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The changing demand for qualified labour in New Zealand

Ralph Lattimore, Gary Hawke, Ian Duncan and John Ballingall*

Abstract

The relative decline in unskilled wages worldwide has prompted some commentators to place the blame on globalisation and trade liberalisation. A more likely cause in the New Zealand context is technical change that favours the employment of skilled labour. This hypothesis is tested using shift share and factor content analysis for 1986, 1996 and 2001. The results suggest that the upskilling that has occurred economy wide has dominated the effects of any reallocation of highly skilled workers between sectors that may have been caused by trade liberalisation in New Zealand. The upskilling has occurred in the form of rapidly increasing numbers of employees with bachelors and higher degrees. This effect combined with a very large reduction over the last five years in employee numbers with sub degree qualifications raises questions about the prevalence of ‘sheepskin’ effects and supply induced demand in the education sector.

JEL: Trade (F1), Labour Markets (J4), Technological Change (O3)

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The Government's objective, broadly expressed, is that every person, whatever his level of academic ability, whether he be rich or poor, whether he live in town or country, has a right, as a citizen, to a free education of the kind for which he is best fitted and to the fullest extent of his powers.¹

Introduction

The 'Trade and Wages' debate is attempting to understand the relative decline in unskilled wage rates in the developed world over the last 30 or 40 years. One hypothesis that has been promoted was that greatly increased trade flows of manufactured products, particularly from East Asia, over the period embodied relatively more unskilled than skilled labour and put downward pressure on unskilled wage rates. This hypothesis was tested, for the case of New Zealand, using factor content analysis, Deardorff and Lattimore (1996). They used 1986 and 1996 population census data on employment by qualification to show that the exportable sector was relatively more intensive in the employment of unqualified workers than the importable sector. This is indirect evidence that the forces of globalisation and trade liberalisation were unlikely to be the culprit in the case of New Zealand. Trade liberalisation at home or abroad could be expected, via the Stolper-Samuelson theorem, to increase the real wages of unskilled labour in New Zealand.

This result begs the question, of course, as to what else might be the cause of falling relative wages for unskilled labour. The most likely contender is that technical change has been biased against the employment of unskilled labour. This paper addresses this hypothesis. Such technical change is likely to be generic in the sense that the bias should appear in both the tradeable and non-tradeable sectors of the economy and there ought not be significant differences in the bias between exportables and importables.

The second objective of this paper is to open up the discussion on the economics of education and the demand for qualifications by industry. Accordingly, the paper begins with some background information on the evolution of the New Zealand education sector and education policy generally. This is followed by a test of biased generic technical change over the period 1986-2001. The trade thesis is then re-examined using shift-share analysis and updated factor content analysis using 2001 census data.

Background

It is sometimes argued that it would be highly desirable for a country like New Zealand, with its dependence on trade, to have its exports based upon the employment of highly skilled workers. In today's environment highly skilled usually means highly qualified in the formal educational sense. Presumably this was one motivation

¹ Bassett and King (2000, p. 144).

behind the recent ‘Knowledge Wave’ conference. Some scholars have even made a case for subsidising high skill exports, Lang (1994).

There has been a rapid increase in the supply of highly qualified graduates in recent years and so it is timely to take stock to see where these graduates are being employed in the economy – to assess changes in the factor proportions of different classes of workers. The 2001 population census provides such an opportunity.

The role of education in the New Zealand economy has changed a great deal over the last fifty or sixty years. Changes have, in part, been associated with major changes in economic policy. The ‘New Deal’ policy packages of the first labour government (from 1935) involved insulating the tradeable sector of the economy from world market forces. The policies also discriminated against exports via import policies that prohibited imports of goods that could be made in New Zealand. Up till the late 1960s these policies appear to have prevented most tradeable sectors from becoming involved in exporting – only those sectors that had built up a strong comparative advantage over many decades were able to survive. These export sectors were (and still are) intensive in their employment of workers without formal school or tertiary qualifications (relative to the importable sector). New Zealand’s largest imports were of machine tools and equipment whose manufacture required a highly qualified workforce. At this time (the 1950s and 1960s), most students did not complete five years of high school education. It was very common to complete just three years of high schooling and to readily find work in well paid jobs – many of them in the large export oriented food processing sector. Polytechnics had yet to be invented and universities were largely ‘night schools’ to train accountants and lawyers as part-time students. The only full-time students at university were the small proportion of school-leavers who had chosen to be doctors, scientists or academics.

All this is in great contrast to the situation today. A very high proportion of high school students complete five years of schooling and a high proportion of them attend a tertiary training institution. Those who do not enter post-5th form education are not guaranteed a well-paid job. Sholeh Maani has consistently found that the returns to tertiary education are high, Maani (2000). Furthermore, the economic policies that heavily insulated the tradeable sector from world technological and other market influences were changed over the 1980s. The export sector is much more diversified, in terms of products, than it was 40 years ago. Yet, the export sector is still (1996) relatively intensive in its employment of unqualified workers, Deardorff and Lattimore (1996). This is not typical of high income countries. In Australia and the United States, for example, the export sector is either relatively intensive in its use of qualified workers or there is no difference in qualification intensity between importables and exportables.

The question we begin to address in this paper are the possible linkages between New Zealand’s comparative advantages in industry and tertiary qualifications. At the heart of these issues is the type of technical change that is being pursued in New Zealand and the extent to which the export sector is, or is not, contributing to growth through advances in education and human capital formation, Briggs, Bishop and Fan (2001).

Recent education policy reform

The statement drafted by C.E. Beeby, and quoted at the beginning of this paper, was at the core of education policy for 50 years. He formulated the policy statement to

capture what he understood to be in Fraser’s mind and, to his later regret, in the sexist language of the 1930s.

The statement was part of the creation of the Welfare State by the first Labour Government. It followed the experience of the Great Depression when the search for economies in government expenditure had led to the closure of teachers’ colleges. Furthermore, some chambers of commerce called for the abandonment of such extravagances as secondary schooling for people who were going to be unskilled labourers (see especially Fisher, 1932, pp. 74-87). The depression led into an era when government promotion of education was seldom questioned. It is not surprising therefore that the statement is usually taken as a manifesto for educational expansionism, and for identification of education policy with social objectives rather than with education for economic potential. The emphasis is usually implicitly on “free education”, and Beeby himself later acknowledged that his youthful idealism eventually encompassed state-funded education on demand at all levels (Beeby, pers. comm. See also Beeby, 1992 and Alcorn, 1999). However, Beeby had political skills of a high order. The statement also included the phrase “for which he is best fitted” and that looks very like selective education. Those few who are “fitted” for advanced education should have assistance to fulfil their potential; for the vast majority, government expenditure would have to bear only the basic education for which they are “fitted”. There can be little doubt that the classic prescription was uncontroversial precisely because it could be read as supporting any prior position.

Nevertheless, as illustrated by the choice of title of Beeby’s biographer, *‘To the fullest extent of his powers’*, the long-run impact of the classic statement was indeed to place education at the service of social goals.² The key developments from the Thomas report of the 1940s, the then highly controversial school certificate which is now the subject of nostalgic romanticism, was built around providing education so as to facilitate more fulfilling lives for all. Accrediting of university entrance, Beeby’s great crusade of the 1950s against the conservatism of many in universities and of even more among schoolteachers, was similarly motivated (Beeby, 1992). The fundamental thrust of education policy was not very far from the classic response of the political elite to the extension of the suffrage in Britain in the 1860s, “Now we must educate our masters.”

As was true even then, economic motivation was not entirely absent, and economic effects were inevitable. Policies seldom have unique intentions shared by all proponents, and the most important effects are often unintended.

In the school sector, economic motivations were apparent mostly in maintaining and nurturing vocational subjects. Book-keeping and commercial practice were School Certificate subjects, along with woodwork, metalwork and agriculture. New Zealand avoided most of the British debate about “eleven plus” and a division between “grammar” and “secondary modern” schools (and the later problems about “comprehensives”), probably more because small size greatly limited the specialisation involved. Schools were left to work out for themselves how to manage “academic” and “vocational” courses, whether by streaming or by some other means.

² Not that this was unusual. A case can be made that the major purpose of industrial protection was the social goal of providing opportunities for the varied skills and aptitudes of New Zealanders and generating a vibrant society – while agriculture provided the resources that made such social engineering possible. “Import substitution industrialisation” was a misleading transference of rhetoric from societies, especially in Latin America, where industrialisation was seen as the core of *economic* progress, Hawke (1985).

The curriculum for School Certificate supported the inclusion of materialist objectives within education services. (And the small proportion of the age cohort proceeding to the upper end of the secondary schools made it tolerable to educational conservatives.)

The importance of economic motivations and effects was even more obvious in post-compulsory education. Schools contributed to the economy by hosting and often running evening classes related to apprenticeships and other vocational skills (such as book-keeping and commercial practice). But it was in tertiary education that materialist concerns were most apparent. The history of universities is the story of tensions between academics pursuing the ideal of liberal education and funders who saw universities as trainers for the professions of medicine, accountancy, engineering and the law (and for farming, irrespective of any nonsense about maintaining matriculation standards, sub-degree diplomas being the mechanism for training future farmers who could not achieve university entrance standards). The tensions are just as apparent in the Currie Commission which led to the devolution of the University of New Zealand into autonomous universities after 1961 and the Parry Report of 1959 as it was in the Reichel-Tate Commission of the 1920's.

Furthermore, technology was widening and deepening the demand for skills in the economy. A gap was soon identified between the professions for which the universities provided suitable training, and the trades for which schools, apprenticeships and evening classes catered. Technicians, those skilled beyond trades, but not needing or being equipped for professions, were in short supply. This was the essential motivation for the establishment of polytechnics from the early 1960s. (There had been technical high schools in some cities earlier, and in the major centres, they had evolved reasonably organically into more or less conventional secondary schools and technical institutes. But clarification of a distinct role for polytechnics and their spread around the country, were post-1960 developments.) The universities were anxious that the polytechnics should be confined to their specific role. The director-general of education was a member of the UGC Curriculum Committee with a principal task of ensuring that the universities did not use the unfortunate precedent of non-matriculated agricultural diplomas to invade the territory of polytechnics (where education was cheaper and controlled by the Department of Education).

New Zealand economists and educationists responded promptly to the ideas of human capital as they emerged in the 1950s and 1960s. The fundamental idea of education as akin to the accumulation of capital can be found in Adam Smith's *Wealth of Nations*, and in Marshall's *Principles*, but its modern development flows from the work of Schultz and even more Becker. The communication to New Zealand may have owed more to the British economist, John Vaizey and then Mark Blaug, but in any case, the transmission was prompt.³ However, it is difficult to see that there was a great impact on educational policy. The 1960s were already characterized by a belief that education was desirable and tertiary education was especially desirable; the Currie Commission had found favour for its advocacy of expansion, and the Robbins Report in Britain in 1963 reinforced this general conclusion. Human capital ideas, especially in the form that there were high social returns to expenditure on education, merely validated an existing policy stance. Indeed, the important ideas were probably less those of human capital in particular than the analyses of people like Denison that

³ One conduit to the authors was Barbu Niculescu who moved from Melbourne to Wellington in 1962. He also stimulated the early work of C. Selby Smith on returns to education in Australia.

argued directly for attributing significant shares of economic growth to expenditure on education, Denison (19XX). Educationists basked in the glow of social approval – not only did they give individuals better lives but they were responsible for material prosperity as well. This complacency and indulgence in simple-minded congenial attitudes without sceptical analysis was seldom remembered when educationists later claimed, with some justification, that they were being blamed for problems which they had never claimed to solve.

The compatibility of humanistic education with economic requirements was seldom questioned through the 1970s, although there were efforts at fine-tuning the balance by organisations such as the Educational Development Conference. There were growing concerns about whether schools were providing the skills required by the evolving economy, but employers had always grumbled and sought to transfer the cost of specific training to taxpayers so that such complaints were for the most part easily deflected. In retrospect, the greatest failure was in not acting decisively in response to the known but often concealed inadequate provision of educational opportunities to young Maori and Pacific Islanders. There was widespread agreement that change was required, but agreement could not be reached on what change. At the time, the greatest challenge to educational policy was usually seen to be whether a reasonable approximation was being achieved to the ideal of equal access irrespective of household income, Renwick (1986). Indeed, at times, the greatest challenge was dealing with a minister, a former primary school teacher, who was preoccupied with having schools fly the New Zealand flag, and concentrate on a most conservative view of the fundamentals, and certainly have nothing to do with sex education. The economy did not loom large in such an educational sector.

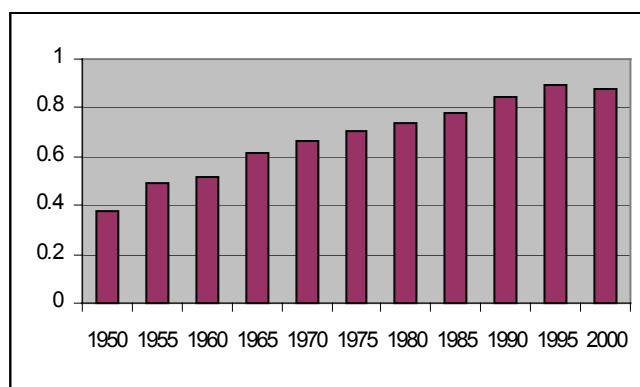
This stalemate ended in the 1980s, not initially by a major development in educational thinking or policy, Hawke (2001). The post-1984 Labour Government promoted a major economic adjustment, and a lot of people were required to change their jobs. Unemployment emerged as a major problem for many years after 1984, and the dominant prescription was skill formation to facilitate adaptability to change. An Ad Hoc Cabinet Committee on Education and Training oversaw the development of programmes, notably Access and MAccess (Maori Access) for this purpose. Regional committees were to identify expanding activities and purchase training for unemployed youths who could no longer find jobs as unskilled labour in sheltered and uneconomic industries and services. It was not long before those committees were complaining that schools and polytechnics could not provide appropriate training. And even more startling, that the young concerned did not have the requisite general education to undertake training. The youth unemployed programmes had to provide remedial education – even life skills to begin youth on the road to “work readiness.”

Ideas that had been talked about in educational circles for some time acquired a new importance. The most important ideas were the need for lifelong education because change would be encountered during the working life of all, and the need for education for all because modern economies required less unskilled labour so that the emphasis should be on increasing capabilities and not selecting an educated elite. These ideas underlay the educational reforms of the 1980s and 1990s. Many educationists regarded them as “managerialist” and a betrayal of the ideas so nobly drafted by Beeby in the 1930s. The small element of justification for such views was that the balance had shifted between economic and social objectives of government expenditure on education.

The supply of tertiary graduates

Education policy is very important in the New Zealand context because the vast majority of primary, secondary and tertiary students are taught in schools controlled by government and largely funded by government. Tertiary education in New Zealand has only been loosely rationed. Matriculation is used to restrict entry to universities for school leavers under the age of 21 but this entry standard is not applied to polytechnics. State subsidies to tertiary institutions have been based on capitation grants that create an incentive to increase student rolls and relax matriculation standards.

Figure 1: Educational participation – schools



Source: New Zealand Official Yearbooks; Ministry of Education

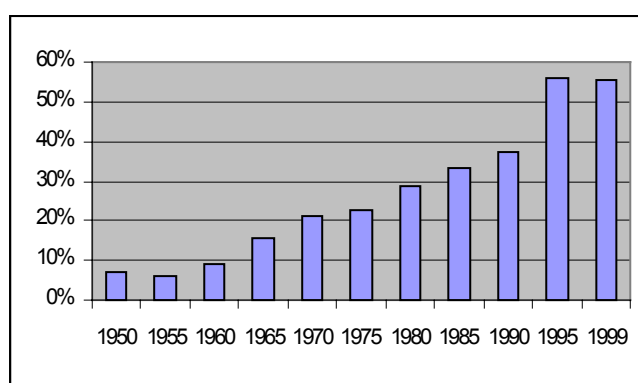
The participation rate of 13-17 year olds at secondary schools has risen steadily since the Second World War, Figure 1. It rose from just less than 40 percent in 1950 to over 75 percent by 1980, where it appeared to have reached a plateau. The participation rate then accelerated again through to 1995. The rate dropped marginally in 2000. The economic reforms addressed the issue of low financial returns in state enterprises. The state owned railways, post office and forestry service were not making high returns in part because these large organisations were used as employment sinks for workers with low qualifications. They were put on a commercial footing from 1984 with no responsibility for assisting in employment policy. Large layoffs of unskilled workers also occurred in the tradeable sector where the combination of subsidy removal, reductions in import protection and an overshooting exchange rate squeezed profitability. This situation created an environment where there were stronger incentives to complete high school education and to obtain tertiary qualifications. The rapidly increasing unemployment rate also provided incentives to stay at school.

Many people were able to use the age (21) exemption to matriculation to gain entry to universities. The universities themselves were under fiscal pressure because capitation grants had not increased significantly for a decade or more. They responded by finding innovative ways of lowering entry standards so that they could admit a growing proportion of school leavers (from growing final year school classes). The result was a very rapid increase in the participation rate of 18-24 year olds in tertiary

institutions after 1985, Figure 2. The participation rate rose from around 30 percent in the early 1980s to over 55 percent by 1995.

In this environment of pressure to obtain jobs and pressure for tertiary education institutions to attract students, supply induced demand can arise. An interesting current case is education for the creative industries. These include such activities as computer software design, fashion design, and screen production. They have attracted a lot of attention from government looking for new economic development strategies.

Figure 2: Educational participation – tertiary



Source: New Zealand Official Yearbooks

These signals, and high profile success stories, have been picked up both by students and by tertiary education institutions. Many students would much rather study something that sounds new and exciting, than a traditional professional course such as accounting or engineering. And institutions have responded by offering a growing menu of degree and diploma courses. The result is that the number of people studying in vocationally oriented tertiary courses hugely outweighs employment prospects in those industries.

Hence, where the dream meets reality is in the job market. Graduates leave three of four year courses in generalist creative studies, sometimes with little operational experience, to find industries in which most people are freelancers, or where permanent jobs for young people are in low-paid support roles. In some cases there is such a large mismatch between the capability and aspirations of the graduates, and the needs of the employers, that potential employers will not even consider such graduates.

At the same time, these industries are complaining about the shortage of skilled technical people. A recent survey of the designer fashion industry reported *inter alia* that:

- Degrees can take 4 or 5 years to complete but involves significantly less practical training than the shorter course of the 1980s;
- Too many people want to be designers but there are not enough with the technical skills to actually make the clothes to the required standard. Design skills alone will not sustain the industry.

- There are sectors of the industry that will not employ graduates. That is the students are paying for an education that is not preparing them for employment in the industry.⁴

The same sort of experience can be found in other industries and in other countries. There is potential here for a waste of resources.

The demand for tertiary graduates

The demand for tertiary graduates is approached from three perspectives. First, the general changes in the employment of tertiary graduates is described over two periods, 1986-1996 and 1996-2001. We focus on two aspects of these changes – the changes in the relative (employment) size of industries and the intensity of employment of qualified workers. The next section quantifies these shifts. Finally, new factor content results for 2001 are presented as an alternate test of the trade versus technology theses.

The data used in this analysis is taken from two sources – the population census, just mentioned and the 1987 (representing 1986) and 1996 input output tables. The input output tables provide estimates of gross output, exports and imports. The 1987 input output table encompasses 62 industries while the 1996 table can be disaggregated to 126 industries. The maximum dimension of the input output table limits the degree of industry breakdown we can view. Accordingly, our analysis of changes from 1986 to 1996 are carried out at the 62 industry level, and at the 126 industry level for the later period. This procedure gives rise to differences in industry coverage. For example, the 62 industry breakdown combines local and central government administration but they are separate ‘industries’ in the later period.

1986-1996

The increasing participation in tertiary education led to a concomitant rise in the share of workers in industry with tertiary qualifications. The proportion of workers with university degrees (which we will term highly qualified workers) rose from just over 7 percent of the New Zealand workforce in 1986 to over 14 percent in 2001.⁵ This is a compound rate of growth of over five percent between 1986 and 1996 and over 6 percent from 1996 to 2001. The proportion of qualified workers (those with sub degree tertiary qualifications) in the New Zealand workforce stayed fixed at around 31 percent over the period 1986-96 but fell to 23 percent in 2001. One explanation is that this qualification (or skill) upgrading has been caused by biased technical change.

There were important changes in total industry employment resulting from changes in market demand, some of which were related to the economic policy reforms. Over the period 1986-96, the employment shares of the primary and manufacturing sectors fell slightly. Among the larger changes, the employment share of the meat processing and the clothing and footwear industries fell by 1 percent and transport equipment manufacture fell 0.6 percent. The restructuring of the meat processing industry was indirectly related to the reforms inasmuch as the sudden removal of meat (and wool) deficiency payments (supplementary minimum prices) reduced the profitability of meat processing as well as farming. All three tradeable industries were affected by the cost-price squeeze induced by the reform sequence of monetary policy tightening and the removal of protection.

⁴ Paul Blomfield ‘The Designer Fashion Industry in New Zealand – Scoping Study.’ June 2002. Report for Industry New Zealand.

⁵ Based on population census data for 1986, 1996 and 2001.

There were major changes in total employment shares in the service sector between 1986 and 1996. Employment shares rose in the restaurant and hotel sector (1.1%), owning and leasing real estate (1.2%), business services (3.5%), education (1.5%) and social and community services (1%). The employment share of the public administration sector remained unchanged. Over this period, service sector employment shares fell in electricity (-0.5%), railways (-0.5%), construction (-0.6%), communications (-1.2%) and health services (-0.5%).

There were very large increases in the employment shares of both qualified (Q) and highly qualified (HQ) workers in selected industries over the period 1986-96. The HQ employment shares rose in all industries except coal mining, petroleum and coal product manufacture and social and community services. The largest primary sector increases occurred in mining (4.5%), agricultural services (3.4%), fishing (2.1%), forestry (1.8%) and sheep farming (1.5%). The largest increases in HQ employment shares in manufacturing occurred in beverages and tobacco manufacture (7.4%), professional and electrical equipment manufacture (6.5 and 6.0%), chemicals (5.4%) and dairy products (3.9%).

The service sector is the largest employing sector in the economy. In large part it is driven by the momentum of Engel's Law. This sector also exhibited some of the largest HQ employment shares from 1986 to 1996 – public administration (7.1%), health (6.6%), insurance (6.6%), banking (8.9%), financial services (8.0%), communications (7.0%), water supply (9.1%) and electricity (8.5%).

1996-2001

The industry total employment shares were similar over the period 1996 to 2001 as compared to the earlier period. The primary sector exhibited small gains and small losses in total employment shares with sheep (-0.4) and dairy farming (-0.1) showing the largest changes. Likewise, manufacturing sector changes were small. The service sector showed the largest changes in total employment shares– retail trade (-0.3%), finance (-0.3%), real estate (-0.1%), computing services (0.5%), business administration (0.5%), central government (-0.5%), primary and secondary education (0.6%) and medical services (1.0%).

Within these totals, the shares of HQ and Q workers changed radically. HQ employment shares in total employment rose a great deal in many sectors while Q employment shares exhibited large falls in all but two (out of 126) industries. The largest HQ employment share gains in the primary sector were in other farming (2.7%), forestry services (6.0%) and coal mining (2.5%). In manufacturing the largest gains were in soft drink manufacture (5.5%), beer and wine (2.5%), publishing (4.3%), fertilizer manufacture (4.4%), medicine and cosmetics (3.0%), glass products (3.1%), photographic and scientific equipment (6.2%) and electronic equipment manufacture (4.0%). The largest HQ share changes in the service sector occurred in gas (17.6%), water (6.9%), life insurance (9.9%) and central and local government (6.0 and 6.8% respectively).

Industry and trade decompositions

A standard procedure is used in this section to decompose the changing employment shares of HQ and Q workers according to whether they are due to changing allocations between sectors or whether they are the result of share changes within sectors, Berman et al (1994). Changing shares of Q or HQ employment within industries are attempting to measure the extent to which the drivers of this type of

‘upskilling’ is common across the economy. High within industry results are indicative of technical change (or some other factor) that appears to be operating right across the economy. Changing shares between industries is measuring resource re-allocations across the economy that is indicating that some sector specific forces are at play. The decomposition is given by equation 1 for qualified (sub-degree) workers.

$$\Delta P_Q = \sum \Delta S_i \times \bar{P}_{Qi} + \sum \Delta P_{Qi} \times \bar{S}_i \quad (1)$$

Where P_{Qi} : the proportion of qualified workers in industry i

S_i : the share of total employment of workers in industry i

– : the mean over the two periods

To repeat, the 1986-1996 decompositions refer to a 62 industry breakdown and the 1996-2001 decompositions to a 126 industry breakdown. The results are given in Table 1 for both highly qualified workers and qualified workers. In the first period the total increase in the employment share of highly qualified workers is 4.7% over the ten year period. Most of this increase, 3.2%, is the result of increasing shares of these workers *within* industries and only 1.4% as a result of changing shares of highly qualified *between* (or across) industries. In other words, there was a strong tendency for qualification upgrading in all industries, rather than in some industries at the expense of others. The same pattern prevails over the later period for highly qualified workers – most of the share increase is due to within industry effects (1.9% of the 2.7% total).

Within industry effects also appear with qualified workers (sub-degree level) but with very different magnitudes. There is virtually no change in the employment share of Q workers over the period 1986-1996. Over this period there is a tiny *between* industry effect counterbalanced by a tiny reduction in the *within* industry effect. Then after 1996, there is a reduction in the *within* industry share of Q workers of 6.9%. This is offset to a small degree by a 0.4% *between* industry reallocation of Q workers.

Table 1: Industry Decompositions of the Rise in the Share of Highly Qualified Workers

	Between	Within	Total
1986/96			
Highly Qualified	0.014	0.032	0.047
Qualified	0.003	-0.003	Zero
1996/01			
Highly Qualified	0.008	0.019	0.027
Qualified	0.004	-0.069	-0.066

These results provide some evidence that there have been two biases affecting skilled employment shares over the period. The first, over the whole period 1986-2001, was a force biasing employment in favour of workers with university degrees (HQ). If it

were technical change, such technical changes would need to be applicable across the diverse range of business tasks from farming to health services to generate these results, though there was some share changes *between* industries. Possible candidates might include disembodied technical changes in information technology and general increases in business complexity, ‘sheepskin’ effects or supply induced demand.

The second conclusion is that more recently, changes have introduced a bias against the employment of workers with sub-degree tertiary qualifications. Taken at face value, and bearing in mind the short timeframe involved, this would suggest that suddenly, sub-degree qualifications become redundant relative to degree qualifications. This is not very credible. More likely, it is caused by the large increase in the number of degree graduates coming onto the market that caused a form of credentialling or ‘sheepskin’ effect as identified by Gibson (2000) using individual record data. There might also be education supply-side influences. Over the last decade or so there have been a number of undergraduate diplomas replaced by degrees. For example, teaching, nursing and agricultural diplomas have been largely replaced by degrees. Some polytechnics have had degree-level courses approved. All tertiary institutions have had strong incentives to increase student numbers and to increase the time students remain in study.

The Berman methodology used above can also be adapted here to re-examine the hypothesis that trade has had an impact on the relative demand for unskilled workers. This is done by decomposing the between and within industry affects over the period 1986 and 1996 in export, import and domestic consumption shares. This can’t be done to 2001 because gross output data by industry is only available in the input-output tables, the latest of which is for 1996. The view taken here, following Berman, is that each sector produces goods either for domestic consumption or for exporting. Imports substitute for employment in New Zealand industries they compete with. Reallocations of employment are made from or to a pool of labour in the domestic consumption sector. It is assumed that the labour intensity of each skill class, in each industry, is the same for exports, imports and the domestic consumption sector with imports defined to be negative. The *between* industry shares in this trade decomposition is given as equation 2.

$$\sum \Delta S_i \times \bar{P}_{HQi} = \sum \Delta S_i^X (\bar{P}_{HQi} - \bar{P}_{HQ}^C) + \sum \Delta S_i^M (\bar{P}_{HQi} - \bar{P}_{HQ}^C) + \sum \Delta S_i^C (\bar{P}_{HQi} - \bar{P}_{HQ}^C) \quad (2)$$

Where $\bar{P}_{HQ}^C = \frac{\sum \Delta S_i^C \times \bar{P}_{HQi}}{\sum S_i^C}$

and the superscripts X, M and C represent the exports, imports and domestic consumption sectors.

The *within* industry shares are given by equation 3.

$$\sum \Delta P_{HQi} \bar{S}_i = \sum (\Delta P_{HQi} - \Delta P_{HQ}^C) \bar{S}_i^X + \sum (\Delta P_{HQi} - \Delta P_{HQ}^C) \bar{S}_i^M + \sum (\Delta P_{HQi} - \Delta P_{HQ}^C) \bar{S}_i^C + \Delta P_{HQ}^C \bar{S}_i^C \quad (3)$$

$$\text{Where } \Delta P_{HQ}^C = \frac{\sum \bar{S}_i^C \times \Delta P_{HQi}}{\sum \Delta \bar{S}_i^C}$$

The trade decomposition results are given in Table 2 for the HQ (degree holder) group of workers. The sub-total *between* and *within* industry shares are the same as before (1.4 and 3.2%). Most of the total positive share change is due to *within* industry share growth – the right hand column. Of the total *within* industry effect, most of the share growth is caused by changes in the domestic consumption sector (3.3%). The trade effects are very small, amounting to only one tenth of the consumption sector effect (0.3% and –0.4%). This is evidence that the increasing demand for highly qualified labour was not caused by changes in exports or imports over the period 1986 and 1996. Conversely, trade does not appear to have reduced the demand for unqualified labour or what we might call unskilled labour.

Table 2: Trade Decomposition of the Rising Share of Highly Qualified Workers

	Between	Within
1986/96		
Exports	-0.078	0.003
Imports	-0.254	-0.004
Consumption	0.346	0.033
	0.014	0.032
Total		0.047

This evidence supports the factor content results obtained by Deardorff and Lattimore (1999) for the same time period. That study concluded that declining unskilled wages were not likely to be caused by increased imports in New Zealand. The shift-share results here more directly point to general factors in the New Zealand economy as the source of changes in wage relativities between qualified and unqualified workers. This could be the result of general biased technical changes taking place across the economy, supply effects or it could be the result of strong ‘sheepskin’ effects, or some combination of the three.

Factor content analysis, 2001

Factor content analysis provides an alternative way of examining structural changes in employment patterns across the economy. The 2001 population census data provides another observation for the analysis. The factor content analysis uses the same methodology as that reported in Deardorff and Lattimore (1999). It is carried out using the 1996 126 industry input-output table to compute the labour content of trade for Māori, non-Māori, females and males, full and part-time workers for the standard 14 categories of highest formal educational qualifications obtained by employees. The full set of results is given as the Appendix Table. Selected results are presented in Table 3.

The results are expressed as percentages of the workforce for each class of workers. Positive values indicate that that class of workers are more intensively employed in export and export allied industries than they are in import competing (and allied) industries, and vica versa for negative values.

Table 3 Selected Factor Content of Trade Results – Proportion of workforce %

	1996		2001	
	Māori	Non-Māori	Māori	Non-Māori
Female FT Bach. Degree	-2.09	-1.92	-2.63	-3.12
Female FT No Qualification	3.20	0.82	-0.66	-4.22
Female PT Bach. Degree	-0.85	1.84	1.88	0.35
Female PT No Qualification	7.88	4.39	9.54	3.04
Male FT Bach. Degree	-5.04	-7.36	-4.10	-7.95
Male FT No Qualification	9.48	5.40	6.77	0.67
Male PT Bach Degree	4.67	0.60	0.39	-0.95
Male PT No Qualification	14.03	9.78	18.07	6.21
Total Bach. Degree	-2.60	-4.84	-2.42	-5.35
Total No Qualification	8.04	4.39	4.92	0.78

Source: Appendix Table

So, for example, a net factor content of -0.67% for female Māori full-time workers with higher degrees in 1996 (first row, first column) means that this class of workers are more intensively employed in import competing activities by a margin that is equivalent to 0.67% of the number of workers in this category. Their concentration in import competing activities means that they will tend to benefit from trade policy interventions at home or abroad and that they will tend to be disadvantaged by the removal of foreign or New Zealand trade policy interventions. They will also tend to benefit from world market forces that reduce New Zealand's terms of trade and be made worse off by market improvements in the terms of trade.

Female full-time Māori workers with no qualifications in 1996 (3.2%) are affected by the opposite effects. They would benefit from trade liberalisation or market effects where New Zealand's terms of trade improved.

Around 60% of all workers have no qualifications and, as noted earlier, the proportion of workers with higher or bachelor's degrees has been rapidly increasing over the last 15 years. We are particularly interested in changes in factor contents for these two groups.

The general pattern of sectoral orientation in 2001 was for workers with no qualifications to be employed intensively in export sectors, especially if they are Māori. Male full-timers (FT) without qualifications have net factor contents of 6.77% for Māori and 0.67% for non-Māori. Part-time (PT) workers are also more intensively employed in exporting. For example, all female PT workers have positive net factor contents, except those with higher degrees. Workers with higher qualifications tend

to be intensively employed in import-competing activities, especially if they are male. All higher degree employee groups have negative net factor contents. This is the same basic pattern as that found in 1986 and 1996 in the earlier study. It is also likely to have been the prevailing pattern in New Zealand since international trade commenced 200 years ago.

However, there have been some major structural changes in the last five years for degree holders and workers without qualifications. There have been some major shifts away from the export sector by non-Māori. Māori workers have tended to move in the opposite direction (both with some exceptions of course). Female FT non-Māori workers without qualifications have experienced a change in net factor content from 0.82 to -4.22% since 1996, male FT non-Māori workers without qualifications have moved from 5.4 to 0.67%. The degree holder worker categories have tended to become more negative for Māori and non-Māori alike. There have been a number of offsetting changes. Female and male Māori PT workers have tended to concentrate more in the export oriented sectors, especially those without qualifications who moved from 7.88 to 9.54% for females and 14.03 to a whopping 18.07% for males.

Another characteristic of the changes has been for a clearer separation to develop between full and part-time workers. In 2001, New Zealand is much more like Australia [Lattimore and Cagatay (1999)] with part-time workers oriented towards the export sector and full-time workers towards the import competing sector. This might be because seasonal work is more prevalent in the export sector or because world market forces put more pressure on export oriented firms to economise on all resources including labour.

The increasing concentration of workers with degrees outside the export sector over the period may be important from a growth perspective. The net factor content of trade for non-Māori with higher degrees is -4.51% and for bachelors graduates, -5.35%. Furthermore, it has become more negative over the last five years. The values are less negative for Māori and have not changed as much since 1996. This appears to be a significant bias against the employment of highly qualified workers in the export sector, which is a major contributor to growth.

There are a number of possibilities here. First, a great deal of export sector research and development is carried out by the crown research institutes (CRIs) but the input-output table does not fully track the linkage between the institutes and the export sectors. This is because a large part of institute funding comes directly from government. To the extent that CRIs are carrying out valuable research to exports, and given the highly qualified staff they employ, the net factor contents of trade for degree holders is biased downwards.

Another potentially important factor is the nature of the technical changes at the sectoral level. It is possible that technical change in New Zealand's export sector differs from that in other sectors in terms of embodiment. If new technology in exports tends to be imported and embodied in capital equipment and other non-labour inputs, then the export sector may not need a high proportion of highly qualified workers. Certainly, the high concentration of unqualified workers in exports over a long period of time might suggest that this is the case. On the other hand, the relatively slow growth in New Zealand exports suggests that other factors may be at play here. The major economic reforms liberalised trade to some extent and should have resulted in a significant speeding up of export growth. The economic reforms did not,

however, result in the deregulation of major export monopolies – in fact the single desk kiwifruit authority was created by the fourth labour government. It has only been in the last two years that moves towards removing export monopoly rights have begun. It is possible that the presence of these institutions has led to the slower adaptation of available disembodied technical change than would have otherwise been the case.

Conclusions

There has been a rapid upskilling of the workforce since 1986 in terms of the proportion of highly qualified workers (degree holders). This growth has occurred at the expense of an apparent loss of popularity for sub-degree qualifications. These changes have occurred right across the economy. Upskilling within sectors has tended to dominate reallocations of highly skilled workers between sectors in spite of the fact that there are significant differences in the proportions of highly qualified workers by sector. At the same time, high unemployment levels in the past, changes in education policy and tertiary institutional incentives appear to have stimulated the supply of highly qualified graduates – a type of supply induced demand. Taken together, this evidence suggests that while generic, biased technical change in favour of highly qualified workers might be influencing these labour demand changes, ‘sheepskin’ effects (akin to those found by Gibson [2000]) and supply induced demand might also be operative.

The evidence for generic technical change of this type is indirect but the contenders would include the expanding use of information technology software that requires disembodied operator skills.

The analysis also provides further evidence than the main ‘culprit’ in the New Zealand trade and wages debate is probably technology rather than trade liberalisation, though some trade influence was found. Around 80-90% of the rising proportion of highly qualified workers was found to be due to generalised upskilling within all sectors of the economy with the remainder due to changes in trade.

The employment structure of the economy continues to change rapidly through to 2001 at both the high and low skill end of the market. Māori workers without qualifications are more concentrated in the export portion of the tradeable sector than they were five years ago. This bodes well for Māori incomes provided that the export sector continues to flourish. Non-Māori workers are more concentrated than they were in import competing related activities. Highly qualified workers tend to be moving away from export activities.

Studies of this type often raise more questions than they answer and that is certainly true here. These results beg important questions about the nature of technical changes that appear to be operating by directly examining business processes across a broad range of sectors. The export sector demands much closer examination because it is heavily reliant upon research and development conducted by outside bodies based largely on public funding.

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Appendix Table Factor content of trade – proportion of workforce

Sex	Labour Force	Qualifications	Net factor	Net factor	Net factor	Net factor
			content of trade 1996: Māori	content of trade 1996: Non-Māori	content of trade 2001: Māori	content of trade 2001: Non-Māori
Female	Employed Full-Time	Higher Degree	-0.67%	-1.92%	-2.63%	-3.12%
Female	Employed Full-Time	Bachelor Degree	-2.09%	-3.66%	-2.12%	-4.32%
Female	Employed Full-Time	Advanced Vocational Qualification	0.30%	0.30%	-0.44%	-0.77%
Female	Employed Full-Time	Intermediate Vocational Qualification	-4.53%	-4.41%	4.54%	0.44%
Female	Employed Full-Time	Skilled Vocational Qualification	0.38%	-0.82%	2.41%	0.37%
Female	Employed Full-Time	Basic Vocational Qualification	1.47%	-1.22%	2.85%	-0.42%
Female	Employed Full-Time	Higher School Qualification	-2.60%	-4.48%	-0.54%	-2.49%
Female	Employed Full-Time	Sixth Form Qualification	-3.23%	-7.58%	-0.90%	-4.11%
Female	Employed Full-Time	School Certificate Qualification	-1.93%	-3.75%	1.43%	-1.93%
Female	Employed Full-Time	Overseas School Qualification	1.05%	-4.47%	-3.99%	-2.75%
Female	Employed Full-Time	No Qualification	3.20%	0.82%	-0.66%	-4.22%
Female	Employed Full-Time	Not Specified	5.32%	-2.45%	5.19%	2.53%
Female	Employed Full-Time	Not Elsewhere Included	2.86%	-0.88%	6.03%	2.36%
Female	Employed Full-Time	Total	0.59%	-2.14%	2.06%	-1.44%
Female	Employed Part-Time	Higher Degree	1.10%	1.21%	-0.47%	-0.14%
Female	Employed Part-Time	Bachelor Degree	-0.85%	1.84%	1.88%	0.35%
Female	Employed Part-Time	Advanced Vocational Qualification	3.57%	2.63%	1.75%	0.99%
Female	Employed Part-Time	Intermediate Vocational Qualification	4.97%	2.96%	4.93%	3.25%
Female	Employed Part-Time	Skilled Vocational Qualification	3.13%	2.04%	3.65%	1.54%
Female	Employed Part-Time	Basic Vocational Qualification	4.17%	2.46%	5.18%	2.04%
Female	Employed Part-Time	Higher School Qualification	5.33%	5.77%	6.52%	4.95%
Female	Employed Part-Time	Sixth Form Qualification	4.75%	1.51%	4.64%	1.43%
Female	Employed Part-Time	School Certificate Qualification	4.80%	1.67%	6.57%	2.39%
Female	Employed Part-Time	Overseas School Qualification	2.43%	-0.04%	3.01%	0.75%
Female	Employed Part-Time	No Qualification	7.88%	4.39%	9.54%	3.04%
Female	Employed Part-Time	Not Specified	8.07%	3.63%	8.04%	4.65%
Female	Employed Part-Time	Not Elsewhere Included	7.40%	3.52%	7.99%	4.19%
Female	Employed Part-Time	Total	6.02%	2.88%	6.26%	2.49%
Male	Employed Full-Time	Higher Degree	-4.95%	-4.97%	-3.16%	-6.64%
Male	Employed Full-Time	Bachelor Degree	-5.04%	-7.36%	-4.10%	-7.95%
Male	Employed Full-Time	Advanced Vocational Qualification	0.84%	-2.31%	0.05%	-3.10%
Male	Employed Full-Time	Intermediate Vocational Qualification	-7.04%	-9.85%	1.08%	-7.20%
Male	Employed Full-Time	Skilled Vocational Qualification	-1.72%	-4.49%	-0.95%	-4.79%
Male	Employed Full-Time	Basic Vocational Qualification	6.34%	-1.09%	5.06%	-1.15%
Male	Employed Full-Time	Higher School Qualification	1.54%	-2.63%	2.74%	-2.19%
Male	Employed Full-Time	Sixth Form Qualification	1.03%	-2.70%	3.66%	-1.20%
Male	Employed Full-Time	School Certificate Qualification	5.42%	2.53%	6.11%	2.41%
Male	Employed Full-Time	Overseas School Qualification	-3.00%	-4.23%	-0.45%	-4.61%
Male	Employed Full-Time	No Qualification	9.48%	5.40%	6.77%	0.67%
Male	Employed Full-Time	Not Specified	8.32%	2.85%	8.50%	5.59%
Male	Employed Full-Time	Not Elsewhere Included	6.20%	-0.63%	9.66%	3.59%
Male	Employed Full-Time	Total	5.15%	-0.95%	5.43%	-1.03%

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Male	Employed Part-Time	Higher Degree	1.25%	1.25%	1.24%	-0.27%
Male	Employed Part-Time	Bachelor Degree	4.67%	0.60%	0.39%	-0.95%
Male	Employed Part-Time	Advanced Vocational Qualification	5.90%	3.07%	6.56%	1.71%
Male	Employed Part-Time	Intermediate Vocational Qualification	0.70%	-3.96%	6.01%	1.71%
Male	Employed Part-Time	Skilled Vocational Qualification	6.88%	0.21%	5.44%	0.11%
Male	Employed Part-Time	Basic Vocational Qualification	10.58%	6.27%	8.66%	3.92%
Male	Employed Part-Time	Higher School Qualification	8.20%	5.49%	7.28%	5.01%
Male	Employed Part-Time	Sixth Form Qualification	9.91%	6.41%	8.80%	5.97%
Male	Employed Part-Time	School Certificate Qualification	10.11%	7.16%	9.25%	6.13%
Male	Employed Part-Time	Overseas School Qualification	5.90%	3.36%	9.26%	1.93%
Male	Employed Part-Time	No Qualification	14.03%	9.78%	18.07%	6.21%
Male	Employed Part-Time	Not Specified	4.64%	4.52%	11.80%	7.93%
Male	Employed Part-Time	Not Elsewhere Included	11.39%	5.58%	12.72%	7.72%
Male	Employed Part-Time	Total	11.39%	5.92%	10.36%	4.82%
Total	Total	Higher Degree	-1.91%	-3.21%	-2.06%	-4.51%
Total	Total	Bachelor Degree	-2.60%	-4.84%	-2.42%	-5.35%
Total	Total	Advanced Vocational Qualification	0.96%	-0.08%	0.62%	-1.17%
Total	Total	Intermediate Vocational Qualification	-5.42%	-8.42%	3.14%	-4.19%
Total	Total	Skilled Vocational Qualification	-0.74%	-3.18%	0.32%	-3.28%
Total	Total	Basic Vocational Qualification	4.84%	-0.24%	4.50%	-0.11%
Total	Total	Higher School Qualification	2.11%	-0.19%	3.10%	0.13%
Total	Total	Sixth Form Qualification	1.04%	-2.81%	2.53%	-1.15%
Total	Total	School Certificate Qualification	3.25%	0.62%	4.90%	1.27%
Total	Total	Overseas School Qualification	0.93%	-3.15%	1.15%	-2.79%
Total	Total	No Qualification	8.04%	4.39%	4.92%	0.78%
Total	Total	Not Specified	7.20%	1.07%	7.90%	4.85%
Total	Total	Not Elsewhere Included	5.87%	0.28%	8.84%	3.72%
Total	Total	Total	4.39%	-0.27%	4.86%	-0.24%