u)\alpha' + (\alpha' - \alpha)\lambda^u, \text{ or}$$

$$d\lambda^u = (\lambda^{u'} - \lambda^u)\alpha + (\alpha' - \alpha)\lambda^{u'},$$

take the average

$$d\lambda^u = 1/2(\lambda^{u'} - \lambda^u)(\alpha' + \alpha) + 1/2(\alpha' - \alpha)(\lambda^{u'} + \lambda^u)$$

the change in λ^r between two years, $d\lambda^r$, is :

$$d\lambda^r = (\lambda^{r'} - \lambda^r)\beta' + (\beta' - \beta)\lambda^r, \text{ or}$$

$$d\lambda^r = (\lambda^{r'} - \lambda^r)\beta + (\beta' - \beta)\lambda^{r'},$$

take the average

$$d\lambda^r = 1/2(\lambda^r - \lambda^r)(\beta' + \beta) + 1/2(\beta' - \beta)(\lambda^r + \lambda^r)$$

then, the change in λ (in urban+rural areas) between two years, $d\lambda = d\lambda^u + d\lambda^r$,

$$d\lambda = 1/2(\lambda^u - \lambda^u)(\alpha' + \alpha)$$

$$+ 1/2(\lambda^r - \lambda^r)(\beta' + \beta)$$

$$+ 1/2(\alpha' - \alpha)(\lambda^u + \lambda^u) + 1/2(\beta' - \beta)(\lambda^r + \lambda^r)$$

= the change within urban areas

+ the change within rural areas

+ the change due to effect of urbanization

rearrange, then:

$$d\lambda = 1/2\sum d\lambda^r(2 - \alpha - \alpha') + 1/2\sum d\lambda^u(\alpha' + \alpha) + 1/2\sum d\alpha(\lambda^u + \lambda^u - \lambda^r - \lambda^r)$$

$$\text{note: } (\alpha' - \alpha) = -(\beta' - \beta)$$

that is an increase in the proportion of the total labour force in urban areas

between two years is equal to a decline in the proportion of the total labour

force in urban areas.

TABLE A8.1
DECOMPOSITION OF CHANGES IN THE AGRICULTURAL SHARE OF
LABOUR FORCE, 1971-80

Male+Female

	Change within		Effect of	Net
	Urban	Rural	Urban	Observed
	Areas	Areas	ization	Effect
<i>Java+Bali</i>				
West Java	0.5	-8.9	-4.4	-12.8
Central Java	0.6	-5.5	-4.1	-9.0
Yogyakarta	0.0	-1.5	-2.1	-3.6
East Java	0.3	-9.0	-2.7	-11.4
Bali	-0.4	-15.7	-2.1	-18.2
<i>Outer Islands</i>				
Aceh	-0.7	-6.7	0.1	-7.3
North Sumatra	0.2	-3.4	-5.0	-8.2
West Sumatra	-1.7	-9.1	1.7	-9.1
Riau	1.3	-2.9	-7.7	-9.4
Jambi	-5.3	-10.0	8.1	-7.2
South Sumatra	-2.6	-4.3	0.8	-6.1
Bengkulu	-0.3	-6.5	0.6	-6.2
Lampung	-0.1	-4.4	-1.7	-6.2
West Nusa Tenggara	-0.3	-11.7	-2.7	-14.6
East Nusa Tenggara	-1.3	-6.3	-0.5	-8.1
West Kalimantan	-1.1	-3.5	-3.5	-8.1
Central Kalimantan	-2.4	-8.4	1.6	-9.2
South Kalimantan	-3.3	-10.4	3.1	-10.6
East Kalimantan	-6.9	-10.0	0.4	-16.6
North Sulawesi	-2.3	-11.3	1.3	-12.4
Central Sulawesi	-0.6	-4.3	-2.3	-7.3
South Sulawesi	-2.1	-6.8	-0.3	-9.2
Southeast Sulawesi	-2.0	-10.7	-2.0	-14.8
Maluku	-0.8	-8.8	1.4	-8.3

Source : as for Table 8.4

TABLE A8.2
DECOMPOSITION OF CHANGES IN THE AGRICULTURAL SHARE OF
LABOUR FORCE, 1980-85

Male+Female

	Change within		Effect of	Net
	Urban	Rural	Urban	Observed
	Areas	Areas	ization	Effect
<i>Java+Bali</i>				
West Java	-0.1	1.1	-2.5	-1.5
Central Java	-0.1	-0.9	-2.7	-3.7
Yogyakarta	0.2	0.2	-1.6	-1.2
East Java	-0.2	-0.6	-1.2	-2.0
Bali	0.0	2.2	-0.9	1.3
<i>Outer Islands</i>				
Aceh	0.1	-2.9	-0.3	-3.1
North Sumatra	-0.8	-0.8	-2.9	-4.4
West Sumatra	-0.4	1.2	-1.0	-0.2
Riau	-0.4	1.2	-1.3	-0.4
Jambi	-0.2	-1.0	-2.4	-3.5
South Sumatra	-0.2	-0.3	-0.7	-1.2
Bengkulu	0.0	-3.2	-1.5	-4.8
Lampung	-0.2	-1.5	-0.5	-2.2
West Nusa Tenggara	0.4	4.8	-1.1	4.0
East Nusa Tenggara	0.1	5.3	-0.7	4.8
West Kalimantan	-0.2	-2.6	-0.8	-3.7
Central Kalimantan	-0.4	-4.3	-1.6	-6.3
South Kalimantan	-0.1	-1.4	0.1	-1.5
East Kalimantan	-0.4	-0.9	-0.4	-1.6
North Sulawesi	-0.2	2.7	-0.5	2.1
Central Sulawesi	0.1	-0.1	0.2	0.1
South Sulawesi	0.0	0.0	0.0	0.0
Southeast Sulawesi	0.1	-0.9	1.0	0.2
Maluku	0.0	-0.1	-1.1	-1.2
Irian Jaya	-0.8	1.6	-0.7	0.2

Source : as for Table 8.6

TABLE A8.3
PERCENTAGE ADDITIONAL OF TOTAL EMPLOYMENT
ABSORBED IN AGRICULTURE, 1971-80 AND 1980-85

	Rural				Urban+Rural	
	Male		Female		M+f	M+F
	I	II	I	II	I	II
<i>Java+Bali</i>						
West Java	29.4	69.6	17.5	64.2	21.1	40.7
Central Java	29.8	33.1	25.0	54.4	22.4	25.7
Yogyakarta	26.4	47.3	78.3	74.7	38.1	43.9
East Java	21.4	55.8	-15.5	62.7	11.4	43.2
Bali	-26.8	58.3	24.6	71.5	5.9	56.5
<i>Outer Islands</i>						
Aceh	55.3	40.4	65.9	75.4	54.3	58.3
North Sumatra	61.9	83.0	71.4	56.2	46.9	35.0
West Sumatra	46.8	87.5	27.4	73.8	34.9	61.2
Riau	55.5	93.7	61.6	75.1	37.4	58.0
Jambi	62.0	70.3	69.8	71.8	59.5	54.6
South Sumatra	63.7	78.5	76.7	76.5	52.0	58.8
Bengkulu	70.0	59.8	86.7	81.4	72.7	62.2
Lampung	81.5	76.9	56.9	76.4	68.8	68.8
West Nusa Tenggara	-4.8	118.4*	4.8	92.3	5.4	80.2
East Nusa Tenggara	68.0	103.4*	-5.7	107.6*	22.7	97.9
West Kalimantan	50.0	51.5	88.3	81.1	45.6	53.0
Central Kalimantan	63.5	62.6	78.0	-15.8	64.3	34.4
South Kalimantan	30.3	76.1	51.6	52.6	28.4	53.4
East Kalimantan	57.1	63.3	52.8	68.6	33.1	43.7
North Sulawesi	41.2	108.2*	12.4	51.6	22.7	66.0
Central Sulawesi	71.3	85.7	17.4	67.0	54.4	72.4
South Sulawesi	20.6	79.5	45.6	60.1	17.3	59.4
Southeast Sulawesi	44.4	65.1	286.9*	82.1	4.8	71.1
Maluku	54.8	89.3	64.9	52.2	54.3	66.5
All Provinces	40.2	69.4	32.5	68.3	29.0	48.7

Source : as for Table 8.4 and Table 8.6

note:I refers to period 1971-80

II refers to period 1980-85

* due to a decline in the numbers of non-agricultural employment.

TABLE A8.4
ANNUAL GROWTH RATE OF AGRICULTURAL EMPLOYMENT

	Rural				Urban+Rural	
	Male		Female		M+F	M+F
	I	II	I	II	I	II
<i>Java+Bali</i>	0.8	1.3	0.5	4.7	1.0	2.6
West Java	1.7	2.7	0.8	5.6	1.7	3.8
Central Java	0.7	0.4	1.0	2.6	1.0	1.3
Yogyakarta	0.7	1.0	3.0	3.5	1.7	2.3
East Java	0.6	1.2	-0.4	5.2	0.5	2.6
Bali	-0.7	1.9	3.1	14.3	0.4	6.1
<i>Outer Islands</i>	2.8	3.1	2.9	6.7	2.7	4.4
Aceh	2.7	1.8	4.0	9.9	3.0	4.7
North Sumatra	2.0	1.8	2.7	1.6	2.5	1.6
West Sumatra	2.5	1.7	1.1	6.4	1.7	3.3
Riau	1.4	3.0	2.5	6.1	2.3	3.9
Jambi	5.9	2.6	5.4	5.7	4.2	3.7
South Sumatra	3.6	2.2	3.8	5.5	3.2	3.6
Bengkulu	5.2	3.3	5.8	6.4	5.4	4.7
Lampung	6.9	4.0	3.6	13.9	6.1	6.6
West Nusa Tenggara	-0.1	2.4	0.4	12.1	0.3	5.0
East Nusa Tenggara	1.0	4.3	-0.1	10.3	0.4	6.6
West Kalimantan	0.9	1.5	1.8	2.7	1.3	2.0
Central Kalimantan	5.3	3.0	10.0	-0.4	6.4	1.7
South Kalimantan	1.3	4.0	3.3	5.0	1.4	4.4
East Kalimantan	6.6	4.2	4.2	13.1	4.8	6.7
North Sulawesi	1.8	4.7	1.2	8.3	1.3	5.4
Central Sulawesi	3.9	4.8	0.3	9.6	2.8	6.2
South Sulawesi	0.4	3.3	4.1	11.2	0.6	4.7
Southeast Sulawesi	1.9	6.6	-2.2	14.0	0.1	9.3
Maluku	2.9	6.2	4.2	3.9	3.2	5.5
Irian Jaya	-	3.4	-	12.4	-	8.6
All Provinces*	1.5	2.1	1.5	5.6	1.6	3.3

Source : as for Table 6.2

note:

I refers to period 1971-80

II refers to period 1980-85

- not available

* excluding DKI Jakarta

TABLE A8.5
PROPORTION OF NON-AGRICULTURAL EMPLOYMENT
TO TOTAL IN RURAL AREA, 1971-85.

	Male			Female		
	1971	1980	1985	1971	1980	1985
<i>Java+Bali</i>						
West Java	31.6	36.3	32.9	23.8	32.8	29.9
Central Java	23.5	26.5	25.9	35.4	38.1	35.9
Yogyakarta	25.2	29.1	29.0	40.3	35.4	32.3
East Java	18.2	24.9	25.1	25.8	35.3	33.5
Bali	17.1	30.9	30.6	39.2	49.7	39.8
<i>Outer Islands</i>						
Aceh	18.0	24.6	28.7	10.5	18.4	20.4
North Sumatra	17.6	18.7	17.4	8.3	12.3	14.4
West Sumatra	20.1	28.7	27.1	17.0	29.5	27.5
Riau	23.3	22.0	19.5	11.9	16.3	17.0
Jambi	9.4	22.5	22.0	4.5	15.7	18.0
South Sumatra	13.4	18.1	17.7	8.6	12.5	14.2
Bengkulu	8.8	16.8	20.1	2.7	7.0	10.0
Lampung	11.9	14.0	15.0	11.5	21.4	21.6
West Nusa Tenggara	20.3	27.8	23.9	43.2	54.2	41.9
East Nusa Tenggara	10.0	12.0	9.4	16.1	28.5	17.7
West Kalimantan	8.4	12.7	15.6	3.8	4.8	6.7
Central Kalimantan	11.7	21.5	23.0	7.6	15.8	23.5
South Kalimantan	13.4	24.5	23.8	9.7	22.5	27.5
East Kalimantan	9.8	19.4	19.6	6.7	18.2	20.5
North Sulawesi	15.8	25.0	20.1	26.7	44.7	43.4
Central Sulawesi	19.0	20.9	19.5	16.1	23.7	26.6
South Sulawesi	13.9	20.6	20.1	40.6	41.7	38.8
Southeast Sulawesi	14.7	23.5	26.4	7.5	18.5	17.9
Maluku	12.4	21.6	18.7	9.4	18.6	24.1
Irian Jaya		14.4	13.8		8.1	5.6
All Provinces	20.6	25.8	24.9	24.7	31.2	29.4

Source : as for Table 8.4 and Table 8.6

TABLE A8.6
PROPORTION OF AGRICULTURAL EMPLOYMENT
IN URBAN AREA, 1971-85.

	Male			Female		
	1971	1980	1985	1971	1980	1985
<i>Java+Bali</i>						
West Java	1.3	4.1	5.2	0.6	2.6	3.4
Central Java	1.0	3.7	4.8	0.6	2.7	3.8
Yogyakarta	1.9	2.6	3.8	1.0	1.6	2.4
East Java	2.0	4.1	4.3	1.9	3.4	3.6
Bali	2.3	3.6	4.3	1.1	2.0	2.6
<i>Outer Islands</i>						
Aceh	2.1	1.5	2.0	2.2	1.0	1.3
North Sumatra	1.7	3.8	2.9	1.0	1.9	2.0
West Sumatra	4.9	1.7	1.1	2.9	0.4	0.4
Riau	1.3	6.2	6.7	0.3	3.5	2.2
Jambi	15.6	1.8	2.3	8.4	0.9	1.3
South Sumatra	6.0	3.4	3.2	6.9	1.7	1.9
Bengkulu	1.7	1.3	1.5	0.5	0.3	0.7
Lampung	2.0	2.7	2.8	1.3	1.6	1.9
West Nusa Tenggara	1.9	3.6	5.6	1.7	5.2	4.4
East Nusa Tenggara	1.9	0.8	1.0	1.6	0.2	0.6
West Kalimantan	2.2	1.9	1.6	0.7	0.5	0.7
Central Kalimantan	5.7	1.5	1.3	3.2	1.1	1.1
South Kalimantan	7.4	2.1	2.0	6.8	1.1	1.1
East Kalimantan	16.1	5.7	5.6	12.0	5.6	4.4
North Sulawesi	6.9	3.0	2.8	2.5	1.3	1.0
Central Sulawesi	1.4	1.4	1.6	0.2	0.1	0.2
South Sulawesi	5.5	2.5	2.7	2.8	2.3	1.4
Southeast Sulawesi	2.8	0.7	0.8	0.9	0.1	0.1
Maluku	2.2	1.1	0.9	1.8	0.2	0.9
Irian Jaya		5.3	3.4		1.2	2.4
All Provinces	2.4	3.4	3.8	1.7	2.3	2.6

Source : as for Table 8.4 and Table 8.6

TABLE A8.7
PERCENTAGE OF URBAN-VILLAGE (*DESA PERKOTAAN*) IN INDONESIA
1971-80

	1971 Definition	1980 Definition
<i>Java+Bali</i>		
West Java	5.4	9.7
Central Java	5.5	9.0
Yogyakarta	30.8	31.1
East Java	7.3	8.5
Bali	6.6	8.3
<i>Outer Islands</i>		
Aceh	2.8	1.6
North Sumatra	4.5	4.4
West Sumatra	10.6	5.0
Riau	3.7	4.3
Jambi	12.5	2.7
South Sumatra	7.7	4.8
Bengkulu	4.9	3.0
Lampung	2.9	3.9
West Nusa Tenggara	9.4	7.3
East Nusa Tenggara	4.4	3.1
West Kalimantan	2.2	0.9
Central Kalimantan	5.2	0.7
South Kalimantan	10.6	5.9
East Kalimantan	12.8	4.5
North Sulawesi	11.3	5.4
Central Sulawesi	3.7	1.9
South Sulawesi	12.5	8.4
Southeast Sulawesi	5.4	3.3
Maluku	3.7	1.1
Irian Jaya	7.9	3.0

Source : Sigit and Hananto (in McDonald, F.P., 1983), Table 4.2, pp.142-143.

TABLE A8.8
OLS ESTIMATES OF THE CHANGE IN THE SHARE OF THE NON-AGRICULTURAL EMPLOYMENT
WITHIN RURAL AREAS,
1980-85

	Dependent Variable: NARE		
	Both sexes	Male	Female
Constant	-0.8614 (-0.1135)	7.2200 (0.9568)	-11.8935 (-0.7883)
INPRES ₈₅	0.0001 (1.1531)	0.0001 (1.1573)	0.0002 (0.7896)
Ln[dQ _{a80}]	-0.8614 (-0.1135)	-1.6723 (-1.1258)	1.6678 (0.5615)
Ln[AVLC ₈₃]	0.3039 (0.2392)	-0.5663 (-0.4486)	2.5505 (1.0103)
Sample size	24	24	24
R-squared	0.1563	0.1051	0.2511
R-bar-squared	0.0298	-0.0291	0.1388
F	1.2354	0.7834	2.2357
Diagnostic Tests			
A.Functional Form($\chi^2,1$)	4.0919	0.3786	3.2622
B.Normality($\chi^2,2$)	6.5288	0.4280	7.1811
C.Heteroscedasticity($\chi^2,1$)	0.4928	0.3547	1.1645

Level of significance : * = 0.05, ** = 0.10

A.Ramsey's RESET test using the square of the fitted values

B.Based on a test of skewness and kurtosis of residuals

C.Based on the regression of squared residuals on squared fitted values

TABLE A8.9
OLS ESTIMATES OF URBANISATION,
1980-85
MODEL M2

	Dependent Variable: U		
	Both sexes	Male	Female
Constant	-0.1093 (-0.0701)	-0.1624 (-0.1191)	0.1579 (0.0640)
dLn[POVER]	0.0151 (0.0430)	-0.0136 (-0.0416)	0.0453 (0.0870)
d[POVER] _{Java}	0.2530 (1.2773)	0.2983 (1.5035)	0.1236 (0.4474)
d[MYS]	1.4655 (1.4626)	1.3832 (1.7318)**	1.5479 (0.9734)
RPOP	-1.5169 (-0.5019)	-0.4401 (-0.1425)	-2.6805 (-0.6235)
RTRAKL	0.3655 (0.7405)	0.2581 (0.5054)	0.5450 (0.7772)
Sample size	25	25	25
R-squared	0.4240	0.4162	0.2547
R-bar-squared	0.2724	0.2626	0.0585
F	2.7974	2.7090	1.2985
Diagnostic Tests			
A.Functional Form($\chi^2, 1$)	0.0001	0.0523	0.4377
B.Normality($\chi^2, 2$)	0.0790	0.3635	0.9260
C.Heteroscedasticity($\chi^2, 1$)	0.0391	0.0459	0.0368

Level of significance : * = 0.05, ** = 0.10

A.Ramsey's RESET test using the square of the fitted values

B.Based on a test of skewness and kurtosis of residuals

C.Based on the regression of squared residuals on squared fitted values

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