Int. Journal of Economics and Management **2(1):** 157 – 178 (2008) ISSN 1823 - 836X

Changes in Relative Demand for Labour in Malaysia (1984-1997) Using a Decompsition Approach

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ABSTRACT

This paper is concerned with the two main causes of wage differentials in the Malaysian labour market during the period 1984-1997. These are the impact of changes in trade patterns and technological change. The paper has employed set of data comprises micro-level data from the Household Income Survey (HIS) for several years during the period 1984 to 1997. The main finding of this paper is that changes in the relative demand for labour favour middle level of education (secondary levels of education) workers and that technological change is the main explanation for the changing pattern of employment in the Malaysian economy. The paper finds that changes in the pattern of trade have had only small effects in explaining the changes in the relative demand for labour.

Keywords: Labor Demand, Wage Differentials, Trade and Labor Market Interaction, Technological Change.
JEL classification codes: J21,J23,J31,O33

IINTRODUCTION

The issue of wage differentials between skilled and unskilled labour has attracted much interest from economists in the last few decades. Although the potential causes of changes in differentials are many, the literature has particularly focused

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on two factors, namely international trade and technological change. In the 1980s, Malaysia initiated a comprehensive structural adjustment programme such that by 2020, Malaysia aimed to be an industrialised country and a developed nation. An important part of this program was a comprehensive industrial plan, called the Import Substitution 2 (IS2) plan (1980-1985), followed by the Export Orientation 2 (EO2) plan between 1985 and 2000. As their names suggest, the first stage in the industrial plan was to develop home industries that could meet local demand. The second stage, then sought to promote economic growth through the expansion of exports. Also, as part of the industrial plan in 1991, Malaysia introduced its Multimedia Super Corridor, which aims to introduce information technology (IT) to Malaysian society and workplaces. As a further part of the plan to develop a knowledge society, in the Third Outline Perspective Plan (OPP3), Malaysia is building up a knowledge-based economy and is working towards establishing a knowledge-based work force. In consequence, employment growth has rapidly increased. According to the International Labour Organization (ILO), this rapid employment growth may create its own problems. In many East Asian countries and in some Latin American economies, trade liberalization has increased the demand of skilled workers, which has occasionally fallen short of supply, despite increasing wages. In Malaysia, for example, between 1986 and 1994, a small fraction of the rising wage gap between skilled and unskilled workers is attributable to their differential demand elasticity. Skilled workers also had smaller supply elasticity than semi-skilled and unskilled workers. In China, the pressure from improved competitiveness and the adoption of new technology has increased the demand for skilled and professional workers more than the supply and created an imbalanced labour market. This situation has also arisen in Chile since it underwent trade liberalization in the 1980s, Chile has been concerned with the increasing inequality between skilled and unskilled workers due to the scarcity of skilled workers. Although the patterns of movement in the Malaysian wage structure have been documented in a few studies, much disagreement remains concerning the fundamental causes of these changes and the nature of the changes that have taken place.

As has been well documented in developed countries, especially in the U.S and the UK, rising wage inequality and the increasing employment share of skilled workers are due to the factors underlying shifts in the relative demand for skills, namely, trade and technology. As regards technology, the argument is based on the hypothesis of skilled biased technological change (SBTC). Increasing information technology (IT) is fostering the relative productivity of more educated workers and the employment shares of skilled workers. However, even amongst those economists who favour SBTC as an explanation of the changing nature of wage and employment structures, there are still disagreements about whether this originates from trade-related factors (and is sector biased) or whether its impact is

factor-biased affecting particular groups of workers. Alternatively, there is the argument that the changes observed arise because of changes in the pattern of trade and are not skill-biased.

Using a theoretical framework based on the Heckscher Ohlin Samuelson (HOS) model this paper aims to provide empirical evidence of the causes of changes in wage inequality in the context of a developing country, Malaysia. It thus attempts to address a significant gap in the previous literature regarding the causes of wage differentials in developing countries, generally, and more specifically in Malaysia. The rest of paper is organized as follows. Section II discusses the trends in the labour market in Malaysia. Section III provides a framework for assessing changes in relative demand and in relative wages namely HOS model. Section VI provides related literature review. Section V describes the data used and method of analysis. Section VII presents the results and Section VIII then concludes the discussion.

TRENDS IN THE LABOUR MARKET IN MALAYSIA

Generally, in the last decade Malaysia has achieved successful economic growth and full employment. Employment grew rapidly from 5.57 million in 1984 to 9.32 million in 2000 (see Table 1). The unemployment rate fell rapidly from 5.05 percent of the labour force in 1984 to 3.06 percent in 2000. Although the Malaysian economic situation showed a good performance during what was a transitional period, the Malaysia economy actually faced a tight situation in the labour market. There were shortages of labour, especially during and after the recession period. This section will discuss the circumstances in the Malaysian labour market during the period when the development strategies were employed.

In general, the Malaysian labour market was transformed from having a primary sector base to being industrially based during the 1980s and 1990s. Table 2 shows employment by sector during the period 1984-2000. Government policy towards the labour market was one linked to the transition of the economy; consequently, the structure of the labour market changed. The total job share of the agriculture, forestry and fishing sectors declined from 30 percent to 18 percent during the period. This decline was arrested in the more difficult years of the 1980s as far as the non-cash crop sector was concerned, but continued at much the same rate in the rubber, palm oil and coconut sub-sectors. On the other hand, the share of the manufacturing sector increased from 15 percent in 1984 to 23 percent in 2000. The services sector continued to contribute the largest share of employment, remaining fairly stable at 50 percent during the period. As can be seen from Table 2, employment growth was especially notable in the social and community sector. Here, employment increased from 1,106 million workers in 1984 to 1,935 million in 2000. Employment in wholesale and retail trade, and the hotel and restaurant

Table 1 Basic Economic Indicators for Malaysia

	1984	1990	1995	2000
Population, millions	15.45	18.10	20.69	23.28
Labour force, millions	5.86	7.00	7.89	9.62
Employment, millions	5.57	6.69	7.65	9.32
Per capita GDP, 1987 ringgit	4,979	5,854	8,054	9,021
Per capita GDP, current US$	2,197	2,432	4,294	3,874

Source: World Bank 1984-2000.

industry also increased dramatically from 956 million to 1,790 million. The expansion of these industries arose from the creation of more job opportunities due to the entry of new large retailers. Similarly, as a result of the telecommunication companies undertaking large capital investment to upgrade their services (such as, the general pocket radio services (GPRS)) the trade-related and telecommunication sectors also expanded to meet increasing demand. In the construction sector, employment accounted for 8 percent of total employment in 1984 and 9 percent in 2000. This was made possible by a sustained demand for affordable housing, together with the ongoing implementation of civil works projects, which provided jobs for 7.98 million workers in 2000.

Changes in employment patterns and rapid job growth in the manufacturing sector contributed to a tightening of the labour market in Malaysia (World Bank, 1995; Sixth Malaysia Plan, 1996; Seventh Malaysia Plan, 2001). As Table 1 indicates, the period was one of a very strong performance in the Malaysian labour market in terms of employment growth. As a result of these employment opportunities the unemployment rate contracted to 2.4 percent in 1997 but increased to 3.43 in 1999 (see Table 1). During the period the labour force participation rate decreased slightly from 65.6 percent in 1997 to 64.2 percent in 1999. According to Lin 1988, the causes of the tightness in the labour market occurred in Malaysia due to a mismatch between demand and supply and through the low quality of labour.

As far as wages are concerned, we can consider the direct evidence of the skill composition and wages shares of Malaysia's labour force from 1985-1999, as presented in Table 3. Using the standard classification of the work force reported by the Malaysian Department of Statistics (DOS) manufacturing Malaysia's labour force is divided into: working proprietors and active business partners, unpaid family workers, professional, non-professional, technical & supervisory, clerical and related occupation, drivers, other general workers, skilled directly employed (that is, they are not employed through a contractor but employed directly by the company – the latter are part-time workers), semi-skilled directly employed, unskilled directly employed, skilled through contractors, unskilled through

Table 2 Malaysian Employment by Sector (1984-2000)

Year	1984		1989		1992		1995		1997		2000	
	(000)	%	(000)	%	(000)	%	(000)	%	(000)	%	(000)	%
Sector Agriculture, Forestry and Fishing	**1695**	**30**	**1833**	**29**	**1536**	**22**	**1527**	**20**	**1481**	**17**	**1712**	**18**
Mining	**46.5**	**1**	**33.1**	**1**	**36.3**	**1**	**32.5**	**0**	**38.5**	**0**	**27.3**	**0**
Manufacturing	**858.4**	**15**	**1171**	**18**	**1640**	**23**	**1781**	**23**	**2003**	**23**	**2126**	**23**
Construction	**428**	**8**	**376.9**	**6**	**506.7**	**7**	**611**	**8**	**793**	**9**	**798.9**	**9**
Services	**2538.8**	**46**	**2977**	**47**	**3329**	**47**	**3694**	**48**	**4254**	**50**	**4658**	**50**
Electricity, Gas and Water	32.9		40.6		45.9		48		50.9		48.1	
Transport, Storage and Communications	242.8		277.6		326.2		359		423.3		422.7	
Wholesale and Retail Trade, Hotels, and Restaurants	956.6		1144		1255		1371		1578		1790	
Finance, Insurance Real Estate & Businesses Services	200.5		253.2		299.8		364		447.2		462	
Services, Social and Community	1106		1262		1403		1552		1755		1935	
Total Employment	5566		6391		7048		7645		8569		9322	

Source: Department of Statistics (DOS) 1984-2000.

contractors and paid employees (part time). As can be seen in Table 3, the aggregate manufacturing labour force became less skill- intensive between 1983 and 1999. The ratio of skilled directly employed fell from 0.25 in 1985 to 0.23 in 1999. Similarly, the wage share of skilled directly employed fell from 0.22 to 0.21. On the other hand, the ratio of semi-skilled workers increased from 0.10 in 1985 to 0.18 in 1999. In line with the share of skilled workers, the ratio of unskilled workers also decreased during the period 1985-1999. This indicates that the trend in the labour market during this period was favourable to semi-skilled workers.

The information in Table 3 indicates that the share of the wages bill grew most during the period 1990-1997, amongst professional, technical, supervisory and semiskilled directly employed groups. However, the share of non-professional, clerical and related occupation, skilled directly employed, unskilled directly employed, skilled through contractors, semi-skilled through contractors and unskilled through contractors fell during the period 1990-1997. It is interesting to note that the share of wages bill for unskilled directly employed increased during the period 1986-1989. The share fell slightly from 1990 to 1997, but was still considerably higher compared to 1984. However in 1999, the share of the wages bill for unskilled workers fell and was below the share of 1984.

This situation shows that the rapid growth of exports under Export Orientation 2 starting from 1985 had not seen a corresponding rise in wage ratio trends for all occupational groups. It only increased the wage bill for certain groups of non-production and production workers. For non-production workers, those workers in professional, technical and supervisory occupations were most likely to have had an increase in their share of the wages bill. However, amongst production workers, only the semi-skilled directly employed group showed an increase in the share of the wage bill during the period 1985-1999. Although the same measure for skilled workers decreased from 1985 to 1999, the share of skilled workers continued to be greater than the share of other occupation groups.

THEORETICAL FRAMEWORK

The basic theoretical framework we adopt here is based on the factor proportions model that was originally developed by two Swedish economists, Eli Heckscher and his student Bertil Ohlin in the 1920s. Further elaborations of the model were provided by Paul Samuelson in the 1930s; and as a result the model is often referred to as the Heckscher-Ohlin-Samuelson (or HOS) model. This model considers the effects of trade and technological change on the relative labour demand and wages of skilled and unskilled workers. The model emphasises the distinction between the *sectoral* dimension of such shifts that are between industries or sectors and the *factoral* dimension that are between different types of skill (Wood, 1994).

Table 3 Skill Composition and Wage Shares of the Labour Force

	1985		1990		1999	
	Employment	Wages	Employment	Wages	Employment	Wages
Working proprietors & active business partners	0.5	-	0.3	-	0.7	-
Unpaid family workers	0.1	-	0.1	-	0.1	-
Professional	2.1	11.9	2.0	12.2	3.2	15.1
Non professional	2.4	8.4	1.7	6.7	2.7	7.7
Technical & supervisory employment	8.9	15.3	8.5	15.4	10.4	17.6
Clerical and related occupational	8.7	10.1	6.6	8.1	6.5	6.8
Drivers	1.7	1.5	1.2	1.3	1.1	1
Other general workers	3.8	2.9	2.7	2.0	2.0	1.4
Skilled directly employed	25.5	22.2	23.3	21.1	23.9	21.3
Semi-skilled directly employed	10.3	6.6	13.5	9.0	18.3	11.8
Unskilled directly employed	25.3	13.5	30.7	16.6	24.9	13.2
Skilled through contractor	3.3	3.4	2.6	3.1	1.4	1.6
Semi-skilledthrough contractors	2.1	1.6	2.0	1.8	1.7	1.2
Unskilled through contractors	3.7	2.1	3.6	2.0	2.2	1.1
Paid employees (part time)	1.4	0.4	1.3	0.5	0.7	0.2

Sources: DOS 1985-1999.

The HOS model incorporates a number of realistic characteristics of production that are left out of the simple Ricardian model of international trade. In the latter, only one factor of production, labour, is needed to produce goods and services. The HOS model begins by expanding the number of factors of production from

one to two. The model considers two countries (one developed and one developing country; in this study we have used the UK and Malaysia), two factors (skilled and unskilled labour) and two products or sectors (which vary in terms of skill intensity) we have used a high technology sector (*H*) and a low technology sector (*L*). The developing country is more abundant in unskilled workers, whilst the developed country is more abundant in skilled workers. Let us apply this to our case, Malaysia (the developing country) trades with the UK (the developed country). This trade causes Malaysia to specialize in the production of the unskilled-intensive good, in which it has a comparative advantage because of the relatively large supply of unskilled labour, and to reduce the production of the skill-intensive good. In developing countries, there is a rise in the relative price of the unskilled intensive good, and the relative demand for unskilled workers. There is also a narrowing of the wage gap between skilled and unskilled workers. In the developed country (the UK) there is an opposite effect as regards the wage gap.

To determine the relative contributions of trade and technology to shifts in labour demand, we follow Lawrence and Slaughter (1993) and consider a general production function for industry *i* at time *t*.

$$Q_{it} = A_{it} F^{i}(S_{it}, U_{it}, K_{it}) \tag{1}$$

where Q_{it} is the output of sector *i* (*H* or *L*) at time *t*. A_{it} is the Hicks-neutral technology parameter for industry *i* at time *t*. The factors of production employed at time *t* are denoted as $S_{it,}$ U_{it} and K_{it} which represent skilled labour, unskilled labour and capital respectively. In order to explain how the trade and the technology work in the HOS model we drop the time subscript *t* and the factor *K*. We exclude *K* for ease of exposition and because in the paper we focus on labour demand[1].The model assumes that both types of labour are mobile between sectors within each country, but are internationally immobile. This model also assumes that restoring zero profits in both sectors is achieved by setting price equal to marginal cost in both sectors. The relative labour demand for sector *i* can then be written as

$$W_{ji} = P_i \times A_i \times F_j^i(\bullet) \tag{2}$$

where, W_{ji} represents factor *j's* marginal revenue product in industry *i*. P_i is the exogenously determined price of output in sector *i*. Because of relative factor prices, the aggregate relative labour demand will change whenever factors flow across

[1]A number of authors believe that, in the context of developing countries, changes in income inequality can only be understood if a three-way categorization of labour is used (Wood,1994). In the empirical analysis therefore we use skilled, semiskilled and unskilled The general propositions we develop in this chapter can, however, be applied to more than two types of labour in a straightforward way.

industries. If for example, there is a shift in factors of production to the high technology industry this will increase aggregate relative demand in that industry. Equation 2 shows that aggregate relative demand shifts respond to inter-industry profitability, in which the impact of trade (product prices) and technology are captured by shifts in P_i and A_i respectively.

LITERATURE REVIEW

The issue of wage inequality came to the forefront, and generated much analysis, when differences in wages between skill groups declined in the 1970s and rose sharply in the 1980s, especially in the US. The interesting issue that has attracted so much analysis is the underlying causes of these changes. A plethora of studies have been undertaken to measure how changes in labour demand can contribute to changes in wage differentials for a whole myriad of countries. For example, Arbache *et al.* (2004), Manasse (2004), Berman and Machin (2000) and Robbins and Gindling (1999) have investigated the changes in wage inequality in developing countries and Katz and Murphy (1992), Haskel and Slaughter (2001; 2002) have conducted an analysis of wages in developed countries. The discussion of wage differentials can be approached on several different levels; the analysis can be conducted by education, occupation, industries, countries, age and experience. In Brazil, for example, wage differentials are due primarily to high income inequality across industries (Gatica *et al.*,1995). In Taiwan, wage differentials reflect the rapid increase in the share of educated workers in the labour market (Lin and Orazem, 2003). The widening in wage inequality in South Korea was due to the expansion of high incomes in certain occupational groups as a result of heavy industrialization (Leipziger *et al.*1992). Wage inequality has also risen significantly in the US, and a large body of literature documents a substantial rise in wage differentials in many contexts of study; for example, in the US, Katz and Murphy (1992), Bound and Johnson (1992), Murphy and Welch (1992) and Juhn Murphy and Pierce (1993) looked at the changes in relative wages due to supply and demand factors. Katz and Murphy (1992) and Robbins and Gindling (1999) employed a supply and demand framework to construct a time series of returns to schooling and relative demand shifts. Changes in wage differentials have also been examined by looking at changes in the sex composition of the workforce. Blau and Khan (1996) examined wage differentials from a gender perspective and how gender affects wage differences across countries. Lucifora (1999) analysed the changes in wage differentials by industry and occupation in Italy.

Much of the extensive analysis has suggested that there are two principal causes of changes in wage differentials: changes in the pattern of trade and skill biased technological change (SBTC). These two hypotheses have attracted much research. Studies related to the trade hypothesis for example, include Wood (1995),

Sachs and Shatz (1994), Haskel and Slaughter (2002), Card and Di Nardo (2002). These studies concluded that changes in patterns of trade have contributed to the increase in the dispersion of wages and employment in developed countries. In developing countries, Edwards (1993), Robbins (1996), Robbins *et al.* (1999), and Arbache (2004) support this argument and believe that wage inequality is largely explained by factors such as changes in the pattern of trade rather than from those relating to exogenous changes in human capital. Galiani and Sanguineeti (2003) find that the rise in inequality in Argentina was due to trade liberalization and not because of changes in the returns to college graduates.

With regard to SBTC, Machin (2001), Berman *et al.* (1998) and Gorg and Strobl (2002) have argued that the declining demand for less skilled workers reflects the fact that technological innovation has been biased toward skilled labour which had a strong impact on the structure of labour demand and thus changes in relative wages. In developing countries, Berman and Machin (2000) investigated the role of SBTC in increasing the demand for skilled workers in manufacturing industries. They reported that SBTC innovation migrated rapidly from developed to middle-income countries, but found no evidence that this happened for low-income countries. Katz and Murphy (1992) have shown that changes in wage differentials can be explained by shifts in the supply and demand for skills (see also Autor, *et al.* (1998)). In particular, the rising demand for skilled workers in parallel with the computer revolution, combined with the slowdown in the relative supply of educated workers, has caused wage differentials to increase significantly.

An interesting extension to the general conclusion that changes in wage inequality arise from the rising demand for skilled workers relative to the unskilled is Acemoglu (2003). Using the supply and demand framework standard in the literature, Acemoglu explores the cross-country inequality in European and the USA. The stylized fact he seeks to explain is that wage inequality increase sharply in the US and the UK but not in most European countries. He considers traditional and alternative explanations in order to explain these differences. Traditional explanations are that the relative supply of skilled workers rose faster in Europe than in the US and the UK and that the wage-setting institutions, acted to maintain the position of unskilled workers in Europe. The alternative explanation Acemoglu considers is that institutional wage compression has led to firms in Europe

Two studies which question the validity of the standard supply and demand models used in the literature are those of Glyn (2001) and Atkinson (2002). Glyn focuses on the position of the least qualified workers in OECD countries. After documenting the relative decline in their position in the labour market he considers whether these can be attributed to shifts in relative demand and supply. As with Acemoglu, Glyn notes that the there is considerable variation in the extent to which the relative position of lower skilled workers has declined across the OECD. This, he suggests, casts doubt on the usefulness of global explanations for changes in inequality. In addition, he argues that changes in relative employment rates are

only loosely correlated with changes in relative wages, and therefore rejects the standard supply and demand based explanation. Glyn proposes a number of alternative explanations such as whether the employment of less skilled workers is less sensitive to changes in relative wages, the impact of institutional factors, such as the impact of trade unions, and the differential rate at which new technology and import competition have impacted upon labour markets in different countries. Glyn does not come to any strong conclusion regarding these alternatives.

Atkinson (2002) rejects the basic model used in much of the literature on the grounds that a simple dichotomy between skilled and unskilled workers is too simplistic and that it is impossible to translate into empirical equivalents. He argues that understanding changes in inequality require that one moves away the idea that one group of workers loses out at the expense of another. Rather, he suggests, one needs to consider a productivity continuum across which workers are spread and associated with which is an earnings distribution. The focus of the analysis should then be on the complete earnings distribution. Atkinson finds that this distribution has tilted something which cannot be explained in the standard model. Explanations for this tilt must, he argues, be found in alternative theories of wage determination beyond a simple supply and demand model. Atkinson focuses on the role of trade unions, and social custom and reputation.

DATA AND METHODOLOGY

Data

The present paper uses the HIS for the years 1984, 1989, 1982, 1995 and 1997, from which information on employment, wages, age, activity, location, status of employment, 3-digit occupation and 5-digit industry data are obtained. The number of individuals surveyed in each year is shown in Table 4.

The data collected from the HIS have been used primarily for the preparation of the various Malaysia Development Plans which influence public policy. The Department of Statistics Malaysia (DOS) is responsible for the survey design, data collection and the processing activities for the surveys. The surveys were first carried out in 1974 and the most recent was for 2002. The survey covers both urban and rural areas of Malaysia. A two-stage stratified sample design has been adopted for the HIS. The first sampling stage is the definition of what we call Enumeration Blocks, which are geographical areas artificially created to have about 80-120 living quarters, each with a population of about 60. In the second stage, living quarters are selected from each of the sampled Enumeration Blocks. The concept of a household is based on arrangements made by persons residing within the same living quarters, individually or in groups, for food and other essentials. Thus, a household may consist of related and unrelated members.

Table 4 Number of people surveyed by gender 1984-1997

	Male	Female	Total
1984	126065	126794	252859
	(49.86)	(50.14)	(100)
1989	138859	140133	278992
	(49.77)	(50.23)	(100)
1992	133235	132739	265974
	(50.09)	(49.91)	(100)
1995	90646	89480	180126
	(50.32)	(49.68)	(100)
1997	86350	85442	171792
	(50.26)	(49.74)	(100)

Source: HIS DOS 1984-1997

As noted earlier in this section, HIS data for 1984, 1989, 1992, 1995 and 1997 is used. There are several restrictions on this data. Firstly, all workers who are employed in the agricultural sector are excluded from the study[2]. This is because the wages in this sector are unreliable as a result of the largely informal nature of employment in Malaysian agriculture. Secondly, the analysis is restricted to employees of working age (15 to 64). Thirdly, we focus on employees; thus, the self-employed are excluded from the study. To investigate the impact of trade, information from HIS is supplemented by information on imports and exports taken from the Ministry of Trade.

Methodology

In this paper, we follow Katz and Murphy (1992) to test the hypotheses of SBTC and trade on the relative demand for labour. Using the supply-and-demand framework suggested by Katz and Murphy (1992) this paper measures both within and between-sector components of relative factor demands to explain wage changes.

[2] Agriculture is excluded from the analysis due to the fact that the data is unreliable (due to measurement error) and because there are significant numbers of unpaid family workers. Furthermore, the sector is very sensitive to economic fluctuations and high rates of turnover. As a result, wage inequality varies significantly over time. The decision to exclude agriculture also reflects the fact that what is happening to the sector in the process of economic development is a separate (though obviously linked) story to what is happening in the rest of the economy. The exclusion of the self-employed is again based on the fact that income data for this group is subject to significant measurement error due mainly to under-reporting. There is also definitional problems, again relating to family members working (often unpaid) in family businesses who may be classed as self-employed.

Between-industry effects represent the impact of trade, while within-industry effects represent technological change.

We measure the overall changes for group *k* (gender) during the 1984-1997 period as follows:

(7)

where *j* indexes sector and refers to the 60 occupation-industry cells, and α_{jk} is group *k*'*s* share of total employment in sector *j* in the base year. In this paper, the base year is the average share of total employment in sector *j* of group *k* over the 1984-1997 period. ΔE_j refers to the differences between the 1984 and 1997 shares of total labour input employed in sector *j*, and E_k is the 1984 share of the total labour input of group *k*. The demand index thus calculates the percentage change in demand for group *k* as a weighted average of the percentage changes in sector employment, in which the weights are group-specific employment distributions. We have again decomposed the overall index into between-sector and within-sector components. The between-sector demand shift index for group *k*, ΔX_k^b, is given by the index in panel 1 of Table 5 when *j* refers to 10 sectors. We define the within-sector demand shift index for *k*, ΔX_k^w as the difference between the overall demand shift index and the between-sector demand shift index: $\Delta X_k^w = \Delta X_k^d - \Delta X_k^b$. These within-sector demand shifts reflect shifts in employment among occupations within sectors.

$$\Delta X_k^d = \frac{\Delta D_k}{E_k} = \sum_j \left(\frac{E_{jk}}{E_k}\right)\left(\frac{\Delta E_j}{E_j}\right) = \frac{\Sigma_j \alpha_{jk} \Delta E_j}{E_k}$$

RESULT

Measures the demand shift 1984-1997

In order to explain the relative demand shift, this paper begins by examining the results by type of education. There are four levels of schooling are used, namely no schooling, primary, secondary and tertiary level education. The results are reported in Table 5, which shows the relative demand shifts in labour for the overall period 1984-1997 and for four sub-periods, (1984-1989), (1989-1992), (1992-1995) and (1995-1997). Table 5 consist of three different panels: panel 1 shows the between-sector demand shift; panel 2 presents the within-sector demand shift; and panel 3 presents the overall (occupation-industry) demand shift. The between-sector component represents the shifts in employment among sectors caused by changes in the demand for workers as a result of changes in patterns of trade. The within-sector element represents the relative demand for labour shift within sectors because of the effects of technological change.

As mentioned earlier, the overall measure (occupation-industry) of the demand shift index for group *k* is considered when *j* indexes 60 occupation-sector cells. Ten sectors and six occupations are considered in this measurement. The industry groups are: mining, manufacturing, electrical and gas, construction, the wholesale trade, hotels and restaurants, transportation, finance, community social and personal services and other industries. The six occupations are: professional, managerial, clerical, sales, service workers and production workers.

The results for the period 1984-1997 and the overall changes in relative demand, as shown in panel 3 of Table 5, will be examined first. The relative demand for males is positive for employees with a secondary education. Similarly, the shifts in the relative demand for females clearly favours those workers with a secondary education. The relative demand for male and female workers are quite similar. As the table shows, there is a strong decline in the demand for those males having no-schooling followed by those having tertiary and primary education levels, whereas the relative demand for females is away from those with tertiary education, no schooling and primary education levels. These results suggest that the relative demand for labour was away from skilled and unskilled workers towards semi-skilled workers.

Focusing on the results for male employees, Table 5 also shows that overall shifts in relative demand are predominantly due to changes taking place within industries which arises because of technological change. Between–industry shifts (that represent the changes in pattern of international trade) are, in general, smaller than within-industry shifts, and this is especially the case for those having tertiary and no schooling education levels. It is also interesting to note that there was a clear shift away from male employees with tertiary levels of education, and that this resulted both from the shift brought about by changes in technology and also as a result of changes in the pattern of trade away from higher skilled and educated workers. There is also a positive relationship between the relative demand for workers with a secondary level education and changes in technology.

As regards the changes in the relative demand for female workers, overall changes were towards those females with a secondary education. Interestingly, in contrast to the findings for male employees, the overall shift in the demand for female workers was caused largely by between-sector changes. This result indicates that changes in the pattern of trade have increased the relative demand for female workers with a secondary education. Trade is also responsible for the fall in the relative demand for female workers with a tertiary education. These findings provide support for the hypothesis that trade liberalization has raised the demand for, and return to, the abundant factor of production and away from a return to the sparse factor of production.

If we consider the results by sub-period, we see some interesting differences. First, looking at male employees, it can be seen that the shift towards employees with a secondary level of education continued from 1984 through to 1995, but

then there was a shift in favour of the least educated between 1995 and 1997. Changes that were taking place in favour of this latter group began in the mid-1990s, following a decline in employment share throughout the 1980s. It is also worth noting that the decline in the other less educated group (primary schooling) continued through the whole period under study, whereas there was an increase in the relative demand for the most skilled through the 1980s, but a shift away from them thereafter. During the period 1984-1989, the shift in relative demand was mainly caused by within-sector effects especially for those with secondary and tertiary education, indicating a relative shift away from workers with the lowest level of education and towards better educated workers. This suggests that skill-biased technological change occurred during this period. Trade effects were, generally, in favour of those with secondary and tertiary education, though these effects were relatively small.

For female employees, the general trend is one of falling demand for unskilled and skilled workers (those with no schooling and tertiary levels of education) in favour of the semi-skilled (secondary education level). Interestingly, employment shifted away from female employees with higher levels of education through the 1980s, but in favour of them during the 1990s. During the period 1984-1989, the shifts in the relative demand for female workers with a secondary education were mainly due to within-sector shifts. There were also significant technology-related, within-sector shifts away from those with no schooling and/or primary schooling. Within-sector shifts also resulted in an increase in the demand for females educated at tertiary level, though here the effect was not as strong as the trade-induced between-sector shift away from the group.

The results indicate a continued shift in employment for both males and females with moderate levels of education at the start of the 1990s, though the reasons are different. Male employment was increasing in relative terms due to changes in technology. For female employees, the overall impact was the result of changes in trade patterns. In the mid-to late 1990s, a similar pattern was evident: in the case of male employees, technological change was biased towards the semi-skilled and against the more educated. In contrast, changes in female employment were affected by changes in the pattern of trade.

Relative Demand for Different Types of Qualification

It is interesting to explore the demand for labour by types of qualification achieved. The results of the decomposition analysis by educational attainment categories are presented in Table 6. The divisions in Table 6 are similar to those used in Table 5.

Not unexpectedly, the results are similar to those presented above. During the sample period (1984-1997) the shifts in relative demand favoured male workers with no qualifications, those with other qualifications and those with primary and secondary qualifications. For female workers, the shifts in demand favoured those

Table 5 Sector and Occupation Based Demand Shift Measures, 1984-1997

	1 Between Industry j=10				
	1984-1989	**1989-1992**	**1992-1995**	**1995-1997**	**1984-1997**
Male					
No school	-2.961	3.175	-0.188	2.636	2.663
Primary	-1.672	1.799	-0.331	1.578	1.373
Secondary	0.555	0.032	0.004	0.077	0.667
Tertiary	0.432	-0.152	-0.001	-0.769	-0.490
Female					
No school	-1.878	0.737	-1.522	-0.521	-3.184
Primary	1.744	4.454	-2.410	-2.282	1.506
Secondary	0.072	0.454	0.410	-0.381	0.555
Tertiary	-2.270	-7.671	1.318	3.373	-5.251
	2 **Within-Industries**				
	1984-1989	**1989-1992**	**1992-1995**	**1995-1997**	**1984-1997**
Male					
No school	-3.303	3.582	-7.245	0.045	-6.921
Primary	0.735	-1.855	0.086	-1.619	-2.652
Secondary	0.881	0.117	0.248	-0.277	0.969
Tertiary	3.456	-5.092	-0.474	-1.537	-3.648
Female					
No school	-0.386	-0.011	0.862	0.796	1.262
Primary	-1.807	-4.449	2.383	2.250	-1.622
Secondary	0.108	-0.030	0.163	0.158	0.400
Tertiary	0.214	-0.407	0.069	0.032	-0.092
	3 **Overall Industry j =60**				
	1984-1989	**1989-1992**	**1992-1995**	**1995-1997**	**1984-1997**
Male					
No school	-6.264	6.757	-7.433	2.682	-4.258
Primary	-0.937	-0.056	-0.245	-0.041	-1.279
Secondary	1.436	0.148	0.252	-0.200	1.636
Tertiary	3.888	-5.244	-0.475	-2.307	-4.138
Female					
No school	-2.264	0.726	-0.660	0.274	-1.923
Primary	-0.063	0.005	-0.026	-0.032	-0.116
Secondary	0.180	0.425	0.573	-0.222	0.955
Tertiary	-2.057	-8.078	1.387	3.405	-5.343

females having no qualifications. The shifts in the relative demand for males are dominated by within-sector effects at medium levels (secondary qualifications) and high levels of education (degree and diploma holders). On the other hand, between-sector effects are more important than within-sector effects at low levels of education (no qualification and other qualification). These results again indicate that changes in technology are the main cause of the shifts in relative demand for male workers in Malaysia. The effects of technological change have increased the relative demand for males with secondary education qualifications and decreased the relative demand for male workers at high levels of education. Trade, on the other hand, is responsible for the increasing relative demand for males at low levels of education.

On the other hand, the shift in the relative demand for female workers during the sample period was dominated by between-sector effects. Trade has moved in favour of female workers with secondary qualifications and those with no qualifications. Changes in the pattern of trade, however, also decreased the relative demand for females with higher levels of education. Technology appeared to be in favour of increased relative demand for female workers with higher levels of education, though the effects of this were not strong enough to contribute significantly to the overall changes in relative demand.

To sum up the above discussion, the findings indicate that the relative demand for labour favoured middle levels of education or semi-skilled workers. We also found that technological change (the within-industries effect) was responsible for these changes and for the shift away from higher levels of education (skilled) and low levels of education (unskilled) employment. Interestingly, trade is a more dominant effect in explaining changes in the relative labour demand for female workers.

CONCLUSION

This paper has reported evidence related to the hypotheses that have been tested in Hecksher-Ohlin and Samuelson (HOS) can be explained the changes in relative demand for labour in Malaysia during 1984-1997. Using micro level data from the Household Income Survey (HIS) this paper have found that technological change are the dominant factor that explained the changes in relative demand for labour compared to trade. However, interestingly to note that, technological change is also responsible to the increases in the relative labour demand for middle levels of education or semi-skilled workers and decreased the relative labour demand at higher levels of education and low levels of education (skilled and unskilled workers). These analyses lead us to conclude that skill structure of labour market in Malaysia during 1984-1997 was favour to semi-skilled biased technological change.

Table 6 Industry and Occupation Based Demand Shift Measures 1984-1997

	Between Industry j=10				
	1984-1989	**1989-1992**	**1992-1995**	**1995-1997**	**1984-1997**
Male					
No-Qualification	-2.382	2.731	-0.077	1.410	1.682
Other Qualification	-6.591	4.960	-0.153	2.632	0.848
Primary Qualification	0.076	-0.096	0.029	0.078	0.085
Secondary Qualification	0.060	-0.012	0.033	0.044	0.126
High school Qualification	-0.077	-0.005	0.055	0.054	0.026
Diploma	-0.036	-0.069	-0.042	-0.013	-0.160
Degree	-0.035	0.006	-0.018	0.005	-0.042
Female					
No-Qualification	2.047	4.797	-2.056	-2.470	2.319
Other Qualification	-2.021	0.782	-1.521	-0.521	-3.280
Primary Qualification	0.069	1.878	-0.946	-1.960	-0.960
Secondary Qualification	-1.273	-2.211	1.470	2.175	0.161
High school Qualification	-3.016	-4.569	2.172	3.340	-2.073
Diploma	-2.272	-9.646	0.623	3.184	-8.111
Degree	-2.628	-8.982	1.594	4.093	-5.923
	Within-Industries				
	1984-1989	**1989-1992**	**1992-1995**	**1995-1997**	**1984-1997**
Male					
No-Qualification	0.001	0.031	0.001	0.036	0.069
Other Qualification	0.011	0.039	-0.012	0.140	0.178
Primary Qualification	1.991	-0.535	0.142	-0.100	1.499
Secondary Qualification	3.304	-2.363	0.291	-1.045	0.188
High school Qualification	5.374	-4.859	0.114	-1.554	-0.925
Diploma	4.194	-6.828	-1.094	-1.964	-5.692
Degree	2.848	-5.629	-0.521	-1.271	-4.573
Female					
No-Qualification	-0.138	0.011	-0.071	-0.008	-0.205
Other Qualification	-0.234	0.410	-0.147	0.065	0.095
Primary Qualification	-0.260	0.322	0.073	0.006	0.141
Secondary Qualification	0.150	-0.043	-0.017	-1.425	-1.336
High school Qualification	0.813	-0.260	0.125	0.098	0.775
Diploma	-0.031	-0.092	0.034	0.013	-0.076
Degree	-0.038	-0.129	0.013	0.011	-0.143

Table 6 Industry and Occupation Based Demand Shift Measures 1984-1997(Continued)

	Overall Industry j =60				
	1984-1989	**1989-1992**	**1992-1995**	**1995-1997**	**1984-1997**
Male					
No-Qualification	-2.381	2.762	-0.075	1.446	1.751
Other Qualification	-6.579	4.999	-0.165	2.771	1.026
Primary Qualification	2.067	-0.631	0.171	-0.022	1.584
Secondary Qualification	3.365	-2.374	0.324	-1.001	0.313
High school Qualification	5.297	-4.864	0.169	-1.501	-0.899
Diploma	4.158	-6.897	-1.136	-1.977	-5.852
Degree	2.813	-5.624	-0.539	-1.266	-4.616
Female					
No-Qualification	1.910	4.809	-2.127	-2.477	2.114
Other Qualification	-2.255	1.192	-1.668	-0.455	-3.185
Primary Qualification	-0.192	2.200	-0.873	-1.954	-0.819
Secondary Qualification	-1.123	-2.254	1.453	0.750	-1.174
High school Qualification	-2.203	-4.829	2.296	3.438	-1.298
Diploma	-2.303	-9.738	0.657	3.197	-8.187
Degree	-2.666	-9.111	1.607	4.104	-6.066

Comparison across gender found that during the period 1984 to 1997 male employment was increasing in relative terms due to changes in technology. For female employees, on the other hand, the nature of employment change was primarily the result of changes in the pattern of trade. In part, this is the result of the fact that education levels are, on average, higher for men than for women. The second reason is based on the education system in Malaysia, and the differences in male and female interests and cultural socialization. In the National Curriculum System in Malaysia, students in secondary schools are allowed to choose technical or commercial subjects and courses based on their interests and potential. According to the Ministry of Education Malaysia (1998), a large number of females pursue home economics courses. The proportion was 97.2 percent,[3] compared to only 2.8 percent for males. On the other hand, males favour manual skilled courses, for example, over 80 those taking mechanical engineering, aeronautical, geology and zoology courses are male. At tertiary education levels, the share of males in mechanical engineering was 87.7 percent, compared to just 12.3 percent females. On the other hand, the percentage of females on commerce courses was 76.8 percent. This situation shows that males are involved significantly more in technology related

[3] The number of females was 14884, compared to a figure for males of 4567.

areas. In addition, many women are employed in small businesses which are more affected by trade fluctuations (Aminah (1998)).

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