

WAGE DIFFERENTIALS, INDUSTRIAL AND SKILL STRUCTURES IN MALAYSIAN MANUFACTURES, 1974-1996

RUSMAWATI HJ. SAID
ZAKARIAH ABDUL RASHID
*Economics Department
Universiti Putra Malaysia*

ABSTRACT

The objective of the present paper is to measure the proportional changes in salaries and wages and the impact of changing industrial structure on the employment of skill workers in Malaysian manufactures during 1974-1996. By using 5-digit MIC, 30 major groups of industries are chosen out of 129 sub-industries. The proportional change in relative wage is ascribed to three distinct effects, namely distributional, differential and industrial ranking effects. The present paper found that during the overall period, there was a clear trend of skill widening ascribed mainly to distribution of skill among sub-industries while skill differences within sub-industry seem to be unimportant. Among all the industries, electrical machinery industry seems to be the most important industry that caused major skill differentials.

ABSTRAK

Kertas kajian ini bertujuan untuk mengukur nisbah perubahan dalam upah dan kesan perubahan struktur industri ke atas penggunaan pekerja mahir dalam industri pembuatan di Malaysia dalam tempoh 1974-1996. Dengan menggunakan klasifikasi MIC 5-digit, 30 kumpulan utama industri dipilih daripada 129 sub-industri. Terdapat tiga kesan yang menyebabkan perubahan nisbah upah relatif, iaitu, kesan pengagihan, kesan perbezaan dan kesan susunan industri. Kajian ini mendapati dalam jangka masa keseluruhan telah berlaku trend yang nyata dalam perbezaan upah, berpunca daripada pengagihan kemahiran di kalangan sub-industri manakala perbezaan kemahiran dalam sesuatu industri adalah kurang penting. Antara industri yang dikaji industri mesin elektrik nampaknya merupakan industri yang penting yang telah menyebabkan perbezaan yang nyata dalam keseluruhan industri pembuatan.

INTRODUCTION

Measured by proportional changes in salaries and wages, the present paper attempts to look at wage differentials, and the impact of changing industrial structure on the employment of skilled and unskilled workers in the Malaysian manufacturing industries during 1974-96. Based on the method employed by Zabalza and Tzannatos (1985), skill is defined into four categories of occupation: technician, supervisor, and skilled and semi-skilled workers. Specifically, the present paper attempts to calculate the share of industrial employment, proportional changes of skilled workers among industries, relative wage of skilled over unskilled workers among industries and their proportional changes, and industrial share of wage in unskilled workers and their proportional changes.

OVERVIEW OF MALAYSIAN ECONOMY, 1960s-1990s

The decades of the 60s to the 90s saw the Malaysian economy undergoing a significant structural change and a remarkable growth, which were ascribed to many factors such as a generous supply of natural resources, particularly oil and gas reserve and arable land and the country's outward-oriented trade strategy. Like other developing countries, Malaysia too adopted industrialization strategy as its major goal of economic development, embarking soon after its independence in 1957.

Development of the manufacturing sector during the 60s and 70s, to a large extent, reflects the country's comparative advantage, which was attributed to an abundant supply of natural resources. During her infancy stage of industrialisation, almost all of the manufacturing activities were rather rudimentary, gearing towards simple processing of natural resources and manufacture of simple consumer goods for domestic consumption. In the 1970s, the sector has already become the leading growth sector for the economy and the main pillar for achieving the objective of the National Economic Plan¹. During this period, textiles (21 per cent), electrical machinery appliances (20.7 per cent) and wood products (16.9 per cent) industries were important because they contributed to a rapid overall output growth. Other industries such as rubber products (14.5 per cent), transport equipment (14.9 per cent) and metal product (11.9 per cent) also contributed substantially to output increase. Figures in parentheses are annual growth rates².

Launching the First Industrial Master Plan in 1985, public sector plan-

ners not only focused on the development of priority industries within the manufacturing sector but also stressed on the importance of export-oriented activities. Promulgated in 1996, the Second Industrial Master Plan adopted a rather different approach, a cluster-based approach where key industries were linked to their second-tier supplier industries and third-tier foundations³.

Certainly the principle strategies and incentives adopted in the development of the sector affected not only the industry's product mix but also its market orientation. Consequently, the economy grew at an average annual rate of 7.7 percent between 1971 and 1998. Most of the early increase in its output took place in the primary and export-oriented industries.

Employment performance of the sector was impressive too as its share to total employment expanded very rapidly by 8.6 percent per annum between 1985 and 1990⁴. Consequently, the labor market underwent dramatic structural changes. During the early 1990s, as the unemployment rate fell below its natural level, average real monthly wage began to increase, for example, between 1991 and 1993, real monthly wage rose by 3.7 per cent per annum.

Wage and Skill Differential

Pay level distinguishes the relative value and position of a worker. Since wages touch at the very centre of an important economic variable, interest in the levels and differences in wages have received special attention not only among economists but also politicians. Can wage be used as a proxy to determine skill level? Following Lary's (1968) proposition that each wage and non-wage value-added can be used as a proxy to factor intensities (i.e., value-added per employee can be used as an indirect measurement of capital intensity) wage will have a direct and important relationship with human capital or skill levels. Although this proposition as applied in the developing countries has been proven elsewhere in the economic literature (Nyaw, 1979 and Mohammed Sharraf, 2001), in the present paper we have adopted result presented by Mohammed Sharraf (2001).

By regressing wages and salaries per employee (W/Em) in the proportion of skilled labour in total employment (SL/L) in 1994⁵, he proved that there is a positive and significant relationship between wages and salaries per employee and the proportion of skilled labour in total employment with the t value at 1% level of significance. Wage gaps, however, remain large between different skill categories. According to

World Bank Report 1994, a larger increase in real wage among semi-skilled and unskilled workers in Malaysia occurred during 1985-1993 period reflects a stronger tendency for investment in less skill intensive activities. We shall verify this statement later in this paper.

LITERATURE REVIEW

Keynes was amongst the earliest economists who discussed the significance of relative wages or wage differentials in the labour market. He argued that concern over wage differential could give rise to a situation in which the real wage would be slow to fall even in the face of significant involuntary unemployment. Over recent years, the potential significance of wage differential has been discussed in a number of New Keynesian models of wage and price behaviour. Demographic characteristic of workers in similar occupations explain only a portion of the wage differences among industries.

Competitive theories of the labor market imply that job characteristic which does not affect the utility of workers should not affect their wages. Substantial evidence exists however, that workers with identical observable characteristics employed in jobs with identical observable characteristics actually receive different wages depending on the industry in which they are employed. These inter-industry wage differentials have received a great deal of attention in recent years because they have been viewed as supporting evidence for efficiency wage theories. These theories predict that, because of the characteristics of their industry (such as market structure or the production process), some firms find it profitable to pay their worker's wages above the going rate. There are, however, potential competitive explanations for inter-industry wage differentials. First, they may be due to unobserved differences in worker quality between industries. Second, they may be due to differences in job characteristics among industries that generate compensating wage differentials.

Krueger and Summers (1988) present evidence that controlling for unobserved worker heterogeneity does not eliminate inter-industry wage differentials. Murphy, Kerin and Topel (1987) and Abowd and Ashenfelter (1981) agree that industry differences in the probability and duration of unemployment cannot fully explain these differentials, either. According to Keane (1993) a fundamental problem with any attempt to prove that industry wage differentials are incompatible with competitive theory is that, while fixed effect estimators can be used to control for unobserved worker heterogeneity, it is impossible to control for unobserved job characteristics. Therefore, competi-

tive explanation for industry wage differentials based upon unobservable job characteristics and tastes can never be ruled out. In light of this problem, a more fruitful approach for testing efficiency wage theory is to ask, not whether unexplained wage differentials exist, but whether these unexplained differentials behave in a manner consistent with the theory.

Causes of Wage Differential

The existence of large wage differentials across industries after controlling for worker characteristics is well documented (Dickens and Kats, 1987). An alternative explanation based on competitive market theory is that differentials are caused by unmeasured skills, i.e., skill differences observable to employers and workers, but not captured by worker-specific variables and directly unobservable to researchers. Several studies have examined the inter-industry wage differentials using fixed effects models (Murphy, Kerin and Topel, 1987; Krueger and Summers, 1988; Gibbons and Kats, 1992; Keane, 1993). Several of these studies have found evidence with first differenced models that support the unmeasured-skill hypothesis.

Previous study by Osburn (2000) shows that the causal connections between industry wage differentials and industry characteristics such as capital intensity and industry concentration are not fully understood. According to Osburn (2000), skill level is the main cause of the wage differentials. Some of the wage level differences among industries are explained by differing levels of skill required of workers employed in given occupations. Photographers are an example of an occupation for which skill levels vary greatly among industries.

METHODOLOGY

The present paper uses a technique suggested by Zabalza and Tzannatos (1985) to distinguish the contribution of changes in industrial structure to the annual changes in the skill differential occurring over a period of time. It enables us to distinguish changes in the distribution of employment among industries, changes in the position of the industry and changes in the differential that are due to 'pure' changes in the differential within each industry.

The authors suggested that the differential between the average wages of skilled labour (W_s) and those of unskilled labour (W_{unsk}) be written as:

$$W_s / W_{unsk} = \sum_i^n F_i W_{si} / W_{unsk} \quad (1)$$

where F_i represents the weight given to industry i , W_{si} represents the salaries and wages of skilled labour in that industry in that same year, and W_{unsk} represents the salaries and wages of unskilled workers in the entire manufacturing industry in that year. It follows from equation (1), that

$$W_s / W_{unsk} = \sum_i^n F_i (W_{si} / W_{unski}) (W_{unski} / W_{unsk}) \quad (2)$$

and

$$R = \sum_i^n F_i R_i S_i$$

Where;

$$R = W_s / W_{unsk}$$

$$R_i = W_{si} / W_{unski} \quad \text{and}$$

$$S_i = W_{unski} / W_{unsk} \quad (3)$$

Thus F_i measures the share of the total skilled labour accounted for industry i , R_i measures the relative wage of skilled and unskilled labour and S_i measures the industrial share of wage in the unskilled labour category. Hence, the position of this industry relative to the all industry wage structure is measured by reference to the ratio of unskilled labour earnings to the average earning of unskilled labour in all industries. From equation (3) it can be shown that the proportional changes in the differential for skilled labour can be decomposed into proportional changes in each of the three effects distinguished above.

That is:

$$R = \sum_i^n K_i F_i + \sum_i^n K_i R_i + \sum_i^n K_i S_i + \text{residual} \quad (4)$$

Where:

$R = \Delta R / R$ - Measures the proportional change in relative wage of skilled over unskilled workers for the whole manufacturing industry in a given period

(4.1)

$$F_i = \Delta F_i / F_i - \text{Measures the proportional change in industrial structure (mix) in a given period.} \quad (4.2)$$

$$R_i = \Delta R_i / R_i - \text{Measures the proportional change in relative wage of skilled over unskilled in industry } i \text{ in a given period.} \quad (4.3)$$

$$S_i = \Delta S_i / S_i - \text{Measures the proportional change in industrial share of wage of unskilled in industry } i \text{ in a given period.}$$

$$K_i = F_i R_i S_i / R - \text{Measure the relative wage of skilled over unskilled in industry } i \text{ compared to that of the whole manufacturing industry.} \quad (4.5)$$

In estimating the above expressions ((4.1) to (4.5)), ideally we would prefer to use base year weighted average index (Laspeyres Index). However due to incomplete data in the base year, we have used terminal year weighted average index (Paasche Index) instead.

In equation (4),

$$\sum_{i=1}^n K_i F_i \text{ measures the degree to which the proportional changes in the differential for skilled labour is due to changing distribution of skilled labour between industries.}$$

$$\sum_{i=1}^n K_i R_i \text{ distinguishes that part of changes in the differential which is attributed to changes in the differential within each industry.}$$

and

$$\sum_{i=1}^n K_i S_i \text{ distinguishes that part which is due to changes in the ranking of industries in the earnings league.}$$

This study covers 129 sub-industries at 5-digit level of Malaysian Industrial Classification, which is aggregated into 30 major groups⁶. Unpublished employment (number of person engaged) and salaries and wages data were compiled from the Department of Statistics for three different periods, 1974, 1986 and 1996. The present study used classification of labour by different categories of employment adopted from the Census of Industrial Manufacturing (Refer Table 2).

The study covers an overall period from 1974 to 1996, which was divided into two sub-periods; 1974-86 and 1986-96. The former covers a period when the economy was about to experience a shift in industrial strategy from import substitution to export oriented strategies while the later covers the First Industrial Master Plan (IMP) period, which was more export oriented and emphasizing on inter-industrial linkages.

Table 1
Malaysia Industrial Classification

MIC Three-digit and Five-digit Classification	
Code	Industry Description
31110, 31121, 31129	Dairy Product
31131, 31139, 31140	Vegetable & Fruit
31151-31153, 31159	Oil & Fats
31162-31164, 31169	Grain Mill
31171-31172, 31190	Baker Conf
31180, 31211-31219	Other Foods
31220	Animal Feed
	Beverages
	Tobacco
321	Textiles
	Furniture Fixture
	Paper Printing
351	Industrial Chemicals
35210	Paints etc.
352	Other Chemical Products
353-354	Petroleum Product
35591-35592	Rubber Processing
355	Rubber Prod
356	Plastic Prod
361-362, 36910	Glass Prod
36921-36922	Cement
36991-36992, 36999	Non-Metallic
371-372, 38111-38120, 38130	Basic Metal
38191-38193, 38199	Other Metal
382	Non-Electrical Machinery
383	Electrical Machinery
38431-38432, 38439	Motor Vehicles
38410, 38441, 38449, 38420	
38450, 38490,	Other Transport
385, 390	Other Manufacturing Product.

Source: Malaysia (1996). Manufacturing Industrial Survey.

Table 2
Classification of Occupation Groups

Scale	Category of Skill
I	Professional
II	Non-Professional
III	Supervisor
IV	Technical
V	Skilled Workers
VI	Semi-skilled Workers
VII	Unskilled Workers
VIII	Other Workers

Source: Malaysia (1996). Manufacturing Industrial Survey.

RESULT AND DISCUSSION

Overall Period 1974-1996

Generally, during the overall period of 1974-96 the present paper found that there was clear evidence of a widening of skill differential in the Malaysian manufacturing sector. Equation (4) decomposes changes in skill differential in the manufacturing industry into three components, namely, distribution effect, differential effect and industrial ranking effect. While distribution effect refers to changes in the distribution of skilled workers among industries, the differential effect refers to changes in wage differential within industries and industrial ranking effect refers to changes in the ranking of industries in the earnings league.

Specifically, the results show that during the overall period, the proportional change in the differentials for technicians, supervisors, skilled and semi-skilled relative to unskilled workers were 1.068, 1.087, 1.088 and 1.192, respectively, implying widening of earning gaps.⁷

Comparing the three effects, distribution effect contributed more than one-half of the widening of the differentials, followed by industrial ranking effect, while differential effect contributed the least. This implies that the widening of differentials was attributed considerably to the changing distribution of technicians, supervisors, and skilled, semi-

Table 3
Decomposition of the Proportional Change in Skill Differential over
the Period 1974-96 by Industry

No	Industry	Distribution Effect				Differential Effect				Industry Ranking Effect			
		Tech	Super- visor	Skill- ed	Semi- skilled	Tech	Super- visor	Skill- ed	Semi- skilled	Tech	Super- visor	Skill- ed	Semi- skilled
1	Dairy												
	Products	-0.001	-0.001	-0.001	-0.001	0.002	0.001	0.005	0.000	-0.001	-0.001	-0.001	-0.001
2	Veg.Fruit	-0.005	-0.003	-0.004	-0.004	0.004	-0.001	0.000	0.000	-0.001	-0.001	-0.001	-0.001
3	Oil & Fats	-0.004	-0.005	-0.005	-0.000	-0.001	0.002	0.006	0.003	-0.001	-0.001	-0.002	-0.002
4	Grain Mill	-0.004	-0.004	-0.004	-0.003	0.002	0.002	0.001	-0.002	0.000	0.000	0.000	0.000
5	Baker Conf	-0.005	-0.003	-0.005	-0.005	-0.002	-0.003	0.004	0.003	0.006	0.004	0.006	0.005
6	Other Foods	0.003	0.002	0.003	0.002	0.006	0.002	0.007	0.000	0.001	0.001	0.001	0.001
7	Animal Feed	-0.001	-0.001	-0.001	-0.001	0.000	0.000	0.000	-0.001	0.001	0.001	0.001	0.001
8	Beverages	-0.003	-0.003	-0.002	-0.003	-0.002	-0.002	-0.001	0.025	0.000	0.000	0.000	0.000
9	Tobacco	-0.009	-0.003	-0.011	-0.003	0.042	0.009	0.065	0.014	-0.007	-0.002	-0.008	-0.002
10	Textiles	-0.021	-0.026	-0.022	-0.021	-0.015	-0.009	0.005	-0.006	0.011	0.014	0.011	0.011
11	Wearing												
	Apparel	0.001	0.001	0.001	0.001	-0.007	-0.007	0.010	0.001	0.012	0.009	0.012	0.014
12	Sawmills	-0.034	-0.030	-0.039	-0.032	0.028	0.005	0.035	-0.019	-0.008	-0.007	-0.009	-0.007
13	Furniture												
	Fixture	0.006	0.004	0.007	0.006	-0.008	-0.001	-0.004	-0.011	0.007	0.004	0.008	0.007
14	Paper												
	Printing	-0.010	-0.009	-0.010	-0.009	0.004	0.001	0.010	0.011	-0.015	-0.013	-0.015	-0.014
15	Indus.												
	Chemicals	-0.002	-0.003	-0.003	-0.003	0.004	0.034	0.014	0.014	0.004	0.006	0.005	0.004
16	Paints Ets	-0.001	-0.001	-0.001	-0.001	0.001	0.002	0.003	0.001	-0.001	-0.002	-0.001	-0.001
17	Other Chemicals.												
	Prod	-0.005	-0.007	-0.007	-0.006	-0.003	0.001	0.001	0.001	0.001	0.002	0.002	0.002
18	Petroleum												
	Prod	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.001	-0.001	0.000
19	Rubber												
	Processing	-0.003	-0.004	-0.003	-0.003	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
20	Rubber												
	Prod.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.005	0.003	0.004
21	Plastic												
	Prod	0.034	0.037	0.040	0.038	-0.009	-0.001	0.014	-0.002	0.015	0.017	0.018	0.017
22	Glass Prod	-0.019	-0.015	-0.007	-0.007	0.161	0.107	0.004	-0.003	0.005	0.004	0.002	0.002
23	Cement	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.001	-0.001	-0.001	-0.001
24	Non-												
	Metallic	0.012	0.015	0.018	0.016	-0.004	0.007	0.014	0.010	-0.002	-0.003	-0.003	-0.003
25	Basic Metal	-0.001	-0.001	-0.002	-0.002	-0.007	0.001	0.012	-0.006	0.001	0.001	0.001	0.001
26	Other Metal	0.008	0.008	0.010	0.009	0.001	0.001	0.017	0.007	-0.002	-0.002	-0.002	-0.002
27	Non- Electrical												
	Machinery	-0.010	-0.011	-0.013	-0.010	-0.018	0.005	-0.014	-0.030	0.032	0.037	0.042	0.034
28	Electrical												
	Machinery	0.789	0.851	0.678	0.838	0.028	-0.086	0.060	0.188	0.147	0.159	0.127	0.156
29	Motor												
	Vehicles	-0.005	-0.005	-0.006	-0.006	-0.001	0.005	0.013	-0.011	-0.004	-0.005	-0.006	-0.005
30	Other												
	Transport	0.002	0.002	0.003	0.002	0.001	0.004	0.006	-0.004	0.000	0.000	0.000	0.000
Total		0.712	0.782	0.612	0.788	0.152	0.081	0.287	0.184	0.204	0.224	0.189	0.220
<i>Total Effect</i>													
All Industries													
and services		1.068		1.087		1.088		1.192					

Source : Computed from equation (4)

skilled and unskilled workers among industries. Combining both distribution and industrial ranking effects would have led to a widening of the differentials for technicians, supervisors, and skilled and semi-skilled workers of 0.916, 1.006, 0.801 and 1.008, respectively, between 1974 and 1996.

Among all the industries, electrical machinery predominated the occurrence of widening of differentials. Over the period, the proportional change in differentials was 0.789, 0.851, 0.678 and 0.838 for technician, supervisors, skilled and semi-skilled relative to unskilled workers respectively. This implies that in 1996 the industry employed a lot more technician, supervisor, and skilled and semi-skilled workers relative to 1974. Proportional change in industrial structure in each industry in 1974 was smaller (10.13 per cent) compared to that in 1996 (33.40 per cent).

In terms of distribution effect, the industry contributed significantly to the differentials in the overall manufacturing industry. It is interesting to note that the negative differential effect, which captures the effect of changes in wage differential within an industry, shown in table 3 for electrical and electronic industry in the technician and supervisor categories of workers has led to a smaller widening of the overall wage differentials. This implies that the relative wage in these two categories of workers has indeed fallen during this period. The respective changes in differentials within each industry (R_i) for technician, supervisor, skilled and semi-skilled categories of workers in 1996 were 2.77, 1.51, 1.24, 1.11 per cent and are smaller than those in 1974. The respective R_i for 1974 were 3.56, 2.20, 1.56 and 1.15 per cent. In the present paper, we have attempted to remove the anomalous effect of electrical machinery industry on the entire manufacturing industry, with the result as presented in Table 4. The table shows that there is still clear evidence of a widening of wage differentials during the period but smaller, about one-half, than that with the inclusion of the electrical machinery industry. The table also sets out that the differential effect (changes in wage differential within industries) contributed a large proportion to the overall differentials. The respective proportional changes of differential effect at 0.274, 0.264, 0.322 and -0.007 outweigh those of the distribution and industrial ranking effects for technicians, supervisors, skilled and semi-skilled categories of workers between 1974 and 1996.

Sub Period 1974-86

By decomposing the proportional changes in skill differentials during the sub-period 1974-86, the paper found that there was a trend of wid

Table 4
Decomposition of the Proportional Change in Skill Differential over
the Period 1974-96 by Industry, Without Electrical Machinery

No	Industry	Distribution Effect				Differential Effect				Industry Ranking Effect			
		Tech	Super- visor	Skill- ed	Semi- skilled	Tech	Super- visor	Skill- ed	Semi- skilled	Tech	Super- visor	Skill- ed	Semi- skilled
1	Dairy												
	Products	0.001	0.001	0.002	0.002	0.003	0.002	0.006		-0.002	-0.002	-0.002	-0.002
2	Veg.Fruit	-0.006	-0.004	-0.004	-0.005	0.006	-0.001	0.000	0.000	-0.001	-0.001	-0.001	-0.001
3	Oil & Fats	-0.001	-0.001	-0.001	-0.001	-0.002	0.004	0.009	0.005	-0.002	-0.002	-0.002	-0.002
4	Grain Mill-	0.005	-0.005	-0.005	-0.005	0.004	0.003	0.001	-0.003	-0.001	-0.001	0.000	0.000
5	Baker Conf	-0.002	-0.001	-0.002	-0.002	-0.004	-0.005	0.006	0.005	0.009	0.006	0.009	0.009
6	Other Foods	0.013	0.008	0.012	0.009	0.009	0.003	0.009	-0.001	0.002	0.001	0.002	0.001
7	Animal Feed	-0.001	-0.002	-0.001	-0.001	0.000	-0.001	0.000	-0.001	0.001	0.001	0.001	0.001
8	Beverages	-0.003	-0.003	-0.003	-0.004	-0.003	-0.003	-0.002	0.040	0.000	0.000	0.000	0.000
9	Tobacco	-0.013	-0.004	-0.013	-0.003	0.064	0.014	0.092	0.022	-0.011	-0.003	-0.012	-0.003
10	Textiles	-0.024	-0.031	-0.023	-0.025	-0.022	-0.014	0.008	-0.009	0.017	0.021	0.016	0.017
11	Wearing												
	Apparel	0.024	0.019	0.024	0.030	-0.010	-0.012	0.014	0.002	0.018	0.014	0.018	0.022
12	Sawmills	-0.034	-0.031	-0.036	-0.033	0.042	0.009	0.050	-0.031	-0.012	-0.011	-0.012	-0.012
13	Furniture												
	Fixture	0.024	0.016	0.026	0.025	-0.012	-0.002	-0.005	-0.017	0.010	0.007	0.011	0.011
14	Paper												
	Printing	-0.002	-0.002	-0.002	-0.002	0.006	0.001	0.014	0.018	-0.022	-0.021	-0.022	-0.021
15	Indus.												
	Chemicals	0.005	0.009	0.006	0.007	0.006	0.053	0.019	0.023	0.006	0.009	0.007	0.007
16	Paints Ets	0.000	0.000	0.000	0.000	0.001	0.004	0.004	0.001	-0.001	-0.002	-0.002	-0.002
17	Other Chemi-												
	cals. Prod	-0.005	-0.008	-0.007	-0.007	-0.005	0.002	0.001	0.001	0.002	0.003	0.002	0.002
18	Petroleum												
	Prod	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.001	-0.001	-0.001	-0.001
19	Rubber												
	Processing	-0.004	-0.007	-0.004	-0.004	0.000	0.001	0.001	0.000	0.000	0.001	0.000	0.000
20	Rubber Prod.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.008	0.005	0.006
21	Plastic Prod	0.092	0.103	0.100	0.108	-0.014	-0.002	0.020	-0.004	0.023	0.026	0.026	0.027
22	Glass Prod	-0.002	-0.002	-0.001	-0.001	0.245	0.170	0.005	-0.004	0.008	0.007	0.003	0.003
23	Cement	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.001	-0.002	-0.002	-0.002
24	Non-Metallic	0.034	0.042	0.045	0.046	-0.006	0.012	0.019	0.015	-0.003	-0.004	-0.005	-0.005
25	Basic Metal	0.020	0.017	0.025	0.024	-0.010	0.001	0.017	-0.009	0.001	0.001	0.002	0.002
26	Other Metal	0.035	0.036	0.038	0.039	0.002	0.002	0.024	0.011	-0.003	-0.003	-0.003	-0.003
27	Non- Electrical												
	Machinery	0.007	0.008	0.008	0.008	-0.027	0.008	-0.019	-0.047	0.049	0.059	0.059	0.054
28	Electrical												
	Machinery												
29	Motor												
	Vehicles	0.004	0.004	0.005	0.005	-0.001	0.008	0.018	-0.018	-0.007	-0.007	-0.008	-0.008
30	Other												
	Transport	0.012	0.012	0.013	0.013	0.002	0.006	0.008	-0.006	0.000	0.000	0.000	0.000
Total		0.169	0.176	0.205	0.223	0.274	0.264	0.322	-0.007	0.087	0.104	0.089	0.101
Total Effect													
All Industries													
and Services		0.53		0.544		0.616		0.317					

Source : Computed from equation (4)

ening of skill gap⁸, which is attributed mainly by changes in the dis-
tribution of workers among industries and changes in wage differen-

tial within an industry, especially in the semi-skilled category. During this period, changes in the distribution of skill workers among industries attributed to more than one-half of the overall differentials in three categories of workers (supervisors, skilled and semi-skilled) except in the technician category. In certain categories of workers the overall differentials caused by changes in wage differentials within an industry were particularly large, for example in the semi-skilled category (0.303). It is important to note that changes in the ranking of industries in the earnings league recorded at -0.058, -0.057, -0.054 and -0.043 for technician, supervisors, skilled and semi skilled workers, respectively have indeed dampened the widening of overall skill differentials.

Sub Period 1986-1996

Table 6 reveals the decomposition of differentials for technician, supervisor, skilled and semi-skilled categories of workers over the sub-period 1986-96, showing the respective proportional change of 0.496, 0.408, 0.761, 0.471. Together, changes in both ranking of industries in the earning league and distribution of skill workers among industries have significantly caused the widening of skill differentials during the period. In aggregate, changes in the ranking of industries in the earning league at 0.204, 0.224, 0.189 and 0.220 outweigh those of the distribution of skill among industries at 0.192, 0.211, 0.180 and 0.214, respectively in all the four categories of workers. However, changes in wage differential within an industry was quite large, especially in skilled category where it contributed about 51.5 per cent of the widening of skilled differentials over the period 1986-96.

Electrical machinery industry was an anomalous example. A change in the share of total employment in the industry would, *ceteris paribus*, have led to an increase in skill differentials for technician, supervisor, skilled and semi-skilled categories of workers to 0.199, 0.215, 0.171 and 0.211 respectively. In other cases, it shows a negative trend in the skill differentials to -0.076, -0.116, -0.061 and -0.013 respectively. This also implies that electrical machinery industry was paying its unskilled workers higher wages compared to other industries. This observation is consistent with our earlier observation regarding the differentials due to changes in wage differential within an industry.

Table 5
Decomposition of the Proportional Change in Skill Differential over
the Period 1974-86 by Industry

No	Industry	Distribution Effect				Differential Effect				Industry Ranking Effect			
		Tech	Super- visor	Skill- ed	Semi- skilled	Tech	Super- visor	Skill- ed	Semi- skilled	Tech	Super- visor	Skill- ed	Semi- skilled
1	Dairy												
	Products	0.009	0.008	0.011	0.009	0.000	0.000	0.002		-0.001	-0.001	-0.001	-0.001
2	Veg.Fruit	-0.004	-0.002	-0.004	-0.003	0.001	-0.002	-0.001	-0.004	0.000	0.000	0.000	0.000
3	Oil & Fats	0.031	0.036	0.035	0.035	-0.007	0.005	0.001	-0.004	0.000	0.000	0.000	0.000
4	Grain Mill	-0.003	-0.003	-0.004	-0.023	-0.001	0.000	0.001	0.191	0.002	0.002	0.003	0.015
5	Baker Conf	-0.001	-0.001	-0.001	-0.001	0.005	0.003	0.005	0.007	-0.004	-0.003	-0.003	-0.003
6	Other Foods	0.032	0.022	0.035	0.021	0.010	0.010	0.017	-0.001	0.000	0.000	0.000	0.000
7	Animal Feed	0.001	0.001	0.002	0.001	-0.001	-0.001	0.002	-0.002	0.000	0.000	0.000	0.000
8	Beverages	0.005	0.005	0.006	0.003	-0.007	-0.007	-0.005	0.019	0.013	0.013	0.018	0.009
9	Tobacco	-0.013	-0.014	-0.014	-0.008	0.022	0.114	0.030	0.058	-0.009	-0.010	-0.009	-0.006
10	Textiles	-0.018	-0.019	-0.015	-0.016	-0.020	-0.010	0.001	-0.008	0.011	0.011	0.009	0.010
11	Wearing												
	Apparel	0.029	0.031	0.030	0.032	-0.008	0.013	0.011	-0.002	-0.002	-0.002	-0.002	-0.002
12	Sawmills	-0.030	-0.029	-0.042	-0.040	-0.003	-0.005	0.024	-0.029	-0.012	-0.012	-0.017	-0.016
13	Furniture												
	Fixture	-0.003	-0.002	-0.004	-0.004	-0.003	0.004	0.001	-0.005	-0.002	-0.001	-0.002	-0.002
14	Paper												
	Printing	-0.018	-0.023	-0.020	-0.016	-0.006	0.016	0.003	0.001	0.002	0.003	0.003	0.002
15	Indus.												
	Chemicals	-0.001	-0.001	-0.001	-0.001	0.001	0.005	0.006	0.007	-0.006	-0.006	-0.007	-0.007
16	Paints Ets	0.000	0.000	0.000	0.000	0.000	0.000	0.001	-0.001	0.000	0.000	0.000	0.000
17	Other Chemi-												
	cals. Prod	-0.003	-0.004	-0.003	-0.003	-0.002	0.007	0.001	0.001	0.000	0.000	0.000	0.000
18	Petroleum												
	Prod	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
19	Rubber												
	Processing	-0.010	-0.011	-0.004	-0.002	0.001	-0.004	-0.005	-0.004	-0.004	-0.005	-0.002	-0.001
20	Rubber Prod.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
21	Plastic Prod	0.010	0.011	0.010	0.009	-0.004	0.005	0.006	-0.004	-0.003	-0.003	-0.003	-0.003
22	Glass Prod	-0.005	-0.004	-0.005	-0.005	0.004	0.002	0.000	-0.004	-0.001	-0.001	-0.001	-0.001
23	Cement	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
24	Non-Metallic	0.018	0.017	0.025	0.026	-0.006	0.002	0.011	0.014	-0.001	-0.001	-0.001	-0.001
25	Basic Metal	-0.003	-0.002	-0.003	-0.003	-0.004	0.014	0.006	-0.010	-0.007	-0.006	-0.008	-0.007
26	Other Metal	-0.001	-0.001	-0.001	-0.001	-0.002	0.001	0.007	0.000	0.001	0.001	0.001	0.001
27	Non- Electrical												
	Machinery	-0.016	-0.013	-0.021	-0.019	-0.001	0.006	0.006	-0.009	-0.001	-0.001	-0.002	-0.002
28	Electrical												
	Machinery	0.247	0.271	0.208	0.207	0.040	0.030	0.099	0.109	-0.034	-0.037	-0.029	-0.029
29	Motor												
	Vehicles	-0.010	-0.009	-0.001	-0.015	-0.003	0.001	-0.002	-0.010	0.000	0.000	0.000	0.000
30	Other												
	Transport	0.004	0.004	0.005	0.003	0.001	0.008	0.005	-0.006	0.001	0.001	0.001	0.001
Total		0.247	0.266	0.223	0.187	0.007	0.216	0.231	0.303	-0.058	-0.057	-0.054	-0.043
Total Effect													
All Industries													
and Services		0.196	0.425		0.4		0.447						

Source : Computed from equation (4)

Table 6
Decomposition of the Proportional Change in Skill Differential Over
the Period 1986-96 by Industry

Distribution Effect		Differential Effect				Industry Ranking Effect							
No	Industry	Tech	Super- visor	Skill- ed	Semi- skilled	Tech	Super- visor	Skill- ed	Semi- skilled	Tech	Super- visor	Skill- ed	Semi- skilled
1	Dairy												
	Products	-0.003	-0.003	-0.004	-0.003	0.002	0.002	0.003	0.003	-0.001	-0.001	-0.001	-0.001
2	Veg.Fruit	-0.004	-0.002	-0.003	-0.003	0.003	0.001	0.001	0.004	-0.001	-0.001	-0.001	-0.001
3	Oil & Fats	-0.008	-0.010	-0.011	-0.011	0.001	0.001	0.006	0.005	-0.001	-0.001	-0.002	-0.002
4	Grain Mill	-0.003	-0.003	-0.003	-0.003	0.003	0.002	0.001	-0.004	0.000	0.000	0.000	0.000
5	Baker Conf	-0.005	-0.003	-0.005	-0.004	-0.004	-0.004	0.000	-0.002	0.006	0.004	0.006	0.005
6	Other Foods	-0.007	-0.004	-0.006	-0.004	0.000	-0.002	-0.001	0.000	0.001	0.001	0.001	0.001
7	Animal Feed	-0.001	-0.002	-0.002	-0.002	0.000	0.000	0.000	0.001	0.001	0.001	0.001	0.001
8	Beverages	-0.003	-0.003	-0.003	-0.003	0.001	0.001	-0.001	0.005	0.000	0.000	0.000	0.000
9	Tobacco	0.000	0.000	0.000	0.000	0.012	-0.002	0.016	-0.001	-0.007	-0.002	-0.008	-0.002
10	Textiles	-0.014	-0.017	-0.014	-0.014	-0.002	-0.001	0.005	0.000	0.011	0.014	0.011	0.011
11	Wearing												
	Apparel	-0.013	-0.010	-0.014	-0.016	-0.001	-0.012	0.001	0.003	0.012	0.009	0.012	0.014
12	Sawmills	-0.008	-0.007	-0.009	-0.008	0.032	0.011	0.014	0.001	-0.008	-0.007	-0.009	-0.007
13	Furniture												
	Fixture	0.013	0.009	0.016	0.014	-0.004	-0.005	-0.005	-0.006	0.007	0.004	0.008	0.007
14	Paper Printing	0.006	0.005	0.006	0.005	0.010	-0.006	0.007	0.010	-0.015	-0.013	-0.015	-0.014
15	Indus.												
	Chemicals	-0.001	-0.001	-0.001	-0.001	0.003	0.018	0.005	0.004	0.004	0.006	0.005	0.004
16	Paints Ets	0.000	-0.001	-0.001	-0.001	0.001	0.002	0.002	0.003	-0.001	-0.002	-0.001	-0.001
17	Other Chemi- cals. Prod	-0.005	-0.006	-0.006	-0.005	-0.003	-0.002	0.000	0.000	0.001	0.002	0.002	0.002
18	Petroleum Prod	-0.002	-0.002	-0.003	-0.002	0.000	0.002	0.005	0.003	0.000	-0.001	-0.001	0.000
19	Rubber												
	Processing	-0.003	-0.004	-0.002	-0.003	0.000	0.001	0.003	0.010	0.000	0.000	0.000	0.000
20	Rubber Prod.	0.001	0.001	0.000	0.000	0.003	0.000	-0.001	0.009	0.004	0.005	0.003	0.004
21	Plastic Prod.	0.014	0.015	0.017	0.016	-0.005	-0.007	0.004	0.006	0.015	0.017	0.018	0.017
22	Glass Prod	-0.009	-0.007	-0.003	-0.003	0.134	0.096	0.004	0.001	0.005	0.004	0.002	0.002
23	Cement	-0.002	-0.003	-0.003	-0.003	0.001	0.002	0.002	0.001	-0.001	-0.001	-0.001	-0.001
24	Non-Metallic	-0.001	-0.001	-0.001	-0.001	0.002	0.005	0.003	0.000	-0.002	-0.003	-0.003	-0.003
25	Basic Metal	0.001	0.001	0.001	0.001	-0.004	-0.008	0.006	0.006	0.001	0.001	0.001	0.001
26	Other Metal	0.009	0.009	0.011	0.010	0.003	0.000	0.007	0.008	-0.002	-0.002	-0.002	-0.002
27	Non- Electrical Machinery	0.032	0.037	0.042	0.034	-0.016	-0.006	-0.020	-0.022	0.032	0.037	0.042	0.034
28	Electrical Machinery	0.199	0.215	0.171	0.211	-0.076	-0.116	-0.061	-0.013	0.147	0.159	0.127	0.156
29	Motor Vehicles	0.011	0.011	0.014	0.013	0.003	0.003	0.386	-0.004	-0.004	-0.005	-0.006	-0.005
30	Other Transport	-0.001	-0.001	-0.001	-0.001	0.000	-0.002	0.001	0.005	0.000	0.000	0.000	0.000
Total		0.193	0.211	0.180	0.214	0.099	-0.027	0.392	0.037	0.204	0.224	0.189	0.220
Total Effect													
All Industries and Services		0.496		0.408		0.761		0.471					

Source : Computed from equation (4)

CONCLUSION

This paper investigates empirically the proportional changes in salaries and wages and the impact of changing industrial structure on skilled and unskilled workers in the manufacturing industries during 1974-96. The results of the present paper show that there was evi-

dence of a widening of skill gap during the overall period of 1974-96. Worsening of skill gap occurred in the technician and skilled categories of workers, as their proportional changes in skill differential got bigger over the two sub-periods⁹. Changes in skill differentials are ascribed to three effects, namely that part due to (1) changes in the distribution of skilled workers among industries, (2) changes in wage differential within an industry, and (3) changes in the ranking of industries in the earnings league.

In general, changes in the distribution of skilled workers among industries was found to be the most important factor contributing to the widening of overall skill differentials, while changes in the ranking of industries in the earnings league ranked second and changes in wage differential within an industry ranked third. It is worth noting that that part of proportional change in the skill differentials due to changes in wage differential within an industry, though not as important as that due to changes in the distribution of wages among industries, was still quite dominant. This is particularly so in the earlier sub-period compared to the later sub-period in the semi-skilled category. This indicates that the worsening of skill differentials over the whole period was not due to changes in skill differential within an industry but rather by changes in the distribution of skills among industries. The findings lead us to two important implications. Firstly, the industry product mix was rather too concentrated, particularly in the product of electrical machinery, to an extent that its skill differentials dominated that of the entire manufacturing sector. Indeed, the increase concentration of the manufactures was the prime factor causing the widening of the skill differentials.

Secondly, the electrical and electronic industry employed the greatest number of workers of varying skill categories. Does it have a spillover effect to other industries? The scope of the present paper is not able to provide an answer to the above question. We can obtain a general clue to the answer by looking at the industry's linkages, forward and backward, to the rest of the manufacturing sector; where it is found to be weak, a limited spill-over effect of skill spreading to other industries is implied.

If the country is going to narrow the skill gap in the manufacturing sector, two related options are available. First, reduce the excessive concentration to the electrical machinery industry, which will bring the immediate effect of a better skill spread among the manufacturing industries. We should choose strongly linked industries, normally resource-based, which will generate a better spillover effect in skilled worker employment, thus building-up a stronger foundation of k-

workers. Secondly, in all industries, the sector should employ a high proportion of skilled workers of various categories relative to the unskilled category, which will come naturally as the sector moves towards more global competitiveness. If the choice of products is based on an optimum resource allocation, as industrialization progresses the sector no longer has a comparative advantage on unskilled labour activities, and thus has to move up the value chain by producing skill-intensive products.

ENDNOTES

1. In terms of growth of output, restructuring of society, export expansion, income generation and employment expansion.
2. Mid-Term Review of the Third Malaysian Plan 1976-1980, 1976.
3. Cluster is an agglomeration of interlinked or related activities comprising industries, suppliers, critical business services, requisite infrastructure and institution.
4. Sixth Malaysian Plan, 1991.
5. For thirty-one industry group ($n = 31$).
 $\text{Log } W/Em = 2.433 + 0.398 \log SL/L$
 $(4.711)^*$
 $R^2 = 0.43, D-W = 1.86$
6. Refer Table 1. Malaysian Industrial Classification.
7. Positive signs indicate widening trend in the proportional change in wage differentials.
8. Table 5
9. The proportional changes were bigger in the later period despite being two years shorter in the earlier period.

REFERENCES

- Abowd, J. & Ashenfelter, O. (1981). Anticipated unemployment, temporary layoffs, and compensating wage differentials. In R. Sherwin (Ed.), *Studies in Labor Markets*, 141-70. Chicago: The University of Chicago Press.
- Dickens, W. & Kats, L. (1987). Inter-industry wage differences and theories or wage determination. *NBER Working Paper* 2271.
- Gibbons, R. & Kats, L.F. (1992). Does unmeasured ability explain inter-industry wage differentials?. *Review of Economics Studies*, 59, (July), 515-35.
- Keane, M.P. (1993). Individual heterogeneity and inter-industry wage differentials. *Journal of Human Resources*, 28, (Winter), 134-61.

- Krueger, A.B. & Summers, L. (1988). Efficiency wages and the inter-industry wage structure. *Econometrica*, 56, (March), 259-93.
- Lary, H.B. (1968). *Import of Manufactures from Less Development Countries*. New York: Columbia University Press.
- Malaysia. (1976). *Third Malaysia Plan, 1976-1970*. Kuala Lumpur: Economic Planning Unit.
- Malaysia. (1991). *Sixth Malaysia Plan, 1991-1995*. Kuala Lumpur: Economic Planning Unit.
- Malaysia, Department of Statistics. (1996). *Manufacturing Industrial Survey*. Kuala Lumpur.
- Mohammed Sharrif Bashir. (2001). Labour skill trade structure and comparative advantage of Malaysian manufacturing industry 1978-96. Unpublished Doctoral Dissertation, Faculty of Economics, University Putra Malaysia.
- Murphy, K. M. & Topel, R.H. (1987). Unemployment, risk and earnings. In L. Kevin & L. Jonathan (Eds.), *Unemployment and the Structure of Labor Markets*, 103-40. London: Basil Blackwell.
- Nyaw, M.K. (1979). *Export Expansion and Industrial Growth in Singapore*. Hong Kong: Kings Way International Publication.
- Osburn, J. (2000). Inter-industry wage differentials: patterns and possible sources. *Monthly Labour Review*, Feb, 34-46.
- Zabalza & Tzannatos. (1985). *Women and Equal Pay: The Effect of Legislation on Female Employment and Wages in Britain*. Cambridge: Cambridge University Press.