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Inequality and Determinants of Earnings in Malaysia

BRANKO MILANOVIC

Branko Milanovic is with the Policy Research Department of the World Bank. This paper is to be delivered at the ***Asia and Pacific Forum on Poverty: Reforming Policies and Institutions for Poverty Reduction***, to be held at the Asian Development Bank, Manila, 5-9 February 2001.

I. Introduction

This paper has several objectives: to study changes in inequality of earnings, their determinants, and how earnings were influenced by the changes in supply and demand of different types of labor over the 13-year period, 1984-1997. This period is composed of two subperiods: 1984-1989 and 1989-1997. The dividing year, 1989, is chosen because it is the last year for which Household Income Survey (HIS) data are available prior to the adoption of the National Development Policy (NDP) in 1991 by the Malaysian government. The new policy represented also the beginning of a new development strategy that placed greater emphasis on private sector development and exports.

The organization of the paper is as follows. Section II gives some background information on the evolution of real gross domestic product (GDP), real wages, and population in Malaysia in the 1984-1997 period. Section III describes individual-level data obtained from three HIS in 1984, 1989, and 1997, which we use here. Section IV presents descriptive statistics for the population and income recipients gleaned from these surveys. Sections V and VI are the main parts of the paper: they analyze respectively changes in the distribution of earnings, and determinants of earnings. Section VII then looks at how these changes can be explained by the forces of labor supply and demand over the same period. The main findings and trends are summarizes in Section VIII.

II. Overview of growth and wages in Malaysia, 1984-1997

Over the period under study Malaysia's real GDP per capita increased by 71 percent, or by an average rate of 4.2 percent per year. Real wage of a manufacturing worker was about 30 percent higher in 1997 than in 1984. However, the overall period consists of two subperiods with significant differences. In the first subperiod, 1984-1989, GDP per capita grew at a relatively modest rate of 1.6 percent per annum. In two years, 1985 and 1986, GDP declined by a little over 1 percent. In the second period, the growth rate accelerated significantly reaching 5.9 percent per capita per annum (Table 1). Other statistics also reflect the duality between the subperiods. Manufacturing worker's and engineer's real wages (the latter taken here to represent earnings of skilled professionals) rose by a little over 1 percent per annum on average in the first subperiod. Their growth accelerated to respectively 2.8 and 6 percent per annum per annum in the second subperiod. On the other hand, plantation worker's daily real wage rate grew substantially during the first period (by more than 6 percent on average) mostly because of the large increases in two years (1986 and 1987), but was

stagnant in the second subperiod. Overall, if we denote by 100 the real wage of respectively manufacturing worker, engineer, and plantation worker in 1984, 13 years later they stood at 129, 160 and 136. Engineer's relative wage therefore pulled ahead of the other two.

Population and labor force increased at about the same, very high, rate in the first subperiod (3.5 percent per annum), and then decelerated (2.9 percent per annum) in the second subperiod. Labor force represented some 40 percent of the population in 1997 against 39 percent in 1984. Finally, GDP per capita in current dollar terms more than doubled, bringing Malaysia into the group of middle-income countries.

Table 1. **Macro Statistics, 1984-1997**

	1984-89	1989-97	1984-97
Growth rates			
GDP per capita	1.6	5.9	4.2
Real wage			
In manufacturing	1.1	2.8[a]	2.3
Engineer's wage	1.3	6.0[b]	4.0
Plantation daily wage (mandores)	6.1	0.2[a]	2.8
Labor force	3.5	2.9	2.9
Population	3.5	2.6	2.7
Levels (at the end of period)			
Labor force as percent of population	39	40	
GDP per capita (current US dollars)	2143	4517	

a Period 1989-95.
b Period 1989-96.

III. The Data

We use three HIS conducted in 1984, 1989, and 1997 As mentioned before, the year 1989 is crucial because it represents the end of an economic and development period. HIS data are normally available in two forms: household-level and individual-level data. Since we deal with *individuals'* earnings and their determinants, we need to use individual level data. All three surveys are very big: two contains information for more than 250,000, and one on 170,000 people.[1] However, in our analysis, we are interested in income recipients alone. We define income recipients as those individuals who report having positive "earned income", *and* non-zero number of hours worked per month. Earned income, in turn, is defined as the sum of income from paid employment, and net

1. The 1984 Survey has data on about 250,000 individuals; the 1989 survey on 278,000; and the 1997 survey is somewhat smaller with information on little over 170,000 individuals.

income from self-employment (both agricultural and nonagricultural).[2] We shall be using the term "earnings" in preference to "wages" in order to convey the fact that self-employment income is included as well. In addition, we are concerned with the population of working age only, that is with those of ages between 14 and 65. (In the data sets, all others invariably report zero hours of work anyway). Thus, our samples are reduced to about 75,000 observations in 1984; about 85,000 in 1989; and about 59,000 observations in 1997. All statistical information presented in Section IV, and the regressions in the following sections are therefore run across that sample only: persons of working age who report positive earnings and positive hours of work.[3] All further details regarding the data sources, definitions of variables, "cleaning" of the data sets etc. are explained in Annex 1.

IV. Descriptive Statistics

A. All Populations

1. *Age*

Table 2 shows an increase in the average age of respondents. It went up from slightly under 24 years to 26 years of age. The increase in average age was slightly higher for women than for men. The percentage of elderly men and women—defined as people 65 years of age or older—is steadily increasing. However, in comparison with European societies or the US, Malaysian society is still very young. The percentage of the elderly in Western Europe is around 15 percent, and in the United States 12.3 percent (World Bank *World Development Indicators*).

2. The reason why we had to include together people with wage income and the self-employed is that about 15 percent of income recipients report both wage and self-employment income. Since there is no information on the amount of time they spend in each activity, there is no way of "isolating" wage income only. Dropping all those who report nonzero self-employment income would clearly bias the results, both because their numbers are significant, and because such an adjustment would not be random (i.e., people choose to be wage earners and/or the self-employed in a systematic fashion). We thus had to choose between two biases: to treat self-employment income (which, of course, includes a capital component) as wage income, or to delete from the sample a nonrandom set of some 15 percent of income recipients. We choose the former course. Finally, note that the earning data for several other countries combine the self-employed together with wage earners (Norway, Sweden, Taiwan according to Peracci [1999, 4).

3. Except for the selection-bias adjustment in the earning regressions.

Table 2. **Average Age by Survey**

	1984	1989	1997
All population	23.98	24.57	25.98
Men	23.69	24.22	25.55
Women	24.27	24.91	26.41
Memo:			
Percentage of population 65 years and older			
All	3.9	4.1	4.2
Men	3.7	3.7	3.9
Women	4.1	4.4	4.6

2. *Location*

Table 3 shows the distribution of the entire by location between Peninsular Malaysia (PM), Sabah and Sarawak.

Table 3. **Distribution of All Individuals by Location**

	1984	1989	1997
Peninsular Malaysia	82.28	83.63	80.44
Sabah	8.97	7.04	7.79
Sarawak	8.75	9.33	11.77
Total	100	100	100

B. Income recipients

1. *Participation rates*

Between 1984 and 1997, the share of income recipients increased from about 29 percent to 34.6 percent. The increase of about 5½ percentage points was registered both among women and men (Table 4).

Table 4. **Earners in total population (percent**)

	1984	1989	1997
Males	40.62	41.36	46.05
Females	17.43	18.29	22.98
Total	28.95	29.77	34.61

Note: Indicates percentage of males and females who are income recipients.

This, of course, suggests that there was an increase in the participation rates. This is, indeed, what we find (see Table 5). The overall participation rate increased from slightly over 50 percent of the working-age population in 1984 to almost 52 percent in 1989, and then jumped to almost 58 percent in 1997. The increase is apparent among both men and women. Men's participation rate went up by 6 percentage points between 1984 and 1997, reaching almost 78 percent—a very high level by international standards—while women's participation rate increased by even more: 8

percentage points. The gap between men's and women's participation rates thus remained almost as large in 1997 as it was in 1984 (almost 40 percentage points).

Table 5. **Participation Rates for Men and Women**

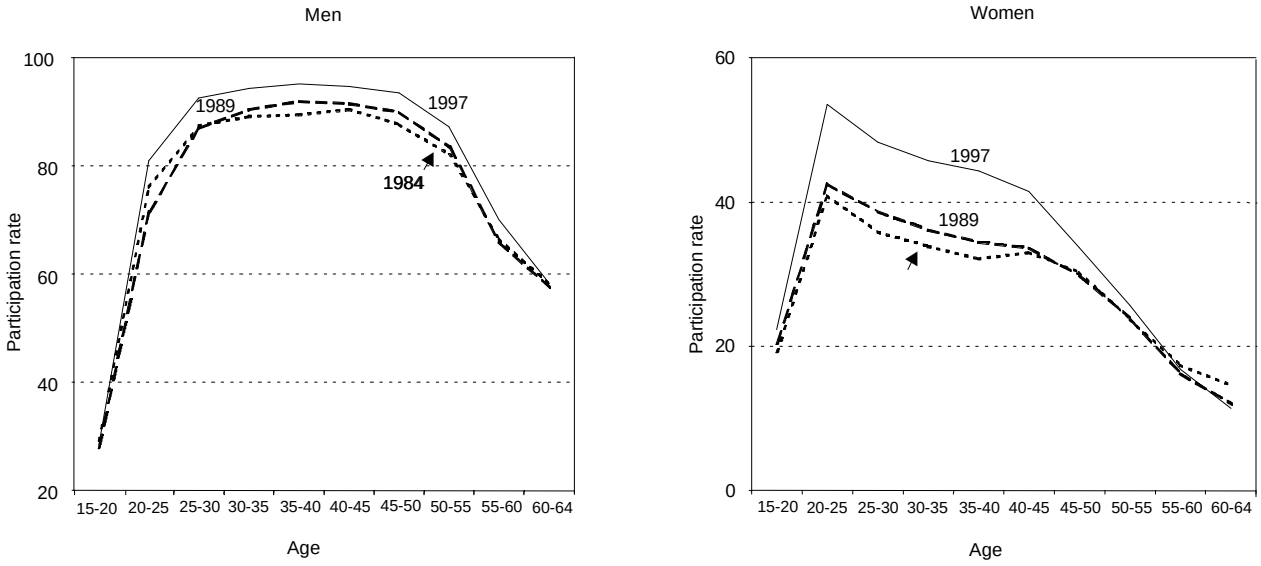
	1984	1989	1997
Men	71.8	72.4	77.8
Women	30.0	31.3	37.9
Total	50.5	51.6	57.7

The increase in participation rates was universal: not only between the years and genders, but also across different age groups. Figure 1 shows the participation rates for men and women by age. The participation rates increase strongly between 1989 and 1997. Even for men in the prime working age (between 30 and 50 years of age), the participation rates that were already high in 1984 and 1989 (around 90 percent) increased further reaching about 94-95 percent in 1997. But the most dramatic changes occurred for women. While participation increased only marginally between 1984 and 1989, the increase between 1989 and 1997 was quite extraordinary. The participation rates went up for women of practically all ages, and by quite a lot: for example, for women between ages 20 and 25 (the peak in terms of participation rates for women), the rate increased from 42 percent in 1989 to 53 percent in 1997. Yet the overall participation rate for women at 37.9 percent is still some 15 percentage points less that of the OECD countries with the lowest level of women's participation (Italy, Luxembourg, Belgium, Austria, Netherlands), and some 25 percentage points below the OECD average.[4]

The participation rates in 1997 are higher for any age/gender combination than in 1984 except among the elderly (people between 60 and 64) where we notice a decline in participation of women (from 15 to 11 percent) and no change in participation of men (already at an internationally very high level of 58 percent). With increased real incomes, better pension system, and aging of the population, we would indeed expect that more of the elderly retire earlier. This has recently begun to happen in Malaysia.

4. For comparison, in 1997, women's participation rates were 71 percent in the US, 67 percent in Great Britain, 62 percent in Germany, 61 percent in France, but 82 percent in Sweden, probably the highest rate in the world (World Bank *World Development Indicators*).

Figure 1. **Participation Rate for Working Age Population**



Note: The vertical axis scales are different

2. *Education Level*

Table 6 shows the distribution of educational levels across all individuals aged 14 and above. The table shows a strong improvement in educational attainment. For example, the percentage of those with primary education only decreased from 36 percent in 1984 to 27 percent in 1997, while the share of those with university education went up from less than 5 percent to 11 percent—a dramatic improvement (how is a 9 percent decrease in the percentage of Malaysians receiving primary education a "dramatic improvement"?). Noticeable also is a fast decline in the percentage of people with religious education only: from 20 percent in 1984 to 12 percent in 1997. The average number of years of schooling increased by more than a year and a half (if religious education is included) and by 1.2 years if it is not.[5]

Like the changes in the participation rates, improvements in education levels were evenly distributed across the genders. As Figure 2 shows, the percentage of university-educated men doubled from 6 percent to 12 percent. For women, the change was again more dramatic, perhaps because their starting position was worse. Thus, the percentage of university-educated women went

5. Since we have no information on the actual number of years of religious education, we assume that formal education of people with religious education only is equal to zero.

up from less than 4 percent in 1984 to more than 10 percent in 1997. The major difference in the educational attainment between men and women persists at the level of religious education. While only about 7 percent of men have religious education only, the percentage of such women is 16.5 percent. Figure 2 shows that the main "losers" were primary and religious education. The largest percentage gains, for both men and women, were realized at the level of senior-high and university education while the share of people with junior high education remained about the same throughout the period (about 20 percent for women and 25 percent for men).

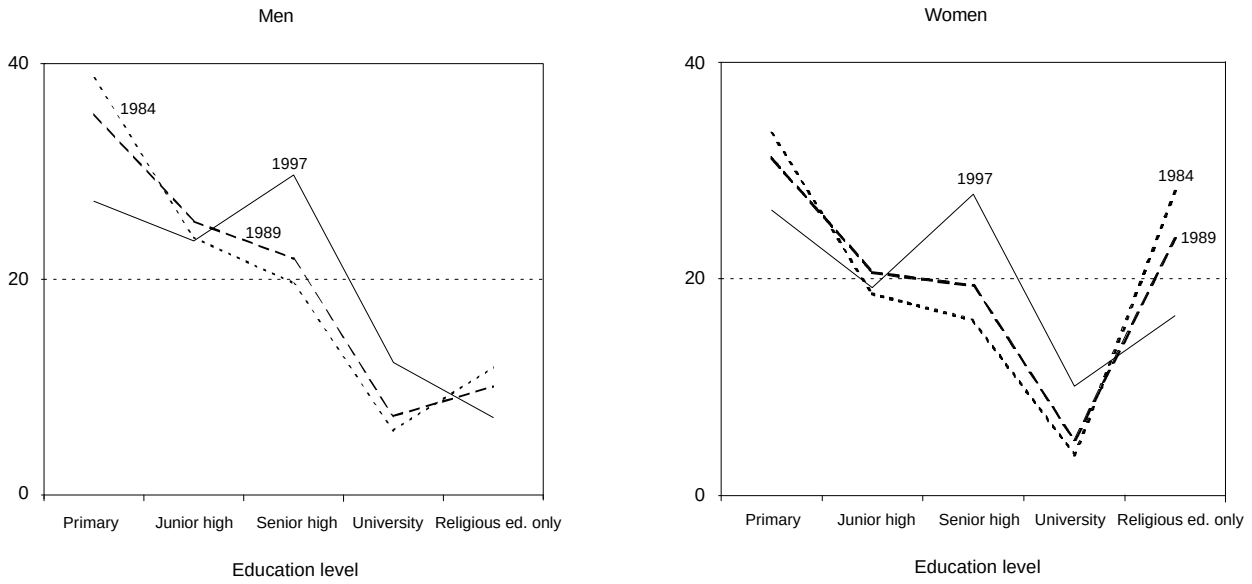
Between 1984 and 1997, the average number of years of schooling for women (if we include religious education) increased by 2 years; for men, by 1.5 years (Table 6). The improvement is even greater if we exclude those with religious education. Then, for example, the difference in average number of years of schooling between men and women is only 0.15 year.

Table 6. **Educational Attainment, 1984-1997**

	1984	1989	1997
School level[a]			
Primary	35.96	33.22	26.78
Junior high	21.18	22.92	21.36
Senior high	17.87	20.61	28.74
University	4.84	6.21	11.19
Religious education only	20.15	17.04	11.93
Total	100	100	100
Average years of schooling (including religious education)[b]			
Men	7.07	7.50	8.61
Women	5.60	6.25	7.60
All	6.32	6.86	8.10
Average years of schooling (excluding religious education)			
Men	8.03	8.35	9.27
Women	7.80	8.20	9.12
All	7.92	8.28	9.20

Note: In percent of population aged 14 and above.
a For the definition of school levels and calculation of the years of schooling see Annex 1.
b Religious education only is assumed to equal zero years of formal education.

Figure 2. **Educational Attainment**



3. *Work Experience*

Table 7 shows the average work experience for income recipients. The overall values are quite stable at around 21 years, with average work experience of men increasing a bit and those of women decreasing slightly. This result is the outcome of several factors. Both men and women now tend to join the labor force at a later age simply because more of them continue schooling past elementary education.[6] Between 1984 and 1997, the average age when men and women join labor force has increased by more than a year. On the other hand, Figure 4 (right-hand panel) shows interesting changes in the distribution of women's work experience. Between 1989 and 1997, there was an increase in the share of women with longer work experience (between 20 and 25 years), but also a *decrease* in the share of women with a very long work experience (over 30 years). The first element can be explained by the aging of the population, the second may be explained by higher incomes and women's decisions to quit working sooner than before. We also notice a decrease among men with a very long work experience (over 30 years) but the percentage decrease is much smaller than for women.

6. Figure 3 shows that there are four peak ages when people begin to work, reflecting respectively the end of compulsory elementary school (11-12 years), junior high (14), senior high (16), and university (21).

Table 7. **Average Work Experience for Income Recipients (in years)**

	1984	1989	1997
Men	21.96	22.36	22.08
Women	18.41	18.32	18.27
All	20.89	21.11	20.82

Figure 3. **When People Begin to Earn: Distribution by Age (percent)**

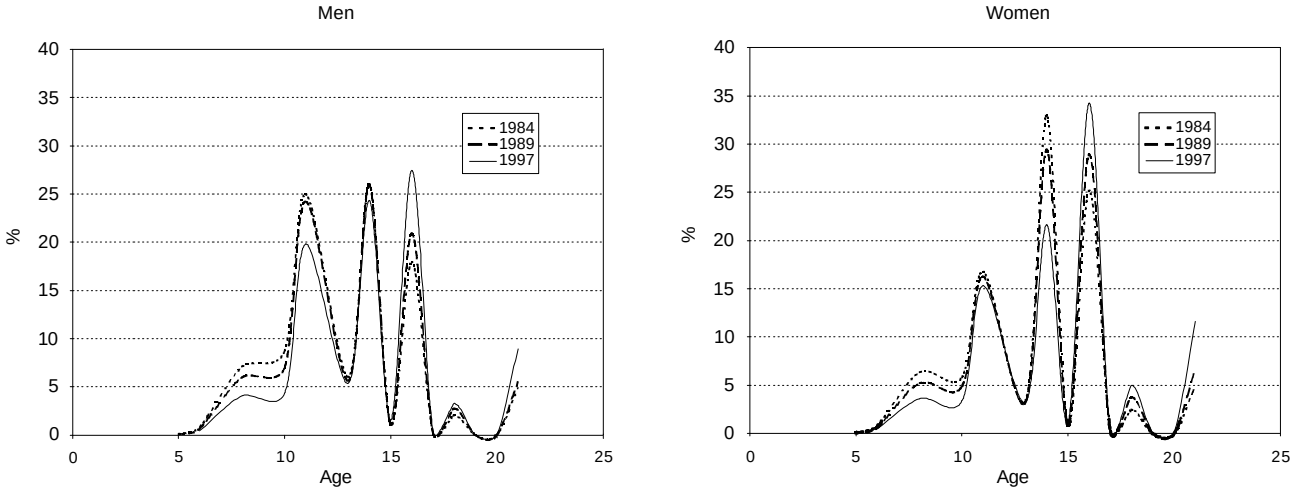
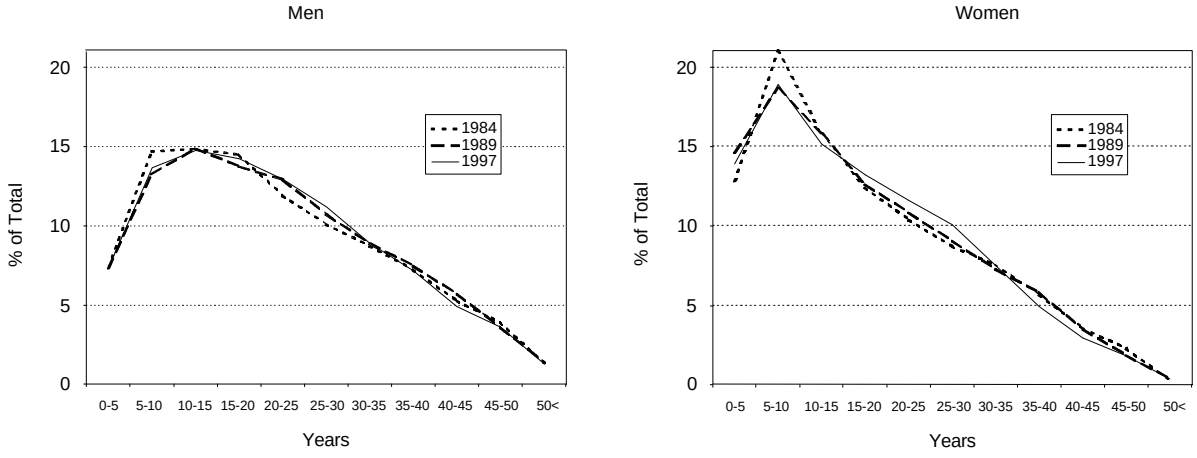


Figure 4. **The Distribution of Income Recipients by Years of Work Experience**



4. *Principal employment status*

Table 8 shows the distribution of income recipients by their principal employment status: employer, employee, self-employed, and family worker.[7] The percentage of employees among income recipients increased significantly during the second subperiod (1989-97). It went up from 72 percent to more than 78 percent. The increase was shared by both genders although the change for women was again more important (for men, the share of employees went up by 4.5 percentage points; for women, by almost 6 percentage points). The share of the self-employed went significantly down in the second subperiod.

The difference between the males and females is apparent here. Men are more frequently employers than women (almost 4 percent of all men are employers vs. less than 1 percent of women), and self-employed (20 percent vs. 15 percent). In consequence, more than four fifths of women who are income recipients are employees; for men, that proportion is around three fourths.

Table 8. **Distribution of Income Recipients by Principal Employment Status**

	1984	1989	1997
Employer	2.89	2.81	2.87
Employee	73.22	72.07	78.36
Self-employed	22.71	24.11	18.45
Family worker	1.18	1.01	0.32
Total	100	100	100

The share of the self-employed among the income recipients decreased by almost 6 percentage points between 1989 and 1997. For these two years, we also have the breakdown of the self-employed between those working in agriculture and outside agriculture. As Table 9 shows, the composition of the self-employed changed. While in 1989, almost 60 percent of the self-employed were engaged in agriculture, in 1997, the breakdown was about fifty-fifty. Therefore, the decline in the relative importance of self-employment as a source of income (or more accurately, as a principal employment status) was driven primarily by the decline in the importance of *agricultural* self-employment. While in 1989, an estimated 14.2 percent of all income recipients were self-employed agricultural workers, in 1997, their percentage was only 9.2.[8] Nonagricultural self-employment

[7] Defined during the reference week.

8. Calculated from Tables 8 and 9. Because of not fully consistent definitions (see Note to Table 9), this is only an *estimated* percentage.

decreased only marginally. The decline in the importance of agricultural self-employment was more significant among men. In 1989, 17.2 percent of men listed agricultural self-employment as their principal occupation; that share went down to 11.8 percent in 1997. For women, the decrease was from 10.4 to 6.6 percent.

Table 9. **Distribution of the Self-employed between Agricultural and Nonagricultural Sectors**

	1989	1997
Agricultural	58.97	50.13
Nonagricultural	41.03	49.87
Total	100	100

Note: This is not necessarily indicative of the individuals' *principal* employment status: the actual number of people in the HIS who report themselves as self-employed (either agricultural or nonagricultural) is greater than the number of people whose principal employment status is self-employment.

5. *Professions*

Table 10 shows the distribution of income recipients into ten occupational categories using the International Standard Classification of Occupations, year 1988 (ISCO-88).[9] It is noticeable that there was—not surprisingly in the light of the significant increase in educational attainment—an increase in the importance of professions that, in principle, require higher skills. The shares of income recipients employed in government and armed forces, managers, professionals, and technician, all went up by between 1½ and 2½ percentage points. These four occupations now employ almost 30 percent of income recipients vs. 21 percent in 1984. The share of machine operators also increased from 8½ to 12 percent.[10] The shares of clerks, service workers, craft workers[11], and elementary occupations[12] remained stable, at around 45 percent of all income recipients. The only profession whose share decreased—and which by implication "fed" the increase in importance in other professions—were agricultural workers. Their share was almost halved going down from 26 percent of all income recipients to about 14 percent.

9. Note, however, that the international codes do not always match codes used in the Malaysian data sets (for details, see Annex 1). Caution in the interpretation of the results is thus needed.

10. They include industrial machine operators, drivers etc.

11. Craft workers are workers employed in extraction and building trades, metal workers, those employed in handicrafts, printing etc.

12. Elementary occupations include (among others): street vendors, unskilled agricultural laborers, mining and construction workers, transport workers.

To the risk of simplification, the occupational structure in Malaysia in 1997 looks as follows: about 30 percent of income recipients are employed in high-skill occupations; some 40 percent are employed in medium-skill occupations (clerks, service workers, craft workers and machine operators); and almost 30 percent are employed in lower-skill occupations (agricultural workers and elementary professions). Fifteen years ago, the shares were respectively 20-40-40. Thus, the change in the composition of occupation has been a decline in the less-skilled occupation and the corresponding increase in high-skill occupations, with the importance of the middle-level types of occupations unchanged.

Table 10. **Distribution of Income Recipients by Profession**

	1984	1989	1997
Government, Armed forces	3.29	3.17	5.02
Managers	4.33	4.80	6.71
Professionals	2.36	2.36	4.54
Technicians	11.05	10.56	12.45
Clerks	10.36	10.59	10.19
Service workers	12.09	12.04	11.98
Agricultural workers	26.02	24.89	13.98
Craft workers	6.74	7.39	7.67
Machine operators	8.59	9.36	11.91
Elementary	15.17	14.84	15.55
Total	100	100	100

Table 11. **Distribution of Income Recipients by Profession (men and women)**

	1984		1989		1997	
	Men	Women	Men	Women	Men	Women
Government, armed forces	3.5	4.1	3.3	3.9	5.4	4.3
Legislators, managers	3.5	6.7	3.7	7.7	4.5	11.5
Professionals	3.8	0.9	3.6	0.9	5.2	2.6
Technicians	9.0	21.1	8.4	19.9	8.0	22.2
Clerks	12.1	9.9	12.1	10.5	10.8	10.1
Service workers	11.3	17.3	11.0	17.6	10.1	17.0
Agricultural workers	20.6	18.0	22.4	13.5	15.9	7.1
Craft workers	5.2	10.7	5.4	11.8	6.8	9.6
Machine operators	10.9	5.7	10.7	8.0	12.5	10.5
Elementary occupations	20.2	5.7	19.4	6.1	21.0	5.2
Total	100	100	100	100	100	100

The occupational structure of men and women is quite different (Table 11). First, we need to remember that the participation rates among men are almost twice as high as among women. Thus many more men work (outside home) than women, which means that more than 60 percent of women are not even included in the occupational classification shown here. Now, women are over-represented (compared to men) among the following occupations: managers, technicians, service workers, and craft workers. They are under-represented among professionals, agricultural workers, and elementary occupations. There are no major differences between the shares of men and women in the other three occupations. A surprise is a relative over-representation of women among legislators, managers and senior officials, and their rapid increase from 6.7 percent in 1984 to 11.5 percent in 1997. The share of active women who are professionals has also increased fast between 1989 and 1997: from 0.9 to 2.6 percent (even if their new level is only half that of men). The percentage of both men and especially women working as agricultural workers has declined, reflecting the already noted movement out of agriculture.

6. *Overall Labor Input and Productivity*

Table 12 shows the average number of weekly hours of work by the employed. Both men and women worked in 1997 more than in 1989, and in 1989 more than in 1984. Men worked, on average, 6 percent more than in 1984, women 8 percent. In 1997, Malaysian men worked almost 50 hours per week, women almost 47 hours. This is about 10 hours more than the average number of hours worked in Western Europe.

Since at the same time both the overall labor force and the participation rates increased, the overall labor input went up significantly. Between 1984 and 1997, labor force expanded by 46 percent, and participation rates increased by 6 percentage points for men, and 8 percentage points for women (see Table 4 above). Since in addition, hours of work increased, this meant that between 1984 and 1997 total annual labor input increased by 70 percent. Furthermore, quality of labor improved as education levels increased for both men and women (see Table 6). If we take this into account, by assigning to additional years of education for men and women respectively the rates of return for men and women obtained from the earnings regressions (see Annex 2)[13], we obtain the

13. Rates for men, 9.8 percent (1984-1989) and 9.4 percent (1989-1997); for women, 10.6 and 10.7percent respectively. There is, of course, some circularity in the argument here because better quality of labor cannot be assessed independently but is gauged from the return to education, which in turn reflects how productive labor is.

"education-" or "skill-" adjusted labor input. We can then calculate GDP per unit of education-adjusted labor as shown in the last rows of Table 12. The earlier conclusion about the very high GDP per capita growth rate is now, to some extent, overturned. The education-adjusted labor productivity decreased by 10 percent between 1984 and 1989, and then increased by 18 percent between 1989 and 1997. Yet in 1997 GDP per unit of "education adjusted" labor was only 6.3 percent higher than in 1984, yielding an average annual growth rate of 0.5 percent as against the GDP per capita growth of 4.2 percent over the same period. Since capital stock must have increased over the same period significantly too, it is not inconceivable that the net factor productivity was negative. [14]

Table 12. **Labor Input and Productivity Growth**

	Total	Men	Women
Average number of work hours per week			
1984	45.4	46.4	43.1
1989	45.9	46.7	44.1
1997	48.3	49.3	46.6
Estimated labor input (in millions of hours per year)			
1984	8128	6749	1380
1989	9571	7815	1756
1997	13813	10849	2964
Estimated "education-adjusted" input of labor			
1984	55440	47714	7726
1989	76478	64342	12136
1997	127131	102186	24945
Real GDP per unit of education adjusted labor input (1984=100)			
1984	100.0		
1989	90.9		
1997	106.3		

Note: Estimated labor input calculated by multiplying labor force (by gender) with participation rates, and average reported number of hours of work by gender for income recipients. "Education-adjusted" labor input is then estimated by assigning gender-specific rates of return to education to the stocks of labor.

14. Young (1994) was the first to point out that very high growth rates in a number of Asian countries may, in fact, conceal negative total factor productivity growth.

V. Distribution of Earnings

A. Earnings Inequality

Over the period 1984-1997, real earnings increased by 44 percent. This yields an average annual real increase of 2.8 percent. However, this number masks two different periods. In the first (1984-1989) real earnings went down by, on average, 0.9 percent per annum, so that in 1989 mean earnings were about 4.2 percent less than in 1984 (see Table 13). In the second period, however, earnings rose, over an 8-year period, by an average rate of 5.2 percent per annum, ending 50 percent higher than in 1989.

Between 1984 and 1989 inequality in distribution of "hourly" earnings[15] decreased from a Gini of 50.1 to 47.4. It stayed at the same level in 1997. [16] More significantly, inequality measured by the ratio between different key percentile points decreased throughout. The ratio between the earnings at the 50th percentile and those at the 10th percentile, often used to estimate inequality among lower incomes, went steadily down from 3.17 in 1984 to 2.83 in 1997. The change was more moderate in the upper range of earnings where the ratio between the earnings at the 90th and 50th percentile went down from 3.03 to 2.87. Thus, inequality was reduced because there was a shrinkage across the entire wage distribution. The 90-10 ratio was therefore reduced from almost 10 to a little over 8.

The percentage of workers earning "low" earnings (defined as less than two thirds of the median) slightly decreased. Overall, however, there are about 30 percent of such earners. There are similarly about 30 percent of people with "high" earnings, defined as those earning more than 1.5 the median.

Figure 5 shows the increase in real hourly earnings between 1984 and 1997 across deciles. While the bottom decile's mean earnings increased between 1984 and 1997 by almost 90 percent, the top decile's earnings went up only a third. The figure also makes clear that the increases in the bottom three deciles were quite significant (all above 50 percent in real terms); the next five deciles registered increases of about 50 percent, and finally the ninth and the tenth decile had increases of respectively 46 and 33 percent. Thus only the top decile grew less than the mean (44 percent). The shrinking of the earnings distribution is unmistakable. What the figure also shows is that the

15. The definition of earnings is as follows. All earnings are defined on an annual basis. This amount is then divided by the reported average weekly number of hours worked. These amounts in ringgit are shown in the text. Therefore to get true hourly earnings, one needs to divide the reported amounts by 52 (weeks).

16. Levy and Murnane (1992, 1343) report US Gini for all earners to have been around 46-47 in the mid-1980s.

shrinking was driven by what was happening in the two bottom deciles and the very top. The relative earnings of the bottom increased; the relative earnings of the top decreased, and the relative earnings of some 70 percent of income recipients remained the same. [17]

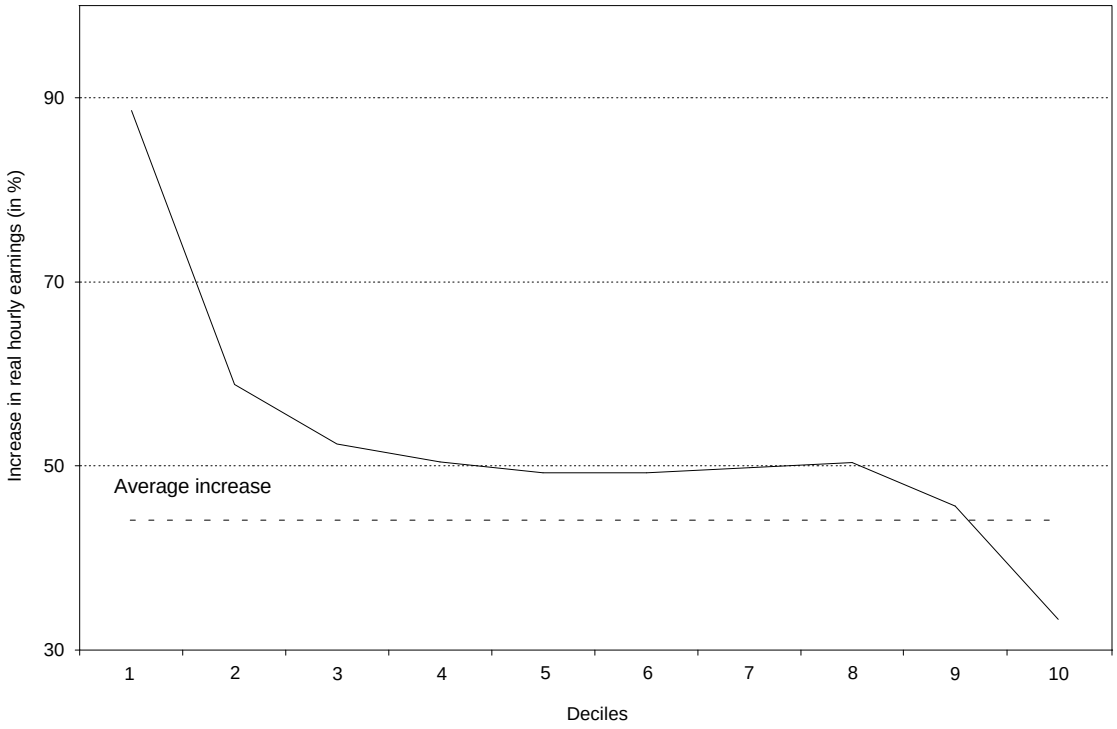
Table **13. Real Earnings, 1984-1997**

	1984		1989		1997	
Decile	Max. Value	Mean	Max. Value	Mean	Max. Value	Mean
1st	50.4	28.04	53.04	29.97	84.38	52.88
2nd	81	66.49	83.70	69.11	125	105.62
3rd	107.63	94.10	108	96.15	161.5	143.35
4th	132.16	119.57	134.18	120.88	199.11	179.87
5th	159.84	145.85	162	147.74	238.93	217.69
6th	192	175.43	194.85	178.00	288.50	261.76
7th	238.71	213.91	241.38	216.65	357.87	320.36
8th	312	271.04	310.73	273.15	465.87	407.51
9th	485	383.87	469.24	376.46	685.69	559.02
10th	44400	989.43	20239.2	874.19	47727	1319.04
Overall mean	–	248.70	–	238.10	–	357.53
Median		169.92		168.75		235.56
Increase of the mean (percent per annum)				-0.9		+5.2
Increase of the median (percent per annum)				-0.9		+4.3
Measures of inequality						
Ginic		50.1		47.4		47.4
Theilc		52.8		44.5		46.1
Ratio 50-10		3.17		3.05		2.83
Ratio 90-50		3.03		2.90		2.87
Ratio 90-10		9.62		8.85		8.13
ln 90/10		2.26		2.18		2.10
Decile ratio[d]		35.3		29.2		24.9
Percentage of people:						
With low earnings[a]		29.8		29.7		29.4
With high earnings[b]		29.5		30.0		30.0

Note: All values are in 1997 ringgit per hour of work (however see footnote 17).
Ratios are calculated at the percentile *points*.
a People with low earnings are defined as all these whose earnings are less than two thirds of the median.
b People with high earnings are defined as all these whose earnings are more than two thirds of the median.
c Gini and Theil indexes calculated across individuals and weighted by sample weights.
d Ratio between the mean earnings of the top decile and mean earnings of the bottom decile.

17. These are *not*, of course, 70 percent of actual people because in the absence of longitudinal data we cannot say much about what happened to individual earners. We simply observe that the relative wage (compared to the mean) of people who were, say, in the 4th decile, was the same in 1984 and 1997.

Figure 5. **Increase in Real Hourly Earnings by Decile between 1984 and 1997**



B. Differences Between the States

Table 14 shows mean hourly earnings by state. The states are ranked by the 1997 level of mean earnings. Not surprisingly, Kuala Lumpur, Selengor, Pilau Pinang, and Johor display the highest average values. These four states are also the ones with the highest average growth rates– all with more than 3 percent per annum—between 1984 and 1997. Sabah, Pahang, and Lubuan, on the other hand, have had stagnant average real earnings. Increasing differences in interstate earnings are also reflected in the increasing coefficient of variation. During the period of practically stagnant real wages (between 1984 and 1989), interstate differences went down (the coefficient of variation dropped from 20.1 to 17.6). Then, as real earnings began to rise, so did inter-state differences.

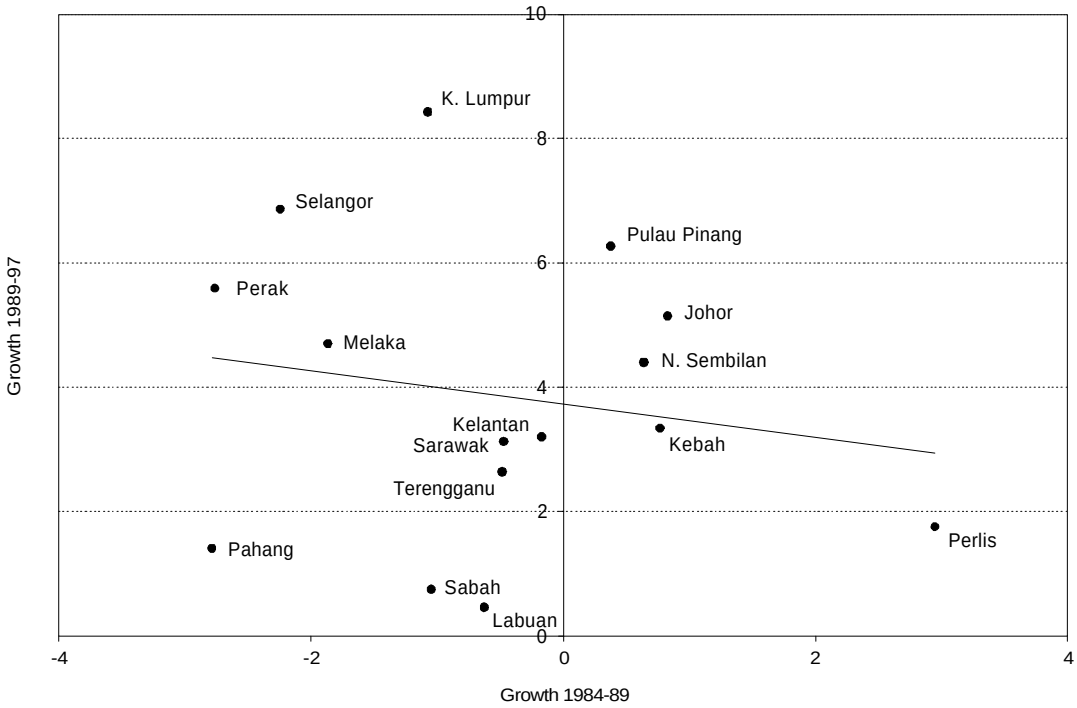
The behavior of different state earnings varied between the two periods. Earnings in the states that registered particularly high growth in the second period (1989-1997) often decreased more than average during the first period. For example, Kuala Lumpur's real earnings increased by an extremely high 8.4 percent per annum over the 1989-1997 period (Figure 6). That was 3.2

percentage points faster than the Malaysia-wide mean. But over the earlier 1984-1989 period, the mean wage in Kuala Lumpur decreased by 1.1 percent per annum, which was a greater-than-average decline. Thus, there was an **accordion effect**: during the good times where earnings in high-earning states increased the fastest, but during the lean times, they also declined more than elsewhere. The correlation between the initial *level* of earnings and their real growth was negative (-0.52) over the first period, and then turned to positive (+0.13) in the following period. However what is interesting is that the shrinking of the earnings distribution across individuals continued during the second period (as we saw in the previous section) even as interstate differences increased.

Table 14. **Average Earnings by State (1997 prices)**

	1984	1989	1997	Average annual percent growth
Kelantan	171.03	169.57	218.24	1.89
Terengganu	197.54	192.84	237.62	1.43
Sabah	238.17	225.99	239.94	0.06
Kedah	183.76	190.92	248.41	2.35
Perlis	195.19	225.71	259.54	2.22
Pahang	286.87	249.11	278.68	-0.22
Melaka	236.21	215.01	310.56	2.13
Sarawak	250.66	244.82	313.31	1.73
Perak	238.97	207.75	321.05	2.30
N. Sembilan	229.65	237.07	334.58	2.94
Labuan	341.41	330.87	343.37	0.04
Malaysia	***248.7***	***238.1***	***357.53***	***2.83***
Johor	230.49	240.2	358.88	3.46
Pulau Pinang	218.9	223.05	362.87	3.96
Selangor	313.84	280.21	476.67	3.27
K. Lumpur	325.17	308.09	588.62	4.67
Coefficient of variation	20.1	17.6	26.6	

Figure 6. **Earnings Growth by State in Two Periods**



C. Occupation and Earnings

Certain occupations (among other reasons because of higher skill levels) tend to be associated with higher earnings. Table 15 gives the unadjusted (e.g., for education, experience etc.) hourly earnings for the ten occupational groups in 1984, 1987, and 1997. Professionals have throughout the highest earnings, agricultural workers the lowest. The ratio between the two went down from 6.2 in 1984 to 5 in 1989 as overall earnings were stagnant, and then widened as wage growth resumed in the second period. Here too we find the same "accordion effect." Note also that the relatively high growth of average earnings (2.8 percent per annum for the whole period) compared to the earnings of individual occupational groups[18] implies a change in the occupational structure toward the better-paid occupations.

Figure 7 shows the distribution of the ten occupation categories across the ten deciles of earnings distribution for the years 1984, 1989, and 1997. For example, we see that in each year about 60 percent of professionals earned wages that placed them in the top decile. Or that clerks were distributed almost uniformly across the earnings distribution spectrum (with about 10 percent of

18. Only one occupational group (clerks) registered earning growth in excess of 2.8 percent per annum.

clerks belonging to each decile); people with so-called elementary occupations were heavily concentrated in the middle earnings brackets. At the other end of the spectrum are agricultural workers; more than 20 percent of them belonged to the bottom decile (that is, they were twice as likely as an average worker to earn a low wage).

Table 15. **Unadjusted Hourly Earnings for Different Occupations (1997 real ringgit)**

	1984	1989	1997	Annual growth rate 1983-1997 (percent)
Government, Armed forces	495.9	525.0	656.7	2.2
Legislators, managers	649.9	551.7	630.7	-0.2
Professionals	1023.7	876.0	1237.2	1.5
Technicians	273.7	278.7	338.1	1.6
Clerks	261.7	235.0	389.1	3.1
Service workers	188.3	183.9	241.0	1.9
Agricultural workers	165.8	174.8	191.2	1.1
Craft workers	184.0	162.0	264.6	2.8
Machine operators	196.8	180.5	257.4	2.1
Elementary occupations	181.4	171.5	243.3	2.3
Average	248.5	238.1	357.5	2.8
Professionals to agricultaral workers (ratio)	6.2	5.0	6.5	

Note: For the definition of "hourly" see footnote 15.

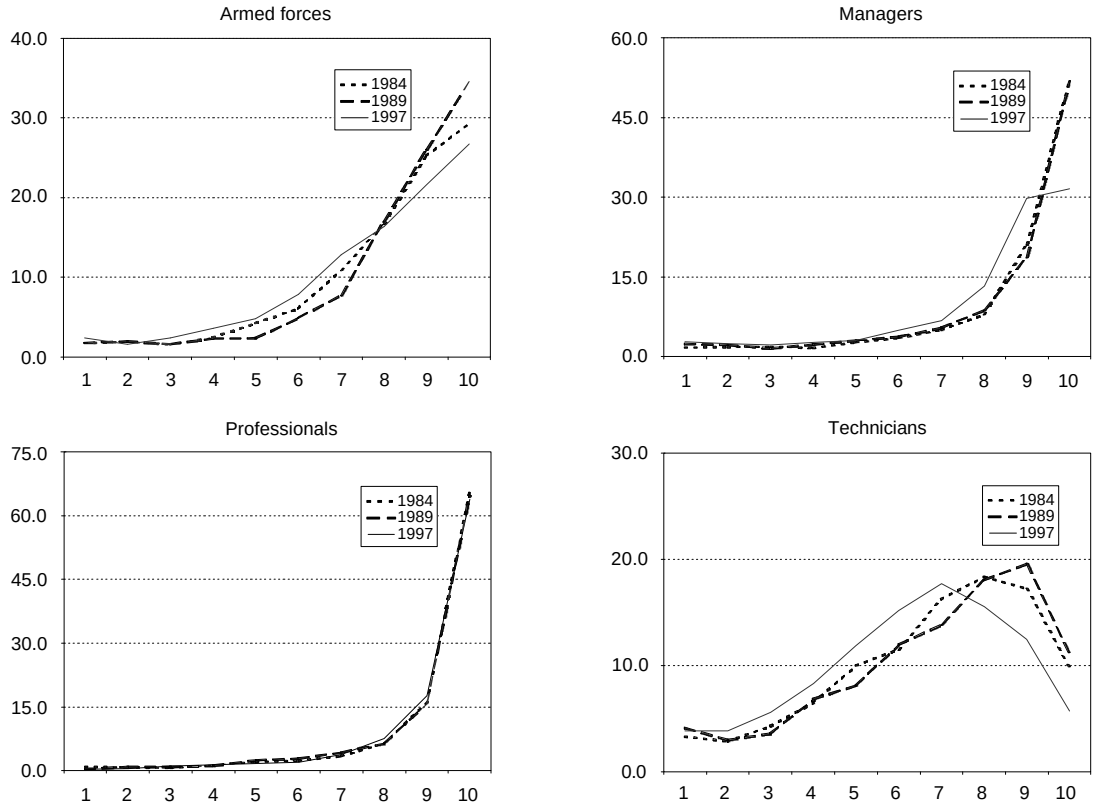
These are all fairly expected patterns. What is more interesting is to look at the changes in the patterns between the years. The share of agricultural workers with very low pay (bottom decile) increased from 15 to 22 percent between 1989 and 1997. In accordance with what we have called the "accordion effect", the low-pay share of agricultural workers *decreased* between 1989 and 1994—that is, during the "lean" times agricultural workers did relatively well, during the good times, they fell behind. The same effect (increasing share of the low paid during the "good times") is noticeable for the service workers. What is more unexpected is a severe decline in the share of highly-paid legislators and managers in 1997. While in 1984 and 1989, over 50 percent of managers belonged to the top decile, and over 70 percent belonged to the top quintile of wage distribution, these shares decreased in 1997 to 32 and 60 percent respectively. What happened is that a very large overall growth in the number of professionals combined with their unchanged share in the top decile[19] "crowded" other occupations out of the top decile. Thus, the top decile in 1997 was composed of 29 percent of professionals vs. only 15 percent in 1984 and 1989.

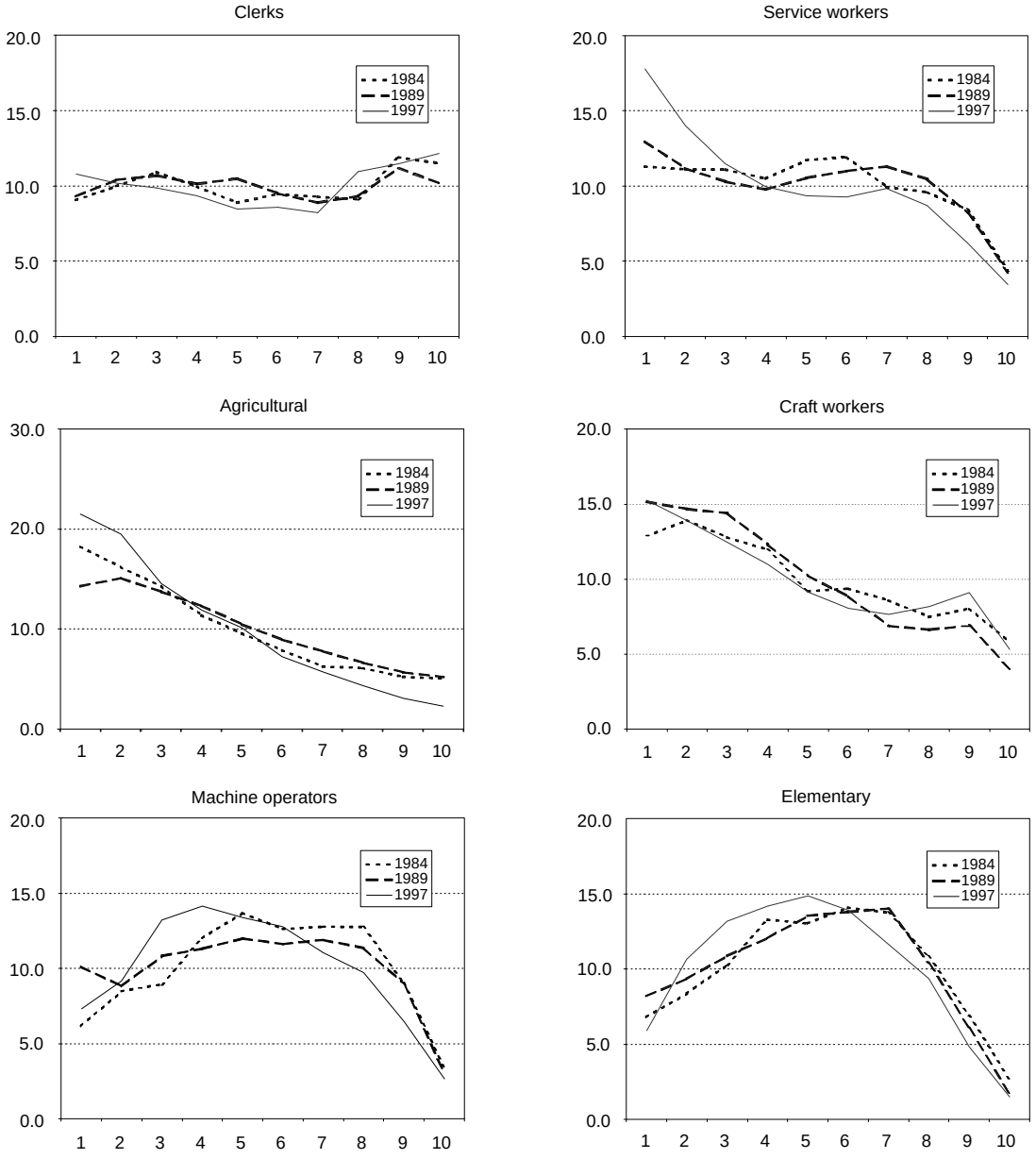
19. Slightly less than two thirds of all professionals were throughout the period in the top decile.

Finally, the curves for technicians, machine operators, and elementary occupations all shifted left toward the lower level deciles. This is the most apparent for technicians whose distribution across the 10 deciles literally seems to have shifted left by about two deciles between 1989 and 1997 (see Figure 7). The peak of their distribution moved from the 9th decile to the 7th.

In conclusion, high average earning growth in the second period was driven by a greater number of people in the highly paid occupations (quantity effect), not by the significant increase in earnings of the already highly paid occupations (price effect). The relative position of several occupations slipped. Some of them, which were bunched around the middle deciles (machine operators, elementary professions) or upper deciles (technicians) slipped down the ladder by a decile or two, and agricultural workers—whose share in the bottom decile was already high—further increased it.

Figure 7. **Distribution of Occupational Categories across Earnings Deciles**





Note: Vertical axis scales differ.

D. Education Levels and Earnings

Table 16 gives average earnings for five levels of education. University education is always paid the most, religious the least. The university-to-primary ratio decreased from 4 to 3.3 over the first subperiod, and then widened to 3.6. Growth rates for all individual groups were less than the average growth rate of earnings, indicating a significant educational shift toward the better-paid educational groups.

Figure 8 plots the distribution of people with various levels of education across earning deciles. Since there was a massive increase in university education (see section IV), the most interesting changes concern the university-educated workers. University-educated workers are, of course, heavily concentrated in the top decile (see Figure 8, panel d). University education practically "guarantees" the position in the four upper earning deciles. The top decile itself is also more and more "dominated" by the university-educated. In 1984, 36 percent of those in the top decile were university-educated; in 1989, their share increased to 42 percent and in 1997 to 56 percent. However, since at the same time there was a massive increase in the number of the university-educated people, the conditional probability of a person with university education being in the top decile declined from 57 percent in 1984 to 40 percent in 1997.

Table 16. **Unadjusted earnings for Different Educational Groups (ringgit in 1997 prices)**

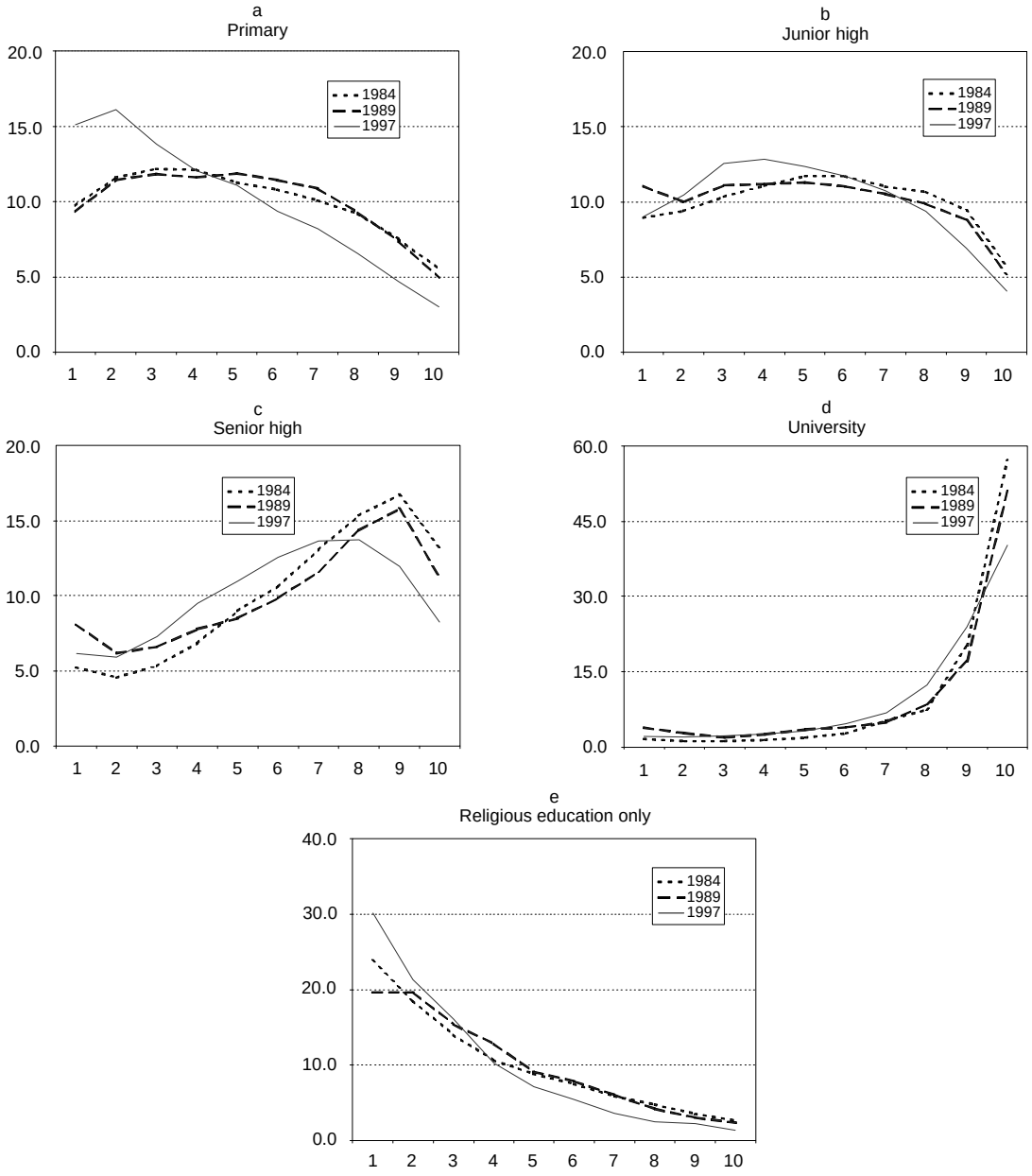
	1984	1989	1997	Annual growth (percent)
Primary	196.2	190.2	228.4	1.2
Junior high	207.8	192.8	274.1	2.2
Senior high	301.2	265.6	355.8	1.3
University	785.9	625.6	821.8	0.3
Religious education only	133.5	130.5	158.3	1.3
Average	*248.5*	*238.1*	*357.5*	*2.8*
University to primary premium	4.0	3.3	3.6	

Note: For the definition of "hourly" see footnote 15.

The probability distributions for those with primary and religious education also changed. In 1997, much more than in 1984, they were bunched among the bottom wage groups. In 1997, about 50 percent of those with religious education, and more than 30 percent of those with primary education, belonged to the bottom two deciles. Thus, changes in the supply and demand of education mean that in 1997—more than before—primary or religious education virtually guarantee that the person will end up among the bottom 20 percent of earners. As the number of university graduates increased by leaps and bounds, they have come to dominate the top deciles; yet, having

a university education no longer guarantees that one will be among the top decile earners as it did in the 1980s when university education was more rare.

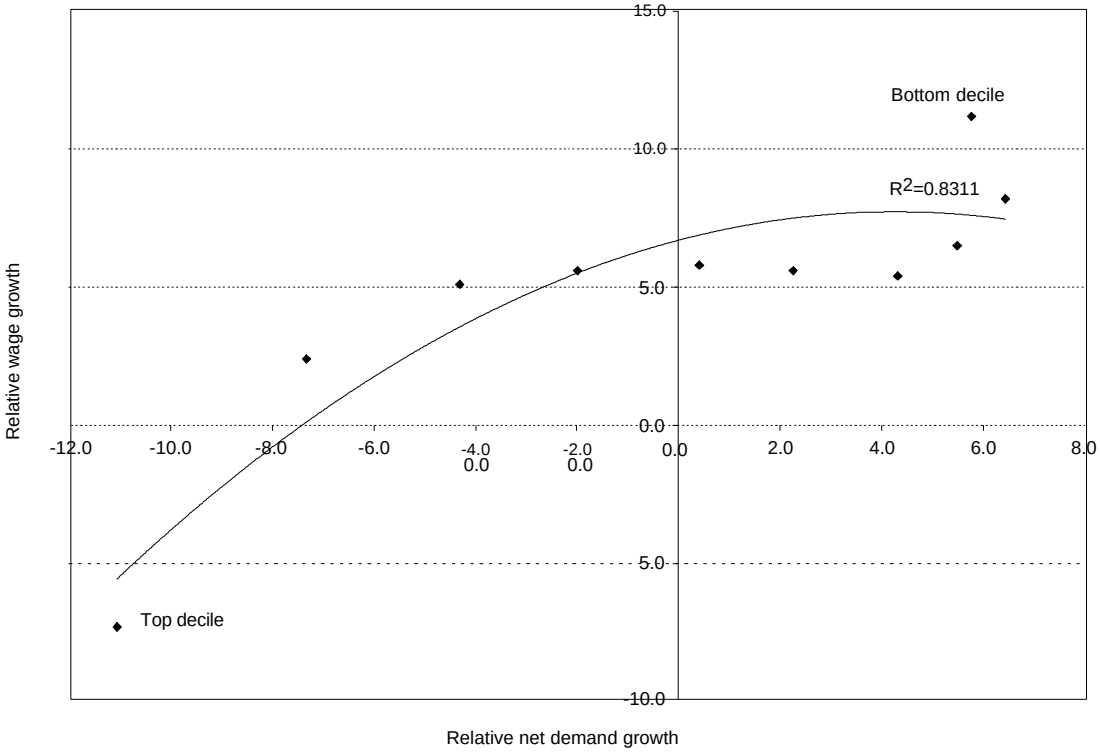
Figure 8. **Distribution of Educational Categories across Wage Deciles, 1984-1997**



Note: Vertical axis scales differ.

Figure 9 displays the average number of years of schooling per decile. We have already seen (section IV) that the overall average number of years of schooling increased significantly. Figure 9 illustrates, however, that while the increase was large and uniform across nine upper deciles (particularly between 1989 and 1997), the bottom decile's mean years of education stayed at the same level in 1997 as in 1989 (6.3 years).

Figure 11. **Net Labor Demand and Earnings, 1984-1989**



Source: Table 21.

VI. Determinants of Earnings

While the tabulations in section V allow us to look at the relationship between individual characteristics like education, location, occupation etc. and earnings, their informational content is limited because they do not isolate the marginal contributions of each individual factor *alone* to the earnings. The latter is done through a multivariate regression analysis where the dependent (right hand side: RHS) variable is (ln) of real hourly earnings, and explanatory variables are education, work experience, location etc. However, running these regressions without acknowledging that the decision to participate in the labor force is not random would yield biased and inconsistent estimates. Therefore

the system to be estimated is composed of the selection (probit) equation (see equation 1), which explains the decision to join the labor force, and the typical earning regression (equation 2).

(1) $Pi = f(X_i, Z_{1i}, e_i)$

(2) $Wi = g(X_i, Z_{2i}, u_i)$

Pi is an indicator variable taking values 1 or 0 for those who are respectively in the labor force or not, Wi is earnings as defined above, Xi is the set of explanatory variables which is the same in both equations (e.g. education, gender, experience etc.), Z_1 and Z_2 variables that explain respectively the decision to participate and earnings (so to ensure the identification requirements), and ei and ui error terms. Z_1 and Z_2 need to be different in order to exactly identify the two equations. We use Z_1=income from capital in order to capture the fact that people with greater non-labor sources of income are less likely to participate in the labor force;[20] and Z_2=dummy variable for nonagricultural self-employment, which explains earnings but may not influence the decision to participate. Normally, the error terms from (1) and (2) will be correlated, $e_i = u_i$, since we expect that (say) greater likelihood to participate in labor force will be associated with higher earnings. (This is a different way of saying that the opportunity cost of nonparticipation is greater for those likely to earn more.) We would thus expect >0. This, however, is not the case here. Only when we run separate regressions for men and women do we find that is not significant for men in 1989 and 1997, and becomes positive for women in the 1997 regressions (see Tables A1 and A2 in Annex 2). This point highlights the fact that not only do women and men not earn the same if they have identical characteristics (as we shall see below) but that the earning structures for men and women are different, and so are the determinants of labor force participation.

The results for a set of such regressions for the years 1984, 1989, and 1997, using maximum likelihood (ML) estimation are shown in Table 17. We shall consider in turn the effect of each characteristic. (Note that the excluded category is throughout a male who derives agricultural income from self-employment, lives in Kelantan, is an agricultural worker, and is of Malay ethnic group.) All the variables show the expected signs and have statistically highly significant coefficients. [21]

20. This, of course, opens the issue of endogeneity since high current capital income may be the result of previous labor force participation and high earnings. Note, however, that this is not much different from possible endogeneity of education.

21. If instead of ML we use a two-step Heckman correction method, the earning regressions are estimated by the standard OLS method. The fit is very good. The regressions have adjusted R^2 of over 0.4 in 1984 and 1989, and 0.48 in 1997. The coefficient of determination is very high for this kind of regressions because earnings are, to a large extent, a

Table 17. **Determinants of (ln) Earnings (maximum likelihood estimation)**

	1984	1989		1997		
Regression No.	1	2	3	4	5	6
Female	-0.4090	-0.3978	-0.3977	-0.3749	-0.3748	-0.3622
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Yrssch	0.1052	0.1023	0.1023	0.1009	0.1008	0.1009
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Releduc	0.2595	0.2873	0.2873	0.3904	0.3900	0.4145
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Workexp	0.0829	0.0901	0.0901	0.0602	0.0602	0.0588
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Expsq	-0.0012	-0.0013	-0.0013	-0.0008	-0.0008	-0.0009
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Employer	0.4413	0.3552	0.3555	0.4334	0.4349	0.4057
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Employee	0.0896	0.0719	0.0710	0.1121	0.1050	0.1039
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Unpaid	-0.7411	-0.8691	-0.8694	-0.3985	-0.4019	-0.4572
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Nagri	–	–	-0.0014	–	-0.0103	-0.0371
			(0.919)	–	(0.554)	(0.017)
Chinese	–	–	–	–	–	0.2292
						(0.000)
Indian, Pakistani	–	–	–	–	–	-0.0199
						(0.046)
Johor	0.3351	0.3691	0.3691	0.5538	0.5536	0.5024
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Kedah	0.0166	0.1224	0.1224	0.2742	0.2741	0.2480
	(0.415)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Melaka	0.2045	0.1968	0.1967	0.3718	0.3716	0.3093
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N. Sembilan	0.3095	0.3167	0.3167	0.4532	0.4529	0.4030
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pahang	0.4298	0.4499	0.4497	0.3711	0.3706	0.3443
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
P. Pinang	0.1348	0.2859	0.2859	0.4706	0.4705	0.4034
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Perak	0.2429	0.1753	0.1753	0.4588	0.4588	0.3968
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Perlis	-0.0031	0.1886	0.1885	0.1995	0.1995	0.1800
	(0.938)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Selangor	0.3987	0.3379	0.3378	0.5842	0.5840	0.5577
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

return to unobservable characteristics (like specific type of knowledge, luck, communication ability, etc.) which cannot be captured by the general variables like education, occupation etc.

Terengganu	0.1383	0.0811	0.0811	0.0824	0.0823	0.0673
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Sabah	0.3074	0.3207	0.3207	0.1484	0.1483	0.3725
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Sarawak	0.2935	0.2986	0.2985	0.3265	0.3259	0.3025
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
K. Lumpur	0.4285	0.4074	0.4073	0.6746	0.6743	0.5996
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Labuan	0.5648	0.5696	0.5695	0.3130	0.3129	0.4634
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Armed Forces, Govt	0.6596	0.6526	0.6530	0.5903	0.5942	0.4630
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Legislators, Managers	0.8465	0.7488	0.7493	0.6741	0.6782	0.5325
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Professionals	0.9542	0.8463	0.8468	0.9433	0.9476	0.7629
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Technicians	0.4245	0.3835	0.3839	0.3866	0.3904	0.2563
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Clerks	0.2208	0.1327	0.1334	0.3008	0.3061	0.1733
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Service Workers	0.0744	0.0004	0.0009	-0.0043	0.0000	-0.0675
	(0.000)	(0.968)	(0.937)	(0.879)	(0.998)	(0.000)
Craft Workers	0.1323	-0.0020	-0.0015	0.1474	0.1517	0.0784
	(0.000)	(0.873)	(0.997)	(0.000)	(0.000)	(0.000)
Machine Operators	0.2127	0.1035	0.1040	0.1952	0.1992	0.1046
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Elementary Occupations	0.1090	-0.0009	-0.0004	0.1235	0.1276	0.0439
	(0.000)	(0.93)	(0.967)	(0.000)	(0.000)	(0.001)
Constant	2.5119	2.4880	2.4885	3.1510	3.1544	3.2631
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Rho	-0.0547	-0.0357	-0.036	-0.0876	-0.0881	-0.0704
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
No. of observations	75,644	85,521	85,521	59,137	59,137	49,936

Note: The dependent variable is ln real earned hourly income. For the model and the selection regression, see equations (1) and (2) above. The results are valid only for *recip*=1. Variables *agri* (agricultural income source from self-employment), *state3* (Kelantan), *self* (self-employed principal employment status), *xx7* (agricultural workers), and *race1* (Malay ethnicity) are always excluded. The P values are shown in brackets. *Unpaid* is unpaid family worker.

Consider first the effect of **gender**. If a person were a female—with all other characteristics being the same as of her male colleague—her earnings would be almost 40 percent less. The unadjusted wage difference was throughout less than the one calculated (more accurately) from the regressions (Table 18).[22] The unadjusted difference went steeply down from 35.8 percent in 1984 to 28.2 percent in 1997. The "true discrimination" (adjusted wage difference) decreased too but much less, going down from 41 percent in 1984 to 36-37 percent (depending on the formulation) in 1997. These results imply that, based on the observable factors like education, experience, location etc. and if there were no discrimination, women would have had higher average earnings then men. Since men are overrepresented in government jobs, which are, under the ceteris paribus conditions, paid more than private-sector jobs, a part of the difference in earnings ("discrimination") disappears once we introduce a dummy variable for government employment. The discrimination coefficient goes down from 37.5 to 35.7 percent (see Annex 2, Table A3).

Table 18. **Male and Female Real Hourly Earnin**gs

	1984	**1989**	**1997**
Female unadjusted earnings	179.0	179.6	283.1
Male unadjusted earnings	279.0	264.3	394.1
Female "discrimination" (in percent of male earnings)			
Based on unadjusted earnings	-35.8	-32.0	-28.2
Based on adjusted (regressions) earnings[a]	-40.9	-39.8	-37.5
Based on adjusted (regressions) earning incl. Government sector	n.a.	n.a.	-35.7
Based on Oaxaca decomposition	-18.1	-15.7	-21.9

Note: All in 1997 prices. All calculations done using weights.
For explanation of Oaxaca decomposition see below.
a Using the same formulations, that is regressions 1,2 and 4 (Table 17).

Returns to **human capital** are captured in the coefficient for the years of schooling. It is remarkable how stable the returns to education are: each additional year of schooling is associated with a wage increase of slightly over 10 percent and that percentage is the same in 1997 as it was in 1989 and 1984. The absolute amount of the education premium, however, is large compared to the high-income countries,[23] a fact that is explicable by the still existing relative (compared to the OECD

22. The unadjusted difference simply shows the difference in average wage of men and women without taking into account that many other factors may be different (level of education, experience etc.)

23. For example, Krueger and Pischke (1992) estimate the rate of return to schooling in Western Germany at 7.7 percent; Vecernik (1997, 380) reports US rate of return of 9.4 percent. Psacharopoulos (1994) in his extensive survey of rates of return to education shows that in high-income and OECD countries, the returns are, on average, slightly under 7

countries) scarcity of highly educated people in Malaysia. On the other hand, the fact that the returns to education have been stable over the 13 years during which the average level of education in the country had expanded significantly suggests that the demand side must have shifted up as well—in about the same proportion as did the supply. This is explored further in section VII.

Since we do not know the number of years of education of people with religious education alone, we have to introduce a binary (0-1) variable for them. It shows that returns to religious education have increased from being equivalent to about 2.5 years of schooling in 1984 (0.2595 divided by 0.1052) to being equivalent to about 4 years of schooling. This might reflect the fact that people with religious education have indeed had, on average, more years of such education in 1997 than in 1984, or that the characteristics that are being developed in religious schools are more valued in 1997 than before.

The **age-earnings** profile shows a typical inverted-U (concave) pattern with earnings at first rising, then peaking at some middle age, and then slowly decreasing. The results show a gradual shift of the peak toward the older age. In 1984, earnings peaked for 34 years of experience; in 1989, the peak moved to almost 35 years, and in 1997, it was 38 years (in the first two formulations). The (linear) premium on experience decreased from 8 to 9 percent for each year in 1984 and 1989 to about 6 percent in 1997. Experience *per se* appears to have become less valuable.[24]

Ethnic differences can be explored only on the 1997 data. We see that being Chinese (with all other attributes the same) results in an almost 23 percent wage premium compared to being a Malay. These differences are less than the unadjusted wage differences, which were twice as large: 46.4 percent in 1997 (Table 19). The implication is, of course, that the Chinese have more of the characteristics valued by the economy[25] so that looking at unadjusted wage differences exaggerates the extent of "pro-Chinese bias." [26] However, once we allow for the fact that Malays are more represented in the government sector and that working in the government carries a premium of 15 percent (see Annex 2, Table A3), the "pro Chinese bias" increases to 25 percent.

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percent. However, for upper middle-income countries, where Malaysia belongs, Psacharopoulos (1994, 1329) gives an average rate of 7.8 percent. In the same paper, Psararopoulos (p. 1342) also reports the results of a 1979 study on Malaysia by Chapman and Harding (1985) who have estimated the returns at 9.4 percent.

24. Because the premium on experience is expressed as a quadratic function, its value will vary at different levels of work experience.

25. For example, the average number of years of schooling is 6.68 for the Chinese, and 6.18 for the Malays.

26. The term "bias" or "discrimination" is simply used in a technical sense. It does not imply that there is a social bias or actual discrimination.

As for the difference in wages between the Malays and the people of Indian, Pakistani or Bangladeshi background both the adjusted and unadjusted differences in earnings are minimal (about 2 percent). Moreover once government employment is introduced in the regression, the effect entirely dissipates.

Table 19. **Difference in Hourly Earnings by Ethnic Group, 1997**

	Malays	Chinese	Indians
Average earnings (in ringgit)	320.0	468.5	314.8
Unadjusted difference (in percent of Malay earnings)	0	+46.4	-1.6
Adjusted difference (based on regression Table 17)	0	+22.9	-2.0
Adjusted difference (based on regression Table A3) incl. Government sector	0	+25.1	0.0
Based on Oaxaca decomposition	0	+30.6	n.a.

Note: All calculations done using weights.
For explanation of Oaxaca decomposition see below.

Social group (employer, employee etc.) also matters. On average, being employer carries a premium of over 40 percent (over the self-employed agricultural worker with the exactly the same characteristics) in both 1984 and 1997. The premium was lower (35.5 percent) in 1989. This may again be related to the stagnant or mildly decreasing real earnings that we have noticed in the period 1984-1989. We may explain this finding by arguing that in conditions of a strongly performing economy, and rising earnings, the employers in particular do well and their premium expands. When the economy is not performing as well, and earnings are stagnant, the employers' premium shrinks too. Employees, compared to the self-employed, also have higher earnings and their premium too seems to expand with better performing economy. The absolute amount of the premium, however, is less: it ranges between 7 percent and 11 percent.

For 1989 and 1997, when such data exist, we introduce a binary variable to check whether there is a difference between agricultural and nonagricultural self-employed workers. The variable is not significant in either year so long as the regressions do not include the ethnic variable. However, once we include the ethnic variable in 1997, nonagricultural self-employed workers are paid, under ceteris paribus conditions, about 3.6 percent less than the agricultural self-employed. This is due to the fact that there are *relatively* more Chinese among the nonagricultural than among the agricultural

self-employed.[27] They thus help "keep" the nonagricultural self-employed earnings at the level of agricultural and the coefficient is not significant. Once however we allow for ethnicity, the ethnic (Chinese) effect "picks up" some of the earnings of the nonagricultural self-employed, who then turn out to be worse off than those in agriculture.

We find **location** to be a strong determinant of differences in earnings. Kelentan, one of the three lowest income states, is in our excluded category. Not surprisingly, earnings in all other states are higher, and the differences for most of them are increasing—a reflection of the already noted increasing interstate differences (see Table 20). For example, while the locational premium in Kuala Lumpur was 40-43 percent for the years 1984 and 1989, it increased to between 60 and 67 percent (depending on the formulation) in 1997. Only Terengganu seems to be consistently getting closer (more similar) to Kelentan. The locational premium in Terengganu, compared to Kelentan, decreased from almost 14 percent in 1984 to 8 percent in 1997. On the other hand, a state like Perlis exhibited no locational premium in 1984, but by 1989 and 1997 the premium was almost 20 percent.

Table 20. **Changes in Interstate earning differences (compared to Kelentan; calculated from earnings regressions)**

[Decreasing, decreasing]	
Terengganu	[Decreasing; increasing]
	Perak
	Selangor
	Kuala Lumpur
[Increasing; decreasing]	[Increasing; increasing]
Pahang	Kedah
Sabah	Melaka
Labuan	N. Sembilan
	Palau Pinang
	Perlis
	Sarawak

Note: The first term refers to the change in the 1984-1989 period, the second to the change in the 1989-1997 period.

Occupation, independent of other characteristics like education, is also an important determinant of earnings. Everything else being the same, a professional will have earnings almost twice as large as an agricultural self-employed worker. However, the premium decreases to 76 percent (see equation 6 in Table 17) if the race variable is introduced. This is explained by the fact that some of the premium is "picked up" by the ethnic (Chinese) variable since the Chinese are quite

27. Among the agricultural self-employed, only 2.2 percent are Chinese, while their percentage among the nonagricultural self-employed is 5.

heavily represented among the professionals. In other words, what appears to be an occupational premium alone when there is no ethnic variable dissolves into the occupational and ethnic premium in the proportions of three fourths and one fourth. Only very few occupations do not show the occupational premium compared to the agricultural self-employed worker. One of these are service sector workers, although allowing for ethnic composition in 1997, brings in a negative (-7 percent) premium, which may be explained by the higher share of the Chinese in the sector. Others are craft workers, and workers in elementary occupations in 1989. However, the latter two groups too have pulled ahead of the self-employed agricultural workers in the most recent period.

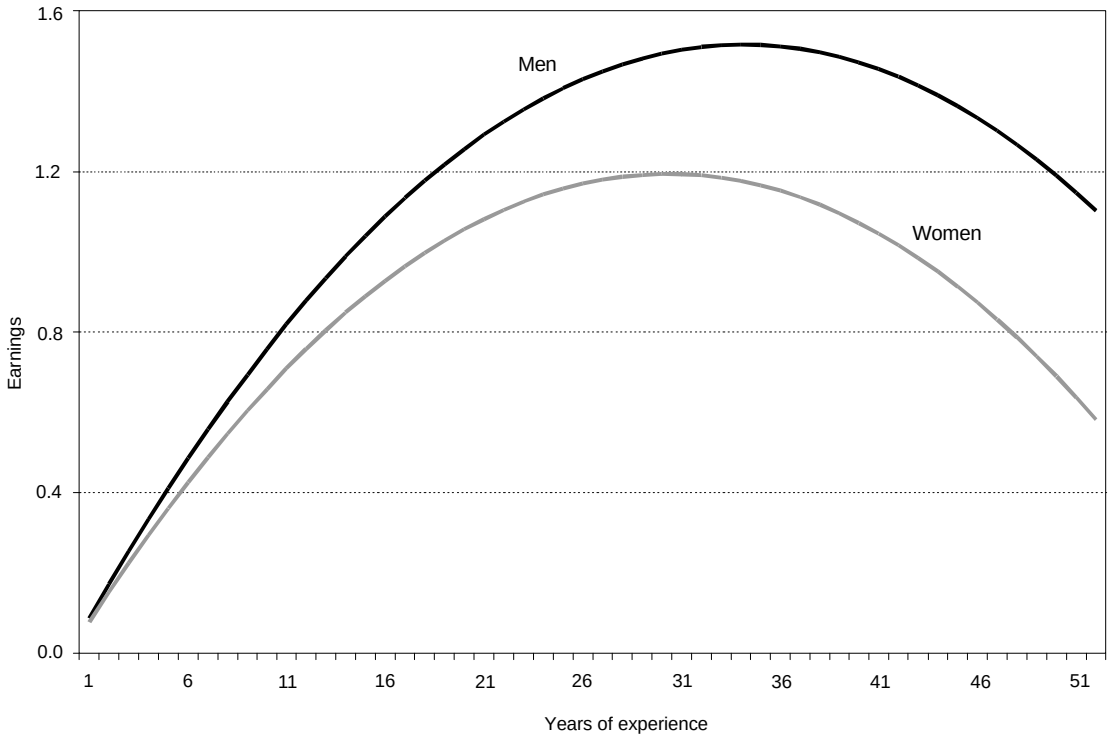
A. Running Separate Regressions for Men and Women

Gender differences are more pervasive than the difference in average earnings alone would suggest. The importance of various determinants of earnings differs between men and women. To investigate this, we run separate regressions for men and women. We find, for example, that while returns to education to men show a constant decline between 1984 and 1989 and 1997, going down by almost 1 percentage point (see Annex 2, Table A1), the rates of return on women's education increased from 10.5 percent in 1984 to 10.7 percent in 1997, and are now almost 1.5 percentage points higher than for men (Annex 2, Table A2).[28] There are other significant differences. Returns to experience, shown on the 1997 data in Figure 10, are throughout the entire range higher for men than women. Even in the old age, the difference does not diminish. Women's earnings peak earlier (at 30 years of experience) than men's (at 34 years), although both are relatively high values compared to international experience, where peaks are reached for under 20 years of experience. Being employer (compared to being self-employed) is in all years much more valuable for women than men. While men can expect a premium of around 30-40 percent, the premium for women ranges from over 60 to over 80 percent (Annex 2, Tables A1 and A2). The same is true for being an employee. Finally, religious education, which is equivalent for men to 3.8 years of conventional education, is worth almost 5 years of conventional education to women. We do not know if this is

28. Schafgans (1999, Table 3) reports the same results for Malaysia using the Second Malaysian Family Life Survey from 1988-1989. She finds that secondary schooling and above (as opposed to less than completed primary education) raises women's earnings by 26 percent vs. 16 percent for men. For 1989, I have return to an additional year of schooling 10.5 percent for women and 8.6percent for men (see Annex 2, Tables A1 and A2).

because women with religious education only are treated by the labor market better than men with religious education only, or because women attend religious education longer than men. [29]

Figure 10. **Age Earnings Profile for Men and Women, 1997**



Running separate regressions for men and women allows us to estimate the gender discrimination by another (Oaxaca) method.[30] Discrimination is now calculated by using first men's structure of earnings as a yardstick, and calculating what would have been men's and women's wages if they were both paid as men. Then, we repeat the same calculation using now women's earnings structure as a yardstick. The difference between the two calculated earnings and the actual earnings gap yields an estimate of discrimination. The results are shown in Table 18 above. The estimates of the gender discrimination are now lower than when calculated from a single regression. For example, in 1997 women's unadjusted earnings were 28 percent less than men's were.

29. It will be recalled that we do not have the data for the duration of religious education.
30. Based on Oaxaca (1973).

However, using male's earning structure, women should have been paid only 8 percent less: the estimated discrimination is thus 20 percent (28-8). If we use women's earning structure as the yardstick, then women should have been paid only 5 percent less, and the gender discrimination is 23 percent. Averaging the two estimates yields the Oaxaca value of 22 percent for 1997. This is less than in the US where the gender discrimination was found to be about 30 percent (see Oaxaca and Ransom 1994 as quoted in Chase 1999, 11). It is interesting to note that the discrimination increased even as the unadjusted gap between women's and men's earning went down significantly between 1984 and 1997. The reason is that women's earning characteristics (education, experience) improved faster than those of men—and the wage gap did not decline as much as one would have expected. A form of accordion effect is present here too: during the "lean times" in 1984-1989, the discrimination went down, and then went up in the second period.

B. Running Separate Regressions for Malays and Chinese

For 1997, we can run separate earnings regressions for the Malays and the Chinese in order to see how much their earning structures differ, and to estimate Oaxaca discrimination (the same way that it was done for women and men). We have seen that the unadjusted Chinese earnings are 46.4 percent higher than those of Malays (see Table 19). The difference drops to about 25 percent when earnings are adjusted for individual characteristics like education, location, occupation etc. The Oaxaca decomposition yields an estimate for the pro-Chinese bias of 31 percent. The two earning structures do not differ much. Whether we use the Chinese or Malay earning structure as a yardstick, the estimate of the bias is about the same.

A glance at Annex 2 Table A4 allows us to focus on the main differences in the earning structure for the Chinese and the Malays. Chinese females seem to be more discriminated (compared to their male ethnic colleagues) than the Malay women: the earnings loss to being a woman is almost 41 percent of men's earning for the Chinese and 34 percent for the Malays. The returns to education are slightly higher for the Malays than for the Chinese (10.4 percent vs. 9.1 percent). For all occupations without exception, the occupational premium (compared to being an agricultural worker) is greater for the Chinese than for the Malays. When it comes to the locational premium, the situation reverses: the locational premiums are almost uniformly greater for the Malays (the notable exception is Terengganu). For example, living in Kuala Lumpur increases a Malay's earnings by 60 percent (compared to a Malay living in Kelentan) while it increases earnings of a

Chinese person by 56 percent; the gains to living in Sabah are respectively 50.7 percent and 24 percent etc. And, importantly, working for the government carries a much greater premium for the Malays: their premium is 15.4 percent compared to 8.7 percent for the Chinese.

VII. Labor Demand and Supply: Explaining Changes in Relative Earnings

We have documented the evolution of real and relative earnings over the period of some 15 years. In this section, we ask the question: can we explain the changes in relative earnings across deciles by the changes of labor supply and demand? Consider labor supply first. Let there be 10 different types of labor defined by their position along the earnings distribution curve (ten deciles). [31] A given type of labor is defined by its skill level and gender composition, that is by the skill/gender mix specific to a given earning decile. The skill/gender components are denoted by Ed_i/Ed where Ed_i = workers with *i* type of education and gender belonging to decile *d*, and Ed = total number of workers in decile.[32] Clearly, higher deciles will have relatively more workers with higher levels of education as seen in Figure 8 above (and also more men than women). The estimated change in the supply of workers in a given decile (S_d) is calculated as

$$\Delta S_d = \sum_i \frac{Ed_i}{Ed} \Delta\left(\frac{E_i}{E}\right) \quad (3)$$

where the first term on the RHS defines the structure of the labor force in a given decile, and the second term multiplies it with the overall change in the skill (education) and gender levels. The reasoning is that each decile is characterized by given schooling and gender requirements. Then, given the overall change in the structure of schooling and gender $\Delta(E_i/E)$, we ask how would the supply of skills specific to decile *d*, be affected. The assumption is, of course, that a given decile maintains the requirements of a given skill and gender mix. The skill-gender mix may vary with economic development but can be thought as relatively fixed in the short-term.

The changes in demand are calculated using the same equation as (1) except that Ed_j now represents workers of *j*-th occupation and gender out of total number of workers in decile *d*. The assumption is that each decile is characterized by a given occupational and gender composition (e.g., lower deciles would have more agricultural workers than upper deciles as shown in Figure 7

31. For the methodology, see Cardoso (1998), and Juhn and Murphy (1995).
32. Note that each *i* represent a cell defined by a given education/gender composition.

above) and that these characteristics persist. Then, given the overall change in occupational structure $\Delta(E_j/E)$, we ask how would the demand for people belong to a given decile change.

In our calculations, i=1 to 5, for five educational levels, and j=1 to 10 for ten occupational categories, and k, of course, 2 for males and females. Tables 21 and 22 show the real growth of earnings across deciles, and the calculated changes in supply and demand for each decile respectively for the period 1984-1989, and 1989-1997.

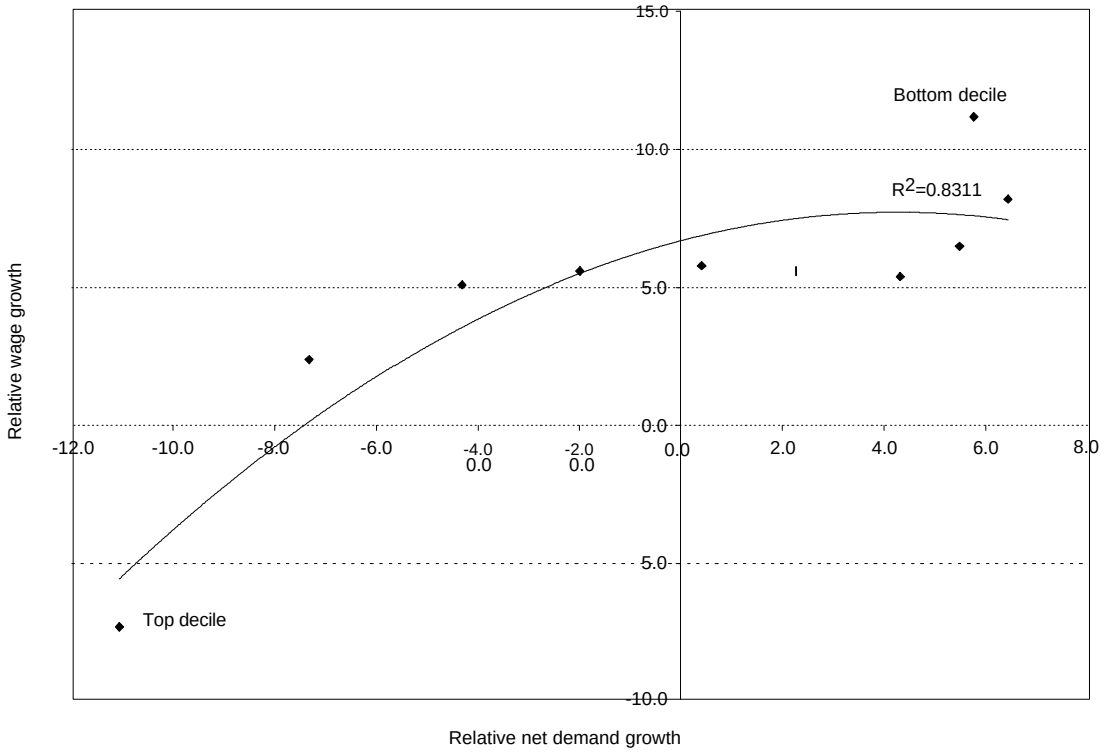
Table 21. **Growth in Real Earnings, and in Estimated Labor Supply and Demand, by Earning Decile, 1984-1989**

Decile	1	2	3	4	5	6	7	8	9	10	Total
(1) Growth in real earnings	6.9	3.9	2.2	1.1	1.3	1.5	1.3	0.8	-1.9	-11.6	-4.3
(2) Growth in labor supply	-7.4	-6.6	-5.0	-3.4	-1.6	-0.4	1.6	3.4	7.1	12.5	
(3) Growth in labor demand	-1.7	-0.2	0.5	0.9	0.6	0.0	-0.4	-0.9	-0.3	1.4	
Net demand growth (3)-(2)	5.8	6.4	5.5	4.3	2.3	0.4	-2.0	-4.3	-7.3	-11.1	
(4) Relative wage growth	11.2	8.2	6.5	5.4	5.6	5.8	5.6	5.1	2.4	-7.3	0

Note: Relative wage growth (line 4) calculated as the difference between the real wage growth in a given decile (from line 1) and the total wage growth (-4.3 percent) for the period.

Table 21 shows an almost perfect match between the relative net demand growth and relative wage growth over the period 1984-1989. Lower wage deciles experienced much greater net demand growth (between 5.5 and 6.4 percent for the bottom three deciles), and they registered the highest relative wage increases. At the other end of the spectrum, the net demand for the top decile's occupation/education/gender mix decreased by 11.1 percent, its real earnings went down by 11.6 percent, and relative earnings by 7.3 percent. The match revealed in Figure 11 is almost perfect: higher net demand growth triggers higher wage growth. Most points lie very close to the fitted quadratic (concave) line and R^2 is 0.83.

Figure 11. **Net Labor Demand and Earnings, 1984-1989**



Source: Table 21.

But the situation is totally altered when we look at the changes that have occurred between 1989 and 1997. Now (see Table 22), the net demand for the bottom two deciles' mix of occupation, gender and education is negative. Yet relative earnings have increased there by more than in any other decile. Or differently, the strongest net demand was registered for the middle three deciles (fifth, sixth, seventh) but their relative earnings decreased more than for any other decile! Only around the top of the earnings distribution do we observe that net demand and relative wage growth move together. Thus, as we can see in Figure 12, the regression line between net labor demand and earnings slopes (slightly) downward instead of upward.[33] That regularity remains even after dropping the bottom decile whose growth was indeed very high, and which might be considered to be an outlier.

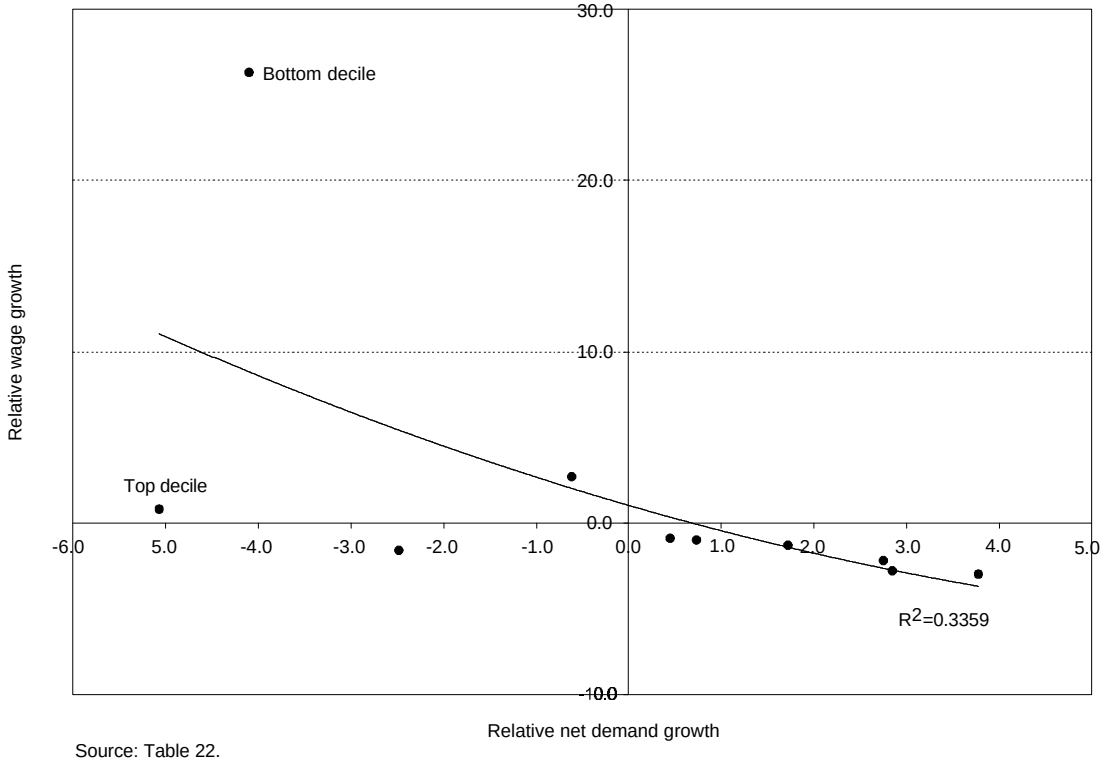
33. The variability of relative wage growth across the deciles is much less in 1989-1997 than in the previous period. If one leaves aside the bottom decile in both periods, in the second period, the relative earnings growth by decile was in a relatively narrow range between –2.7 percent and +3.0 percent (see Table 23), while in the first period the range was much wider, from –7.3 to +8.2 percent.

Table 22. **Growth in Real Earnings and in Estimated Labor Supply and Demand by Earning Decile, 1989-1997**

Decile	1	2	3	4	5	6	7	8	9	10	Total
(1) Growth in real wage	76.4	52.8	49.1	48.8	47.3	47.1	47.9	49.2	48.5	50.9	50.1
(2) Growth in supply	-7.3	-11.9	-10.8	-8.7	-6.5	-4.7	-1.3	5.3	14.0	32.0	
(3) Growth in demand	-11.4	-12.5	-10.1	-7.0	-3.7	-0.9	1.5	5.8	11.5	26.9	
Net demand growth (3)-(2)	-4.1	-0.6	0.7	1.7	2.8	3.8	2.8	0.5	-2.5	-5.1	
(4) Relative wage growth	26.3	2.7	-1.0	-1.3	-2.8	-3.0	-2.2	-0.9	-1.6	0.8	0

Note: Relative wage growth calculated as the difference between the real wage growth in a given decile (from line 1) and the total wage growth (50.1 percent) for the period.

Figure 12. **Net Labor Demand and Earnings, 1989-1997**



Source: Table 22.

It seems that a simple model based on fixed occupational, educational, and gender composition across the deciles, does not seem to work in the latter period. The most puzzling development occurs in the bottom decile. The relative supply of people with characteristics the same as those of the people who were in the 1989 bottom earning decile decreased by more than

7 percent (mostly because the relative supply of low educated workers decreased). The relative demand, however, for the occupation/gender mix characteristic of the bottom decile decreased by even more (11 percent). We would therefore expect a relative earnings decline in the bottom decile. But nothing of the sort happens: the relative earnings growth of the bottom decile is by far the highest of any decile.[34] One explanation could be that characteristics of the people in the bottom decile had dramatically changed between 1989 and 1997. Suppose for example that the expansion of education, and changes in the occupational structure were so huge that the characteristics of the people in the bottom decile in 1997 are entirely different (e.g., they are much more educated) than the characteristics of the bottom decile in 1989. Then our model based on fixed occupation/ education/gender mix by decile would not work. But that hypothesis is not supported by the data either. In effect, we find that the occupational/education/gender characteristics have changed *more* for the higher deciles: the bottom decile's 1997 composition, both in terms of supply and demand characteristics, differs the least of all deciles from the 1989 composition.[35] Therefore, the reasons for such a high growth of earnings in the bottom decile should lie, it seems, in the institutional changes that have taken place between 1989 and 1997.

VIII. Summary of Main Trends and Conclusions

Malaysia recorded a very high GDP growth rate (4.2 percent per annum per capita) over almost 15 years, from 1984 to 1997, which are studied here. The main trends that one observes read almost like a stylized picture of what fast development accomplishes (or differently, what are the human capital requirement *for* fast development).

(i) Participation rates increased for both men and women and across practically all ages. However, a large gap between participation rates of men and women persists (men are 40 percent more likely to work than women). That gap is due to the still relatively low participation rate of women (less than 40 percent in Malaysia vs. more than 60 percent in OECD counties).

34. Note that the earnings growth of the bottom decile was greater than of any other decile in both periods. However, while in the first period it obeyed to changes in relative demand and supply, in the second it went against them.

35. If we express the maximum change in the decile composition either in terms of education/gender or occupation/gender mix as 100, the supply change in the bottom decile over the 1989-1997 period was only 1 percent, or the demand change was 3 percent. Both were less than the compositional changes in any other decile in the 1989-1997 period (e.g., supply changes in the 6th and 7th decile were 10 percent), and less than the changes in the bottom decile during the first period (4 and 5 percent).

(ii) There was a large improvement in educational attainment. The average number of years of schooling (excluding those with religious education only) increased from 8 years in 1984 to 9.2 years in 1997. It is now only 3-4 years below the OECD average. The increase occurred equally among men and women. It occurred primarily through greater percentage of people completing university and senior-high school, and a decrease of those with religious and primary education only.

(iii) Work experience remained stable overall, and for men and women separately. There were some changes though in the distribution of women by their work experience: an increase in the share of women with medium- and high-level experience (25-30 years), and a decline in the share of women with very long experience, apparently a result of their decisions to retire earlier.

(iv) There was a significant growth in paid employment (wage laborers). While in 1984, 73 percent of income recipients were employees, their share increased to 78 percent in 1997. It happened to the detriment of the self-employed, mostly those engaged in agriculture. The share of agricultural labor, among both men and women, went down. Many of them, it seems, moved into the cities and got jobs there as wage-earners.

(v) The share of income recipients employed in high-skill professions (government and armed forces, managers, professionals, and technicians) increased by almost 10 percentage points—as much as the share of those employed in low-skill professions (agricultural workers and elementary occupations) that went down. Percentage of those employed in middle skill level professions remained constant.

(vi) The only gloomier picture of developments is afforded by the evolution of GDP per unit of education-adjusted, or even nonadjusted, labor. In 1997, education-adjusted productivity was only 6.3 percent higher than in 1984. These figures, combined with the fact that physical capital must have increased significantly over the same period, suggest that net factor productivity growth might have easily been close to zero or negative. In other words, the observed high GDP per capita growth was achieved in an “extensive” manner, through increased inputs of labor—by higher participation rates and increased hours of work—and use of greater capital stock.

Turning to inequality of earnings, the most important change was the reduction in inequality during the "lean" times between 1984 and 1989. This, despite widening disparities between the states, and certain occupational and educational groups in the second period of very fast growth, was not reversed. The Gini coefficient of earnings was at the same level in 1997 as in 1989; the decile ratio though went down, as did the earnings ratios between the 50^{th} and 10^{th} percentiles, and the 90^{th} and 50^{th} percentiles of earnings distribution.

During the first subperiod (1984-1989), real earnings did not increase, mostly because of the 1985-1986 recession. In the second subperiod (1989-1997), they increased briskly so that mean hourly earnings in 1997 were 50 percent higher than in 1989. The increase in real earnings between 1984 and 1997 was particularly strong among the bottom three deciles. On the other end of the spectrum, the top decile registered below-average growth.

The inter-state differences in average earnings increased substantially in the second period, after shrinking during the first. There was thus an "accordion effect": during the slow growth period, differences are reduced; during the fast growth period they increase. The earning growth was the strongest in Johor, Pulau Pinang, Selengor, and Kuala Lumpur; and slowest in Sabah, Pahang, and Lubuan.

Professionals, thanks to the high growth of their number and high earnings, have come to dominate the top earnings decile. Together with managers they "fill" more than 50 percent of the top decile in 1997. The accordion effect was present here too: the ratio between professionals' and agricultural workers' earnings shrunk between 1984 and 1989, and later expanded. The accordion affected the university-to-primary school premium, and to the premium of being an employer (compared to being an employee or a self-employed worker).

Despite massive expansion of education and improvement in educational attainment, rate of return to schooling remained at the same—very high—level of about 10 percent per each additional year of schooling. However, while the rate of return for men decreased by about 1 percentage point (between 1984 and 1997), for women it went up by 1.5 points, so that it is now higher for women than for men, a reversal of the 1984 situation.

Gender discrimination remains high even if looking simply at the unadjusted male-female differences in earnings overestimates true discrimination. However, the trends are different. The shortfall of unadjusted women's earnings decreased from 36 percent in 1984 to 28 percent in 1997.

Discrimination, measured by the Oaxaca method, meanwhile increased from 18 to 22 percentage points.

The ethnic pro-Chinese bias is overestimated when one looks at the difference in unadjusted earnings. This is because the Chinese have more characteristics valued by the economy that the Malays. The Chinese have unadjusted earnings some 46 percent higher than the Malays. However, the net "bias" is estimated by three different methods to ranges between 23 and 31 percent. Yet, one must keep in mind that our estimates of either gender or ethnic "bias" are imperfect because we are unable to account for many unobservable characteristics that may matter for the earnings. Care should be therefore exercised when interpreting these values. However, if the ethnic data for the previous years were made available for research, one would have been able to get a firmer grasp on this differential and its significance, e.g., whether it too (like the bias against women) might show a declining trend or not.

Finally, we tried to explain the changes in relative decile earnings by looking at the relative net demand. Between 1984 and 1989, net labor demand for various education/occupation and gender mixes, and relative earnings moved in step. Net demand growth was the greatest for the labor characteristics specific that are to the bottom deciles, and their wages increased the most. But between 1989 and 1997, relative wages of the bottom deciles increased even faster although the net labor demand for their characteristics was negative. This suggests some institutional explanations for the fast growth of earnings in the bottom decile—a factor that was also instrumental in bringing earnings inequality down.

Annex 1. **Data and Variable Definitions**

We have defined a new variable, "earned income" (*earninc*), as the sum of total income from paid employment and total income from self-employment (in HIS codes as respectively *is01* and *is21*). Some values were negative—for the 1984 survey, 0.1 percent (92) of those with nonzero earned income reported negative *earninc*, 0.04 percent (39) for 1989 and none for 1997. All such values (recorded for self-employed individuals only) and zeros were subsequently converted to 1 in order to facilitate log transformations, later used in regression analysis. Further justification for this is that there is usually a tendency to overstate self-employment expenses, capital expenditures often being included when only current expenses should be taken into account. All wages were expressed in real terms, and those in 1997 were treated as a base.

Further variable modification involved changing the definition of "income recipients". In the original data sets, even those with no earned income, but who nevertheless received transfer payments of another sort, were treated as income recipients. Interestingly, for the year 1984, 90.18 percent of such individuals who are of working age (14-65 exclusive), work zero hours per month. For 1989 and 1997, the figures are 92.46 percent and 96.04 percent, respectively. We have narrowed down the definition by generating *recip*, which assumes value 1 if *earninc* and number of hours worked per month are both greater than zero, 0 otherwise. This refers to the population between 14 and 65 only, since all others invariably reported zero hours of work. In all of our regression analyses, the results only account for the individuals for whom *recip* =1. This made it possible to express wages in terms of (real) earned income per hour worked, but it also meant that all those who were outside the working-age limits, but reported positive *earninc*, had to be omitted. For '84, there were 1.21 percent (3033) of such individuals, 1.23 percent (3421) for '89 and 1.3 percent (2237) for '97.

We have used the original variable representing the level of education –or more exactly either the already attained highest level of education, or for those enrolled, the current level of education—(see Table A1) to generate *yrssch*, "years of schooling", though only approximate values could be obtained.

Table A1. **Education Levels and Years of Schooling**

Level of education in HIS	Assumed number of schooling of years
01 Less than 1 year	1
02 Second and third class	3
03 Fourth and fifth class	5
04 Sixth class	6
Primary	
05 Tinkgatan 1,2	8
06 Tinkgatan 3, Junior middle	9
Junior high	
07 Tingkatan 4	10
08 Tingkatan 5, Senior Middle 3	11
09 Tingkatan below level 6	12
Senior high	
10 Tingkatan above level 6	13
11 University	16
University	
13 Religious education	0

For example, all those who have reached university were treated as having completed 16 years of schooling (which is the maximum value), but clearly this category included both those who have only enrolled for a university course without finishing it, as well as those who have actually obtained a degree. Similar inaccuracies inevitably arose for other, lower values. Moreover, religious education was not accounted for at all by this new variable, but only by a separate dummy, *reledu*.

No data for work experience of respondents was available, but we have constructed a proxy, *workexp*, being equal to age-*yrssch* -5 except for those with religious education only, in which case *workexp* was set to be equal to age-14; all missing values for *yrssch* had previously been re-coded to zero. Out of the total number of observations thus obtained, counting only those with age between 14 and 65, 0.14 percent (204) in the ’84 survey had negative values; similarly, there were 0.19 percent (329) negative values for ’89 and 1.32 percent (1359) for ’97. They were all converted to zero, and *expsq*, “work experience squared”, subsequently generated.

We have defined 10 major occupation groups, using the revised ISCO-88 (International Standard Classification of Occupations), though the codes described in it did not always match those

we found in the data sets. Our classification, therefore, ought to be taken with caution - it is not clear how accurately it describes the actual occupations of the respondents, and there may well be some overlap between the different groups.

List of variables used in the regression analysis:

lrncphw: Logarithm of real earned income per hour worked; used as a dependent variable

female: Sex dummy (1 if female, 0 if male)

state1-15 Regional dummies:
-state1 – 1 if Johor
-state2 – 1 if Kedah
-state3 – 1 if Kelantan
-state4 – 1 if Melaka
-state5 – 1 if N. Sembilan
-state6 – 1 if Pahang
-state7 – 1 if Pulau Pinang
-state8 – 1 if Perak
-state9 – 1 if Perlis
-state10 – 1 if Selangor
-state11 – 1 if Terengganu
-state12 – 1 if Sabah
-state13 – 1 if Sarawak
-state14 – 1 if Kuala Lumpur
-state15 – 1 if Labuan

xx1-xx10: Dummies for occupation groups:
-xx1 – 1 if armed forces
-xx2 – 1 if legislators, senior officials or managers
-xx3 – 1 if professionals
-xx4 – 1 if technicians
-xx5 – 1 if clerks
-xx6 – 1 if service workers or shop and market sales workers
-xx7 – 1 if skilled agricultural or fishery workers
-xx8 – 1 if craft workers
-xx9 – 1 if plant and machine operators and/or assemblers
-xx10 – 1 if elementary occupations

Dummies for principal employment status:
-emplr – 1 if employer
-emple – 1 if employee
-unpaid – 1 if unpaid family worker
-self – 1 if self-employed

Dummies for individuals receiving income from self-employment ('89 and '97 data sets only)[36]:
-agri – 1 if income source is in the agricultural sector
-nagri – 1 if nonagricultural income source

workexp — work experience proxy (see above)

expsq — work experience squared

yrssch — years of schooling

releduc — 1 if with religious education only, 0 otherwise

recip — 1 if earned income and hours worked both greater than zero, 0 otherwise

race1-3, — Dummies for ethnic groups ('97 data set only):
-race1 – 1 if Malay
-race2 – 1 if Chinese
-race3 – 1 if Indian, Pakistani, Bangladeshi or Sri Lankan
-others – 1 if any other ethnic group

36. Most, but not all, of such individuals are of the self-employed principal employment status defined above: 65.58 percent for the 1989 and 62.45 percent for the 1997 survey. The rest fall within other three categories.

Annex 2. **Additional Earnings Regressions**

Table A1. **Determinants of Men's (ln) Earnings (maximum likelihood estimation)**

	1984	**1989**	**1997**
Yrssch	0.1034	0.0980	0.0943
	(0.000)	(0.000)	(0.000)
Workexp	0.0888	0.0972	0.0671
	(0.000)	(0.000)	(0.000)
Expsq	-0.0013	-0.0014	-0.0001
	(0.000)	(0.000)	(0.000)
Emplr	0.3995	0.2731	0.3073
	(0.000)	(0.000)	(0.000)
Emple	0.0620	0.0607	0.0955
	(0.000)	(0.000)	(0.000)
Unpaid	-0.5115	-0.7172	-0.3050
	(0.000)	(0.000)	(0.006)
Nonagro		0.0485	0.1031
		(0.001)	(0.000)
Releduc	0.2444	0.2717	0.3613
	(0.000)	(0.000)	(0.000)
Johor	0.3230	0.3691	0.5674
	(0.000)	(0.000)	(0.000)
Kebah	-0.0042	0.1075	0.2438
	(0.852)	(0.000)	(0.000)
Melaka	0.1614	0.1582	0.3611
	(0.000)	(0.000)	(0.000)
N. Sembilan	0.2853	0.3032	0.4753
	(0.000)	(0.000)	(0.000)
Pahang	0.4557	0.4572	0.3728
	(0.000)	(0.000)	(0.000)
Pulau Pinang	0.0822	0.2056	0.4536
	(0.000)	(0.000)	(0.000)
Perak	0.2539	0.1799	0.4578
	(0.000)	(0.000)	(0.000)
Perlis	0.0036	0.1913	0.2019
	(0.932)	(0.000)	(0.000)
Selangor	0.3718	0.2989	0.5778
	(0.000)	(0.000)	(0.000)
Terengganu	0.1423	0.0859	0.0918
	(0.000)	(0.000)	(0.000)
Sabah	0.3014	0.2783	0.1040
	(0.000)	(0.000)	(0.000)
Sarawak	0.3225	0.3152	0.3450
	(0.000)	(0.000)	(0.000)
Kuala Lumpur	0.4045	0.3826	0.6700
	(0.000)	(0.000)	(0.000)
Labuan	0.5660	0.5715	0.2885
	(0.000)	(0.000)	(0.000)
Armed Forces	0.6890	0.6841	0.6284
	(0.000)	(0.000)	(0.000)
Managers	0.7484	0.6354	0.5902
	(0.000)	(0.000)	(0.000)
Professionals	0.9650	0.8636	0.9480

	(0.000)	(0.000)	(0.000)
Technicians	0.3364	0.3166	0.2560
	(0.000)	(0.000)	(0.000)
Clerks	0.2449	0.1509	0.2771
	(0.000)	(0.000)	(0.000)
Service Workers	0.1202	0.1028	0.1165
	(0.000)	(0.000)	(0.000)
Craft Workers	0.2484	0.1065	0.2324
	(0.000)	(0.000)	(0.000)
Machine Operators	0.2118	0.1137	0.2030
	(0.000)	(0.000)	(0.000)
Elementary Occupations	0.1414	0.0354	0.1155
	(0.000)	(0.001)	(0.000)
Constant	2.4656	2.4368	3.1401
	(0.000)	(0.000)	(0.000)
Rho	-0.0197	-0.0002	-1.536
	(0.003)	(0.979)	(0.125)
Number of observations	52575	58676	39675

Note: The dependent variable is ln real earned hourly income for men. For the model and the selection regression, see equations (1) and (2) above. The results are valid only for *recip*=1. Variables *agri* (agricultural income source from self-employment), *state3* (Kelantan), *self* (self-employed principal employment status), *xx7* (agricultural workers) and *race1* (Malay ethnicity) are always excluded. The P values are shown in brackets. *Unpaid* is unpaid family worker.

Table A2. **Determinants of Women's (ln) Earnings (maximum likelihood estimation)**

	1984	1989	1997
Yrssch	0.1050	0.1054	0.1070
	(0.000)	(0.000)	(0.000)
Workexp	0.0788	0.0822	0.0547
	(0.000)	(0.000)	(0.000)
Expsq	-0.0013	-0.0012	-0.0007
	(0.000)	(0.000)	(0.000)
Emplr	0.6242	0.7061	0.8303
	(0.000)	(0.000)	(0.000)
Emple	0.1851	0.1185	0.1641
	(0.000)	(0.000)	(0.000)
Unpaid	-1.0053	-1.0388	-0.5928
	(0.000)	(0.000)	(0.000)
Nonagro		-0.0752	-0.2023
		(0.021)	(0.000)
Releduc	0.3722	0.3778	0.4939
	(0.000)	(0.000)	(0.000)
Johor	0.3401	0.3670	0.4966
	(0.000)	(0.000)	(0.000)
Kebah	0.0425	0.1455	0.3082
	(0.304)	(0.000)	(0.000)
Melaka	0.2622	0.2754	0.3764
	(0.000)	(0.000)	(0.000)
N. Sembilan	0.3437	0.3465	0.3765
	(0.000)	(0.000)	(0.000)
Pahang	0.3105	0.3831	0.3289
	(0.000)	(0.000)	(0.000)
Pulau Pinang	0.2133	0.4268	0.4742
	(0.000)	(0.000)	(0.000)
Perak	0.2037	0.1699	0.4301
	(0.000)	(0.000)	(0.000)
Perlis	-0.0886	0.1760	0.1653
	(0.379)	(0.011)	(0.001)
Selangor	0.4288	0.4114	0.5737
	(0.000)	(0.000)	(0.000)
Terengganu	0.1119	0.0573	0.0216
	(0.012)	(0.169)	(0.606)
Sabah	0.2841	0.4258	0.2235
	(0.000)	(0.000)	(0.000)
Sarawak	0.1531	0.2307	0.2396
	(0.000)	(0.000)	(0.000)
Kuala Lumpur	0.4516	0.4527	0.6609
	(0.000)	(0.000)	(0.000)
Labuan	0.5146	0.5192	0.2695
	(0.000)	(0.000)	(0.086)
Armed Forces	0.7034	0.6648	0.6815
	(0.000)	(0.000)	(0.000)
Managers	1.0031	0.8768	0.8416
	(0.000)	(0.000)	(0.000)
Professionals	1.1381	1.0414	1.1030
	(0.000)	(0.000)	(0.000)

Technicians	0.5394	0.4435	0.5775
	(0.000)	(0.000)	(0.000)
Clerks	0.2255	0.1207	0.4163
	(0.000)	(0.000)	(0.000)
Service Workers	0.0513	-0.1131	-0.0007
	(0.021)	(0.000)	(0.980)
Craft Workers	0.0594	-0.0639	0.2174
	(0.018)	(0.007)	(0.000)
Machine Operators	0.3052	0.1078	0.2984
	(0.000)	(0.000)	(0.000)
Elementary Occupations	-0.0235	-0.1565	0.2288
	(0.418)	(0.000)	(0.000)
Constant	2.0664	2.1044	2.6432
	(0.000)	(0.000)	(0.000)
Rho	-0.0166	-0.019	0.0205
	(0.022)	(0.043)	(0.037)
Number of observations	23069	26845	19462

Note: The dependent variable is ln real earned hourly income for women. For the model and the selection regression, see equations (1) and (2) above. The results are valid only for *recip*=1. Variables *agri* (agricultural income source from self-employment), *state3* (Kelantan), *self* (self-employed principal employment status), *xx7* (agricultural workers) and *race1* (Malay ethnicity) are always excluded. The P values are shown in brackets. *Unpaid* is unpaid family worker.

Table A3. **Determinants of Overall (ln) Earnings with Government Employment (maximum likelihood estimation)**

	1997
Female	-0.3590
	(0.000)
Yrssch	0.0989
	(0.000)
Workexp	0.0563
	(0.000)
Expsq	-0.0008
	(0.000)
Releduc	0.4056
	(0.000)
Emplr	0.4116
	(0.000)
Emple	0.0754
	(0.000)
Unpaid	-0.4379
	(0.001)
Nonagri	-0.0540
	(0.003)
Johor	0.5065
	(0.000)
Kebah	0.2505
	(0.000)
Melaka	0.3125
	(0.000)
N. Sembilan	0.4008
	(0.000)
Pahang	0.3370
	(0.000)
Pulau Pinang	0.4108
	(0.000)
Perak	0.3931
	(0.000)
Perlis	0.1775
	(0.000)
Selangor	0.5686
	(0.000)
Terengganu	0.0654
	(0.002)
Sabah	0.3635
	(0.000)
Sarawak	0.2916
	(0.000)
Kuala Lumpur	0.6098
	(0.000)
Labuan	0.4495
	(0.000)
Armed Forces	0.4466
	(0.000)
Managers	0.4673
	(0.000)
Professionals	0.7781

	(0.000)
Technicians	0.2399
	(0.000)
Clerks	0.1790
	(0.000)
Service Workers	-0.0847
	(0.000)
Craft Workers	0.0929
	(0.000)
Machine Operators	0.1154
	(0.000)
Elementary Occupations	0.0544
	(0.000)
Chinese	0.2515
	(0.000)
Indian	-0.0034
	(0.741)
Govsec	0.1506
	(0.000)
Constant	3.3141
	(0.000)
Rho	-0.0746
	(0.000)
Number of observations	49,936

Note: The dependent variable is ln real earned hourly income. For the model and the selection regression, see equations (1) and (2) above. The results are valid only for *recip*=1. Variables *agri* (agricultural income source from self-employment), *state3* (Kelantan), *self* (self-employed principal employment status), *xx7* (agricultural workers) and *race1* (Malay ethnicity) are always excluded. The P values are shown in brackets. *Unpaid* is unpaid family worker.

Table A4. **Determinants of Overall (ln) Earnings for Malays and Chinese, 1997 (maximum likelihood estimation)**

	1997	
	Malays	Chinese
female	-0.3425	-0.4121
	(0.000)	(0.000)
yrssch	0.1044	0.0912
	(0.000)	(0.000)
workexp	0.0540	0.0560
	(0.000)	(0.000)
expsq	-0.0008	-0.0009
	(0.000)	(0.000)
emplr	0.3389	0.4098
	(0.000)	(0.000)
emple	0.1339	0.0920
	(0.000)	(0.000)
unpaid	-0.4689	0.0192
	(0.001)	(0.925)
releduc	0.4313	0.3329
	(0.000)	(0.000)
Johor	0.4706	0.4787
	(0.000)	(0.000)
Kebah	0.2375	0.2020
	(0.000)	(0.000)
Melaka	0.3388	0.1951
	(0.000)	(0.000)
N. Sembilan	0.4181	0.3147
	(0.000)	(0.000)
Pahang	0.3739	0.1447
	(0.000)	(0.010)
Pulau Pinang	0.4289	0.3305
	(0.000)	(0.000)
Perak	0.4052	0.3174
	(0.000)	(0.000)
Perlis	0.1699	0.1371
	(0.000)	(0.042)
Selangor	0.5699	0.5327
	(0.000)	(0.000)
Terengganu	0.0526	0.2266
	(0.017)	(0.002)
Sabah	0.5074	0.2408
	(0.000)	(0.000)
Sarawak	0.2661	0.2521
	(0.000)	(0.000)
Kuala Lumpur	0.6024	0.5628
	(0.000)	(0.000)
Labuan	0.5253	0.2180
	(0.000)	(0.127)
Armed Forces	0.3627	0.5669
	(0.000)	(0.000)
Managers	0.4092	0.5047
	(0.000)	(0.000)
Professionals	0.7362	0.8198
	(0.000)	(0.000)

Technicians	0.1669 (0.000)	0.3333 (0.000)
Clerks	0.0960 (0.000)	0.2443 (0.000)
Service Workers	-0.1473 (0.000)	-0.0206 (0.492)
Craft Workers	0.0211 (0.332)	0.1559 (0.000)
Machine Operators	0.0712 (0.000)	0.1335 (0.000)
Elementary Occupations	-0.0089 (0.598)	0.1007 (0.000)
Govsec	0.1543 (0.000)	0.0867 (0.002)
Constant	3.2605 (0.000)	3.5986 (0.000)
rho	-0.0632 (0.000)	-0.0508 (0.043)
Number of observations	27772	17312

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