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**TRADE LIBERALISATION,  
TECHNICAL CHANGE AND  
RELATIVE WAGES<sup>i</sup>**

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## **1. Introduction**

One of the economic puzzles of the last 25 years has been the decline in real wage rates around the world. This issue is sometimes expressed in terms of a decline in unskilled wage rates relative to skilled rates, Deardorff (1999) and sometimes as here in terms of real wage movements relative to product prices. Figure 1 gives the general picture for New Zealand.

In that Figure there is a definite break point in the trend in real wages around the time of a major positive terms of trade shock from 1972-74 closely followed in 1975 by the first oil shock. The period 1972-75 marks a break point in these relationships. Up to that time real wages trended upwards by  $x$  percent per year. Thereafter, real wages trended downwards. There is some evidence that the trend may have changed again in the mid-1990's, Aghion et al (1999) but that issue is not addressed here in depth on the grounds that it is too soon to tell.

The two likely candidates that are postulated to explain this break are first, that trade liberalisation as part of the trend towards globalisation or unilateral trade barrier reductions have resulted in relative declines in the prices of goods intensive in unskilled labour and that such goods are importables in higher income countries like New Zealand. This issue has been explored recently by Deardorff et al (1999) for the case of New Zealand and Lattimore et al (1999) for Australia. It is concluded in the New Zealand study that trade liberalisation is unlikely to reduce unskilled wages because New Zealand exportables are relatively intensive in unskilled labour. The second candidate hypothesis is that technical change is the culprit.

## **2. Framework**

It is this issue that is the subject of this paper. The standard trade model encompassing only final goods predicts that increased trade between high skill and low skill countries will cause an increase in the demand for low-skill intensive goods and a corresponding reduction in low skill wage rates in the high skill countries. On the other hand, skill-biased technical change across an economy can be expected to cause an increase in the relative demand for skilled employees within all industries contemporaneously.

Berman et al (1994) use the following share equation to test these competing hypotheses.

If  $E_i = X_i/N_i$  is the share of highly skilled workers in the total employment of industry  $i$  and  $S_i = N_i/N$  is the share of total employment of all types of workers represented by industry  $i$ , then the cumulative change in the share of highly skilled workers in total employment is given as:

$$\Delta E = \sum_i \Delta S_i \cdot E_i^* + \sum_i \Delta E_i \cdot S_i^* \quad (1)$$

Where the starred variable is the starting value of the variable. The first term of equation 1 represents changes in employment shares between industries and the second term reflects changes within industries. If the first term is large relative to the second term then the change in the share of skilled employment is mainly due to intersectoral shifts in employment that may be trade policy and/or international market related, especially for a small country like New Zealand. However, if the second term is relatively large then technical change is the more likely driver associated with the increased demand for skilled employees.

### **3. Data and Results**

New Zealand is an excellent candidate within which to examine these issues for at least two reasons. First, New Zealand embarked upon a major unilateral trade policy liberalisation programme after 1984, particularly. The nominal rate of import protection fell from around 30 percent, on average, to less than 10 percent today. This is a substantial policy shock that ought to provide evidence on the trade effect hypothesis and allow us to discriminate between this and the technical change hypothesis.

The second reason is that the structure of the New Zealand economy is somewhat different than other higher income countries. In New Zealand, exportables tend to be intensive in unskilled labour inputs (and incidentally, natural resources) and importables tend to be intensive in higher skilled labour inputs. This is more characteristic of developing countries than it is of many developed countries.

The focus here is on the tradable sector of the economy, which is defined here as the primary and manufacturing sectors. The time period chosen is 1986-96 because the major trade liberalisation started just before this period and was largely complete by 1996. A second reason for choosing the time-frame is that employment data by highest educational

qualification obtained and by industry is available from population censuses in 1986 and 1996. Educational qualifications provide a finer breakdown of skill levels than do traditional manager-worker characterisations. Furthermore, educational qualifications have been found to be highly correlated with skill levels, Aghion (1999, p. 1637). The 1986 and 1996 censuses use slightly different classifications of educational qualifications. The difference lies in the number of tertiary qualifications at the sub university degree level. These differences do not affect the aggregation used here into three levels. Employees with no qualifications or only school qualifications are categorised as unskilled. Tertiary qualifications comprise the skilled employee class while highly skilled employees are defined as those with university degrees. The industry classification for both years has been aggregated to the 25 sector SNA level for consistency purposes. These data presented in Table 1 for each industry making up the tradable sector.

There are a number of important shifts between 1986 and 1996 shown in the Table. Total employment in tradables fell by 19 percent over the period mainly in the manufacturing sector. Total employment reductions were large in both the exportable and importable sectors. This can be seen in spite of the fact that industries at the 25 industry breakdown contain significant importable and exportable elements. The food and forestry industries are mainly exportable in orientation. They had a 13 and 24 percent reduction in total employment, respectively. A mainly importable sector like fabricated metals, machinery and equipment had a 25 percent reduction in employment. Trade liberalisation cannot be responsible for these reductions because they apply to importables and exportables, alike. One likely explanation was a policy of making workers redundant in State Owned Enterprises associated with the forestry sector and others. Forestry and selected other formerly government owned sectors had previously been used as employment sinks to hold down the unemployment rate. This policy was changed after 1984. The other likely candidate explanation that has been discussed is resource pull from the non-traded goods sector as a result of an appreciating real exchange rate, Lattimore and Wooding (1996).

Within total tradable sector employment, only one sector has gained in employees over the period and that is other manufacturing, which comprises firms producing more elaborated products. All other sectors lost employees. The agricultural (farm) sector, however, lost few employees (actually workers because many in the category are self-employed rather than employees). In agriculture the drop in total labour employed amounted to only 1 percent.

It is also clear from Table 1 that a great deal of upskilling has occurred in all sectors, particularly in the highly skilled class. For example, highly skilled workers increased from 2.5 percent of the workforce in the fabricated metals industry in 1986 to 4.8 percent by 1996. A similar trend occurs with skilled workers with the exception of the fishing industry where the proportion of skilled workers fell from 42 to 34 percent over the period. The other manufacturing sector is more typical with an increase in the proportion of skilled workers from 25 to 31 percent of the total workforce.

The change in the employment share using equation 1 above has been computed for both highly skilled and skilled employees (relative to total employment). For skilled employees, the share of the total increased by 3.1 percent, from around 28 percent in 1986 to nearly 31 percent in 1996. All of this increase (100 percent) is due to the second term of equation 1, the within industries category. This suggests that technical change(s) across the whole tradable sector was the main influence on the rising employment of skilled workers; not trade liberalisation. A similar result is found if the highly skilled share is defined as E in equation 1. Highly skilled employment rose overall from 3 percent in 1986 to 4.8 percent in 1996 and all of this rise (100 percent) is explained by the within industry term. Again this is evidence that the rising demand for higher skilled workers is due to technical change rather than the changing demands of the exportable sector v's the importable sector resulting from trade liberalisation.

These within industry percentages are higher than those found in the United States and the United Kingdom. Berman et al (1994) found, using a white-collar/blue-collar classification, that 70 percent of change in the white-collar employment share in the US was due to within industry shifts over the period 1979 and 1987. In a similar study, Machin (1996) found that 82 percent of the non-manual workers share of employment in the UK was due to within industry shifts over the period 1979 and 1990. These studies and others are summarised by Aghion et al (1999, p. 1637).

## 4. Conclusions and Further Research

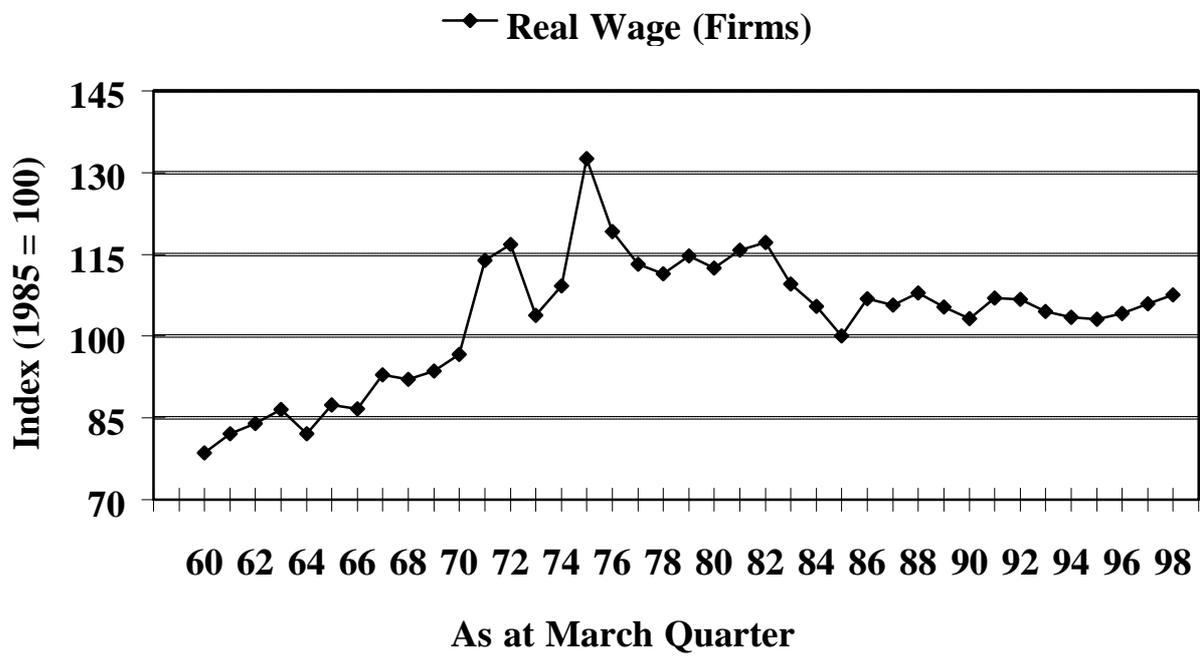
This evidence adds to the research of Deardorff et al (1999) that concluded that trade liberalisation in New Zealand, at least, is not likely to have penalised unskilled (or lowly qualified) employees. However, as Aghion et al (1999) have pointed out, the assumption here that only final goods are involved is likely to be an important one. Furthermore, we cannot reject the trade thesis unless it can be shown that the relative price of less skill intensive goods has also fallen over the period at issue. These two assumptions will be examined in subsequent research.

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**Table 1**  
**Distribution of Employment, by Tradeable Industry by Skill Class, 1986**  
**(1996 in Bold Italics)**

SECTORS	Total	Highly Skilled	Skilled	Unskilled
	Employment	%	%	%
	<b>000</b>	<b>%</b>	<b>%</b>	<b>%</b>
Agriculture and Hunting	98.5	3	23.6	73.5
	<b>97.1</b>	<b>4.4</b>	<b>27.1</b>	<b>68.5</b>
Fishing	4.6	2.1	42.4	55.5
	<b>4.5</b>	<b>4</b>	<b>33.5</b>	<b>62.5</b>
Forestry and Logging	12	4.3	24.4	71.3
	<b>10.5</b>	<b>6</b>	<b>30.3</b>	<b>63.7</b>
Coal, Petroleum and Gas	6.3	5.7	32.5	61.8
	<b>4.7</b>	<b>7.8</b>	<b>34.1</b>	<b>58.1</b>
Food, Beverage, Tobacco	76.7	2.6	22.9	74.6
	<b>58.3</b>	<b>4.8</b>	<b>25.3</b>	<b>69.8</b>
Textile, Apparel and Leather goods	45.6	1.6	17.5	80.9
	<b>27.4</b>	<b>3.4</b>	<b>21.6</b>	<b>75</b>
Wood and Wood Products	27.3	1.4	27.9	70.7
	<b>26</b>	<b>2.5</b>	<b>32.5</b>	<b>64.9</b>
Paper, Paper Products and Printing	36.6	4.4	35.3	60.3
	<b>28.3</b>	<b>6</b>	<b>36.7</b>	<b>57.4</b>
Chemicals	28.2	6.2	30.9	62.8
	<b>21</b>	<b>8.5</b>	<b>33</b>	<b>58.5</b>
Non Metallic Minerals	10.9	3.4	26.1	70.4
	<b>6.9</b>	<b>4.6</b>	<b>28.3</b>	<b>67.1</b>
Basic Metal Industries	7.8	4.6	35.1	60.3
	<b>6.3</b>	<b>6.5</b>	<b>37</b>	<b>56.6</b>
Fabricated Metal, Machinery and Equipment	87.5	2.5	36.8	60.6
	<b>65.6</b>	<b>4.8</b>	<b>40.6</b>	<b>54.6</b>
Other Manufacturing Industries	5.1	2.8	25.2	72
	<b>5.2</b>	<b>4.2</b>	<b>31.4</b>	<b>64.3</b>
<b>TRADEABLE SECTOR, TOTAL</b>	447.3			
	<b>361.9</b>			



**Figure 1**  
**Real Wage Rate**

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