

Understanding reductions in the gender wage differential 1997-2003

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Abstract

The female-to-male hourly earnings gap in New Zealand narrowed by 4 percentage points between 1997 and 2003. The objective of this paper is to throw light on the factors that contributed to recent reductions in the economy-wide gender pay gap, by analysing statistical data from the HLFS-Income Survey in an exploratory manner. The paper begins by presenting descriptive information on the changes in the size and structure of the pay gap, and linking those changes to movements in the underlying male and female earnings distributions. The second part of the paper considers the impact of a number of factors that may have contributed to the improvement in women's relative earnings, including changes in the attributes of the workforce, recent patterns of job growth, and the level of the minimum wage.

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Access to the official data used in this study was provided by Statistics New Zealand under conditions designed to give effect to the confidentiality provisions of the Statistics Act 1975. The results presented in this paper are the work of the author, not Statistics New Zealand.

Disclaimer

The views expressed in this paper do not necessarily represent the views of the Department of Labour. The author is responsible for all errors and omissions.

1. Introduction

The female-male hourly earnings ratio in New Zealand rose by 4 percentage points during the six years from 1997 to 2003. This paper poses the question of what factors contributed most to the decline in the gender pay gap during this period. To shed light on the question, it takes a 'macro'-level perspective and reviews evidence on the wider changes that have occurred in the labour market, population and workforce during this period. The paper is intended to provide insights and provoke discussion, rather than to provide a comprehensive or conclusive explanation of the gender gap reduction.

The paper begins with a descriptive summary of the recent changes in the size and structure of the gender pay gap. It goes on to present some contextual information on other relevant changes in the labour market during the 1997-2003 period. The final part of the paper puts forward and briefly assesses several hypotheses about the possible causes of the reduction in the gender gap in this period.

The population of study is employees aged 16-64 years. The data source is the Income Survey (IS), an official household survey that is conducted each June quarter as a supplement to the Household Labour Force Survey. During the period 1997-2003, changes in the wage structure were measured in a consistent manner by the Income Survey. We use data on each individual's gross total hourly and weekly usual earnings, adjusted to June 2003 dollar values. Further information on the sample of employees and measure of earnings is given in the Appendix.

2. Reductions in the aggregate gender earnings gap

Between 1997 and 2003, the ratio of female to male hourly earnings increased by approximately 4 percentage points, raising the gender wage ratio to a historic high of 88.3. The ratio of female to male full-time weekly earnings also increased in this period, by a similar amount (4 percentage points).

Table 1 presents several alternative measures of the female-to-male earnings ratio, using information on the hourly earnings of all employees; the hourly earnings of full-time employees; and the weekly earnings of full-time employees, and using different measures of the centre of the earnings distribution. While these alternative measures give somewhat different estimates of the size of the gender pay gap at any point in time, they show similar trends during the past six years. In the remainder of this paper, the geometric mean is used as the basis for calculating the gender pay ratio.¹

¹ The geometric mean is the antilog of the mean of the log distribution. Geometric means are less sensitive to changes in the upper tail of the earnings distribution than are arithmetic means, and they tend to lie between the arithmetic mean and the median.

Table 1: Alternative measures of the gender pay gap 1997-2003

	1997	1999	2001	2003	<i>% chge</i> <i>1997-03</i>
Hourly earnings, all employees					
Arithmetic means	83.3	83.4	83.9	86.4	3.8
Geometric means	84.9	86.4	86.8	88.3	4.0
Medians	83.9	85.2	88.1	88.1	4.9
Hourly earnings, full-time employees					
Arithmetic means	83.6	85.7	86.2	87.0	4.1
Geometric means	85.8	88.8	89.3	90.1	5.1
Medians	87.7	91.9	91.2	92.3	5.2
Weekly earnings, full-time employees					
Arithmetic means	76.8	78.7	79.3	79.8	3.9
Geometric means	78.8	81.2	81.9	82.2	4.3
Medians	79.8	82.9	83.3	85.0	6.6

Table 2 shows the underlying movements in male and female real earnings that gave rise to the reduction in the gender gap. While average real hourly earnings rose by about 8 percent in total (an average of 1.3 percent per year), females experienced significantly faster growth in real wages than did males. Over the total six year period, the real hourly earnings of women increased by 10 percent, compared with an average increase for men of around 6 percent.

The real weekly earning of full-time employees grew in a similar fashion, with total increases of around 5 percent for males and 9 percent for females.

Table 2: Growth in real earnings by gender

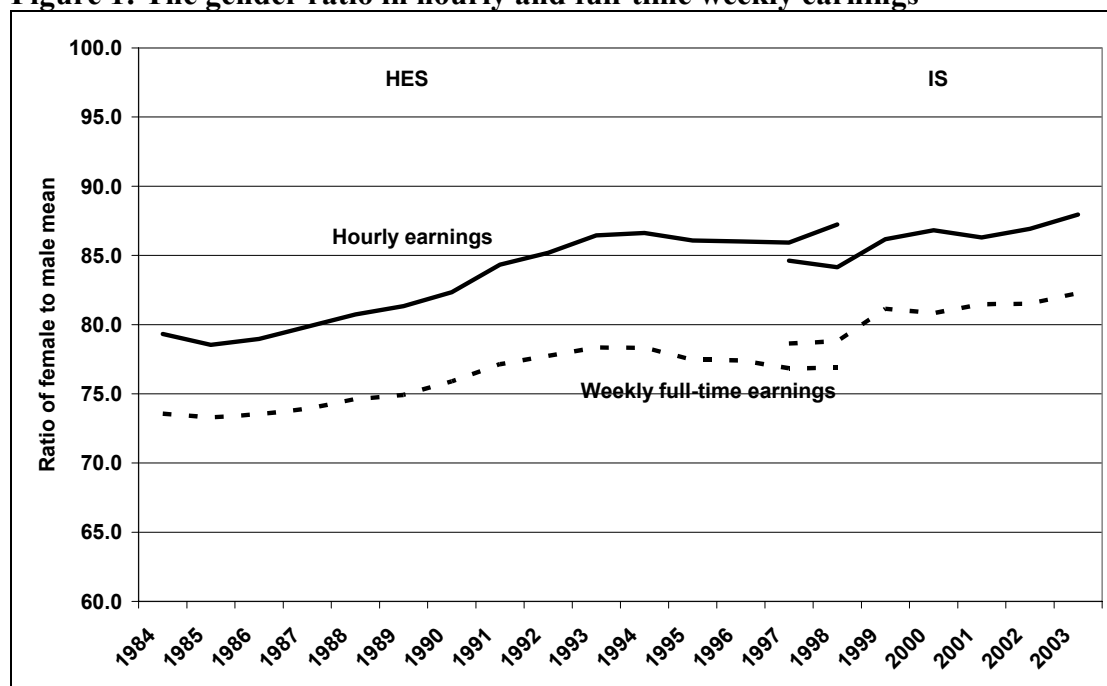
	1997	2003	<i>% Chge</i> <i>1997-03</i>
	\$	\$	
Hourly earnings, all employees			
Males	15.74	16.68	6.0
Females	13.36	14.73	10.2
All	14.55	15.69	7.9
Hourly earnings, full-time employees			
Males	16.18	17.17	6.1
Females	13.87	15.47	11.5
All	15.23	16.45	8.1
Weekly earnings, full-time employees			
Males	720.29	754.98	4.8
Females	567.52	620.64	9.4
All	655.61	697.11	6.3

Note: The underlying averages are geometric means.

Figure 1 illustrates the trend in the gender pay gap recorded by the Income Survey during the last six years. To provide some historical perspective, it also plots the trends apparent between 1984 and 1998, drawing data from an earlier data source, the Household Economic Survey.² While the two series are not perfectly comparable, together they suggest that the female-male earnings ratio probably increased by around 8-9 percentage points in total between 1984 and 2003.

² The Household Economic Survey is no longer conducted on an annual basis.

Figure 1: The gender ratio in hourly and full-time weekly earnings



Notes: The underlying averages are geometric means. The samples are limited to employees aged 20-59 years so that the HES and IS figures can be validly compared. HES=Household Economic Survey. IS=Income Survey.

Annual changes in Income Survey estimates of average male or female hourly earnings are not always large enough to be statistically significant.³ These sampling error problems usually disappear when longer periods of time, and larger changes, are considered. Our sampling error estimates indicate that the changes in the aggregate ratios of female-to-male earnings, taken over the entire period from 1997 to 2003 (as shown in Table 1), are in fact statistically significant.

Variations across sub-populations

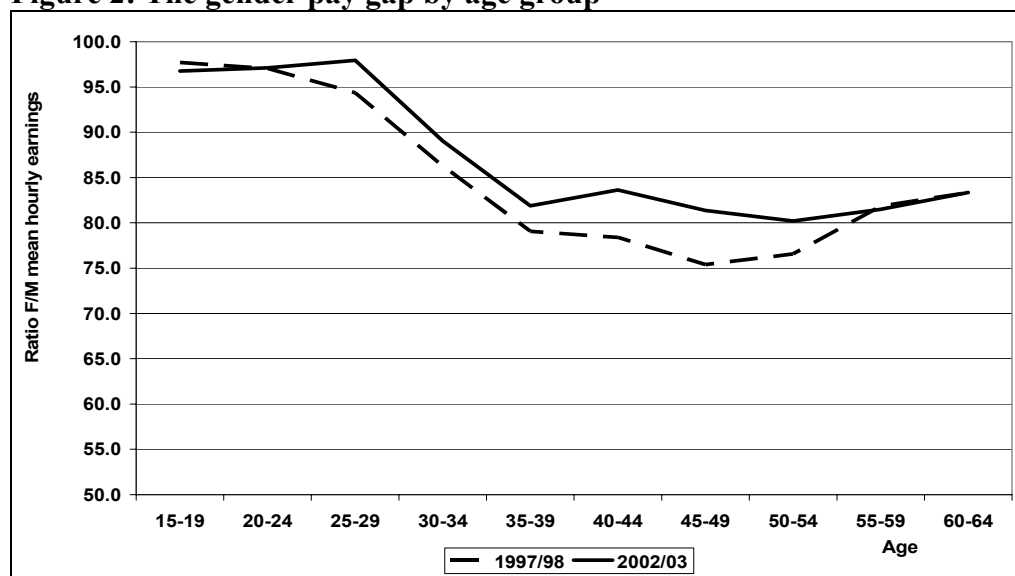
The gender pay differential varies in size across demographic and socio-economic groups, and between sectors of the labour market. It is of interest to know whether these dimensions of the gender pay gap were stable or changing in the period under consideration. Table 3 gives information on changes the gender pay gap by age group, level of qualifications, and ethnic group, during the past five years.

The data suggest that the pay gap faced by young workers (16-24) and by older workers (55-64) changed relatively little in this period of analysis. The contraction of the pay gap was concentrated in the prime age groups of 25-54 years. Figure 2 provides additional information on the pattern of change by age group, showing that women in the 40-54 year age groups experienced the largest increase in earnings, relative to similarly-aged men.

³ By statistically significant, we mean that the change is outside the 95 percent confidence interval around the estimate of change.

Table 3: The gender pay gap by demographic characteristic

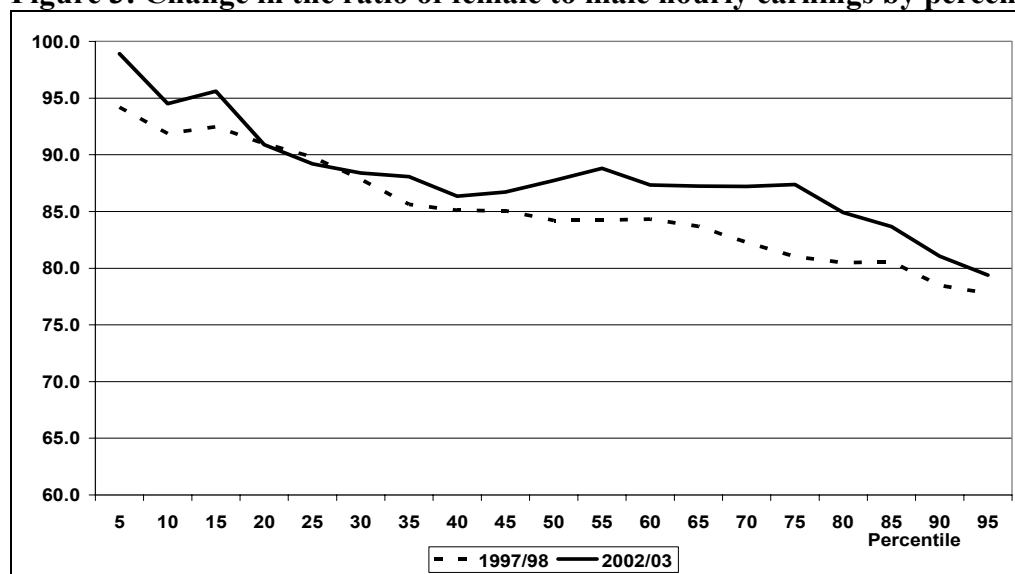
	F/M pay ratios		5-year change
	1997/98	2002/03	
Broad age group			
16-24	96.7	96.4	-0.3
25-39	86.5	89.4	2.9
40-54	76.8	81.9	5.1
55-64	82.4	82.2	-0.3
Highest qualification			
No qualifications	86.6	89.8	3.2
School qualifications	90.2	93.0	2.8
Vocational qualifications	84.8	86.1	1.4
Degree	81.2	85.0	3.8
Ethnic group			
Pakeha	84.5	86.5	2.0
Maori	86.5	89.5	3.0
Pacific Island peoples	92.6	97.6	5.0

Figure 2: The gender pay gap by age group

Note: The underlying averages are geometric mean hourly earnings.

There is less evidence of significant variation in the pattern of change across educational and ethnic groups. However, the data suggest a particularly large reduction in the gender differential for Pacific Island peoples.

Finally, we can consider the size of the reduction in the gender gap at different levels of earnings. Figure 3 plots the size of the gender pay gap by percentile of hourly earnings in 1997/98 and in 2002/03. The improvement in women's relative wages is shown by the vertical distance between the lines, and this distance is largest between the 50th and 80th percentiles. This indicates a somewhat more rapid improvement in the *relative* earnings of women who were located in the mid to upper ranges of the wage distribution, than elsewhere.

Figure 3: Change in the ratio of female to male hourly earnings by percentile

3. The labour market context

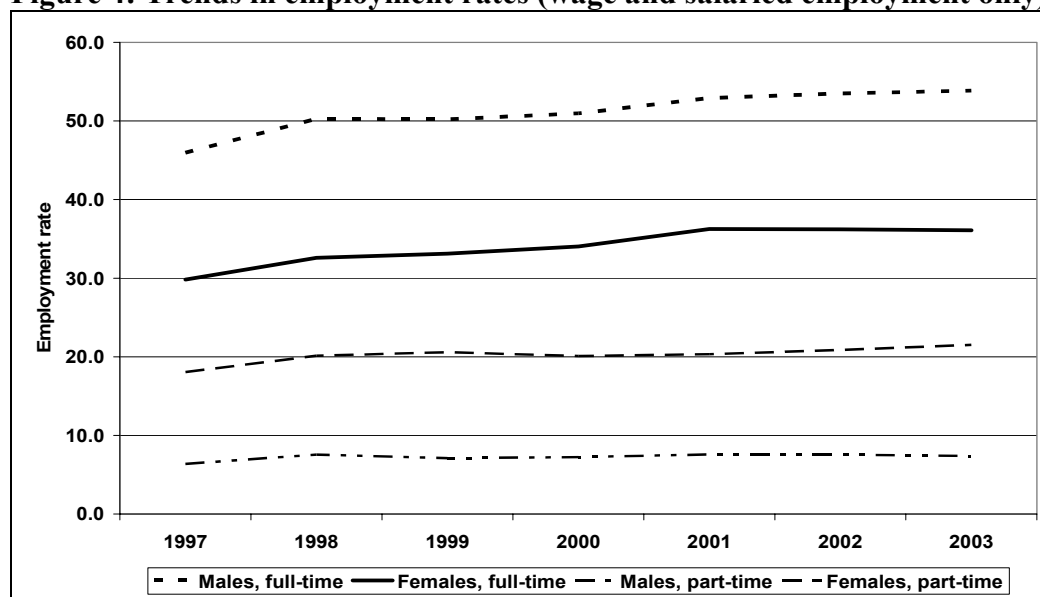
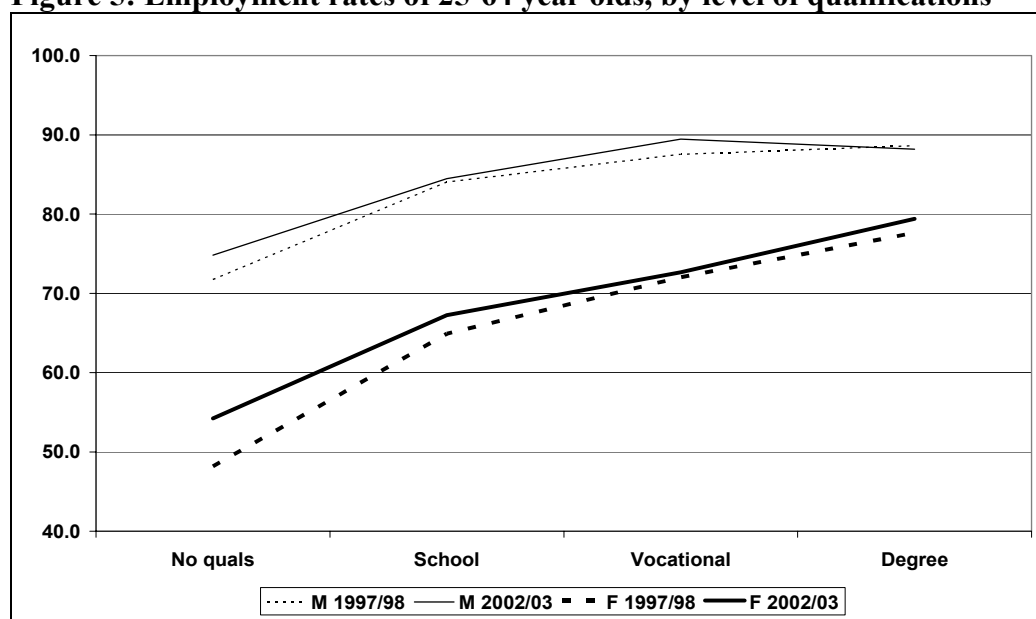
The size of the aggregate (or national-level) gender pay gap can be influenced by a wide variety of developments in the economy or society that influence employment rates, the composition of the workforce, wage levels, and the structure of wages. This section briefly reviews some of the key labour market changes in this period, seeking to identify trends that may have made a reduction in the gender earnings gap more likely.

Rising employment rates

Relatively high rates of economic growth lead to rapid employment growth during this period. Figure 4 illustrates the trend in male and female rates of wage and salaried employment.⁴ The male employment rate increased by 8.9 percentage points overall, and the female employment rate by 9.7 percentage points.

For both men and women, the full-time employment rate increased a little more rapidly than the part-time employment rate, raising the full-time share of the workforce. Other data, not shown here, indicate that the employment rates of prime-age and older adults grew more strongly than those of young people. Finally, the employment growth phase of 1997-2003 pulled an increasing proportion of adults with no formal qualifications or low levels of formal qualifications into the workforce. Figure 5 illustrates the extent to which the recent phase of employment growth has had its largest impact on the employment rates of less educated adults. For example, the employment rate of 25-54 year old women with no qualifications increased by 6.1 percentage points, about three times larger than the increase in the employment rate of women with university qualifications (1.8 percentage points).

⁴ That is, the proportion of working-aged men or women who were employed in waged or salaried jobs.

Figure 4: Trends in employment rates (wage and salaried employment only)**Figure 5: Employment rates of 25-64 year olds, by level of qualifications**

Aggregate employment rates are relevant for understanding the gender pay gap because they provide an index of the extent to which less skilled and less educated workers are employed, rather than unemployed or out of the labour force. A rise in the proportion of less skilled and less educated males/females in employment has the potential to reduce average male/female wages, through its impact on the composition of the workforce.⁵

⁵ See OECD (2002, p.100) for a discussion of the relationship between women's employment rates and the gender pay gap. It argues that cross-country difference in national female employment rates are mainly accounted for by differences in the degree of integration of less-educated, lower-paid women into employment. In countries where a higher proportion of less-educated women are employed, the gender pay gap tends to be wider.

What is interesting about the period from 1997 to 2003 is that the male and female employment rates rose at roughly similar rates. The expansion of both male and female workforces involved considerable growth in the participation of less educated workers. The simple descriptive statistics presented here suggest that these changes were not *strongly* gender-differentiated in their pattern or impact, suggesting that they did not operate in a manner that particularly impeded improvements in women's relative earnings. (A more rigorous statistical analysis might, of course, show otherwise.)

Earnings dispersion

Economy-wide wage differentials between two groups of workers that differ in their mean earnings, such as men and women, can also be influenced by the amount of wage dispersion that is present in the labour market as a whole (Blau and Kahn, 1997). On average, women tend to be located at lower positions than men in the wage ranking (from highest to lowest). This means that a simple increase in overall dispersion of wages (the distance between individuals in the wage ranking) will tend to widen the average male/female wage gap, all other things being equal.

Between 1997 and 2003, real wage growth was more rapid at the upper and lower extremes of the earnings distribution than the centre. Both male and female wage distributions became somewhat more compressed at the lower end, and somewhat more spread out at the upper end (see Figure 6). The five-year growth that was recorded at different percentiles in the earnings distribution, between 1997/98 and 2002/03, is summarised in Table 4.

Figure 6: Change in the dispersion of log hourly earnings

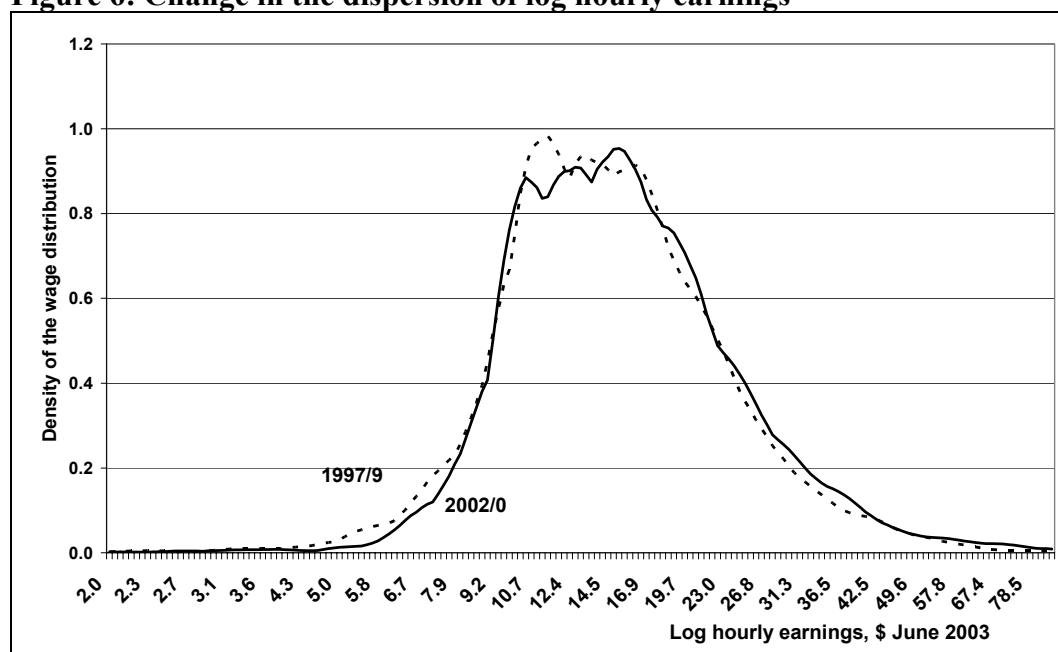


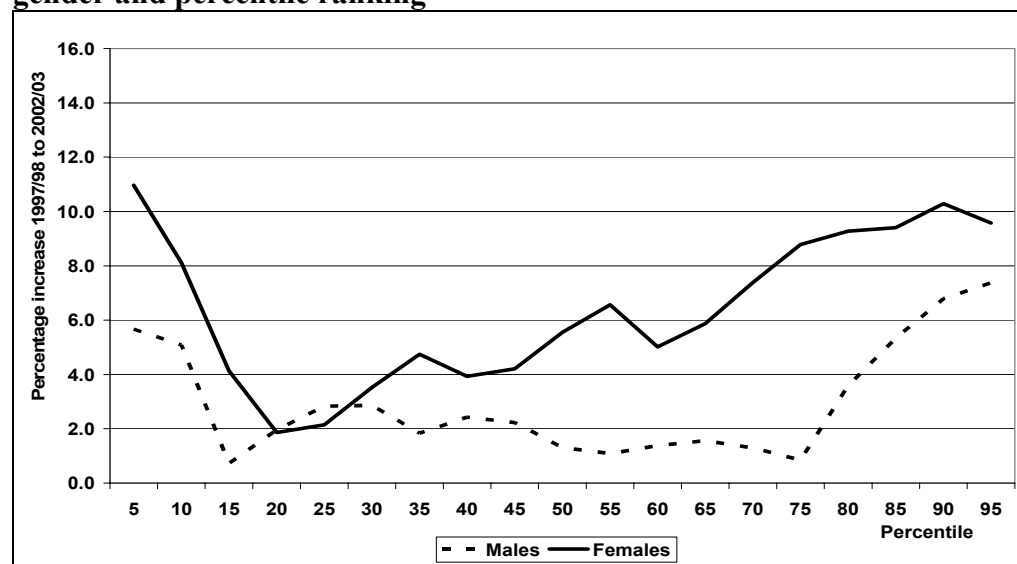
Table 4: Total growth in real earnings between 1997/98 and 2002/03, by gender and percentile ranking

Percentile	Hourly earnings		Weekly FT earnings	
	Males %	Females %	Males %	Females %
10	5.1	8.1	1.2	7.5
25	2.8	2.1	1.7	4.6
50	1.3	5.6	0.7	5.7
75	0.8	8.8	1.8	9.3
90	6.8	10.3	7.6	10.7

The pattern of growth in the real earnings of men was bi-polar, with larger increases at the 5th, 10th, 80th, 90th and 95th percentiles than in between. For example, the 10th percentile of male earnings increased by 5 percent, the 50th percentile by 1.3 percent, and the 90th percentile by 6.8 percent. For women, earnings growth was more evenly distributed across employees at different levels of earnings, although the lower and upper regions recorded faster growth nevertheless.

The net impact of those changes on the overall dispersion of earnings was to increase inequality - as reflected in summary measures of inequality such as the Gini index, the standard deviation of log wages and the 90/10 percentile ratio, which went up a little between 1997 and 2003. Those overall increases appear to have been driven largely by the faster increases in earnings at the upper tail of the wage distribution. While they could potentially have had an adverse impact on the relative earnings of women, in practice they did not, because female wage growth exceeded male wage growth at almost all levels of earnings. This is illustrated in Figure 7. As plotting in Figure 7, the wage growth function for females is higher than that for males at all percentiles of hourly earnings except the 20th and 25th.

Figure 7: Growth in real hourly earnings between 1997/98 and 2002/03, by gender and percentile ranking



4. Factors contributing to the recent reductions in the gender pay gap

Drawing on past international research, it is possible to suggest a number of potential explanations for the contraction of the gender gap in this period. In this paper we briefly consider the following four hypotheses:

- Convergence in the average attributes/skills held by men and women in the workforce, such as age, experience, and educational qualifications.
- Shifts in the industrial and occupational composition of employment that were (more) favourable to women, and helped increase their relative rates of pay.
- Shifts in the pattern of returns to attributes or skills that were relatively favourable towards women.
- Increases in the real value of the minimum wage, which raised the relative earnings of low paid women.

This section begins by reviewing descriptive evidence on the changes in employees' skills and pay-related attributes, and the changes in the composition of waged and salaried employment. It then presents the results of a decomposition analysis carried out to estimate the impact of the (measured) changes in employees' personal attributes and job characteristics on the gender pay gap. This is followed by a discussion of the third and fourth hypotheses.

Gender convergence in skills and other pay-related attributes

The size of the gender pay gap is influenced by the size of male-female differences in skills and other personal attributes that are rewarded in the labour market, such as age, experience, level of educational attainment, and specific job skills. Previous New Zealand research has found evidence that increases in women's relative educational levels and (estimated) years of lifetime work experience over the past two decades, made a positive and reasonably substantial contribution to the long-term reduction of the aggregate gender pay gap (Dixon, 2000).

Between 1997 and 2003, the composition of people in wage and salaried employment changed in a number of ways. Evidence from the Income Survey indicates that:

- Employees became somewhat older, on average;
- There was an increase in the proportion of employees with post-school qualifications;
- Full-timers made up a larger share of employees by the end of the period, reflecting the more rapid growth of full-time than part-time employment.

While these changes affected the male and female workforces in a broadly similar manner, there were minor differences that may help to account for the contraction of the gender pay gap. These differences are illustrated in Table 5. In particular, the female workforce aged a little more quickly than the male workforce, due to a faster increase in the employment rates of prime-aged and older women. Consequently, there were relatively more female employees in the higher paid 40-54 year age group by 2003. The average educational attainment of the female workforce also rose somewhat more rapidly than that of the male workforce. For example, the proportion

of female employees with degrees rose from 11.9 percent to 15.5 percent, a faster rate of increase than that recorded among males (13.3 to 15.0 percent).

Table 5: Changes in the attributes of male and female employees

	Males		Females		Change in proportions	
	1997/98 %	2002/03 %	1997/98 %	2002/03 %	Males %	Females %
Proportion working full-time						
Full-time	86.8	87.8	61.3	63.1	1.0	1.8
Part-time	13.2	12.2	38.7	36.9	-1.0	-1.8
Age group						
15-24	20.3	19.9	20.4	18.2	-0.5	-2.1
25-39	41.5	37.3	38.1	34.1	-4.2	-4.0
40-54	29.2	31.8	33.7	36.8	2.5	3.1
55-64	8.9	11.0	7.8	10.9	2.1	3.1
Mean age	37.2	38.2	37.5	38.7	1.0	1.2
Ethnicity						
Pakeha	81.7	76.3	82.3	77.6	-5.5	-4.8
Maori	9.4	10.9	8.7	10.6	1.5	1.9
Pacific Island peoples	4.3	5.6	4.5	5.0	1.3	0.5
Highest qualification						
None	20.0	17.8	18.7	16.2	-2.2	-2.5
School	24.0	23.5	30.3	28.7	-0.4	-1.7
Vocational	42.5	43.2	38.9	39.1	0.7	0.3
Degree	13.3	15.0	11.9	15.5	1.7	3.6

Age and highest qualification are quite limited and imperfect indicators of skill. Using richer data sets, overseas researchers have shown that other dimensions of skill contribute significantly to individual pay outcomes and help to explain aggregate gender pay differentials, including field or subject area of qualification, firm-specific skills and tenure with the current employer.⁶ Unfortunately, none of these other variables are measured in the Income Survey or in other currently available household datasets, which means that our analysis of the effects of changing workforce attributes on the gender pay gap (below) is unavoidably a partial one.⁷

Changes in the mix of jobs in the labour market

The aggregate gender pay gap can be influenced by shifts in demand and the resulting changes in the composition of employment, altering the distribution of men and women across relatively poorly-paid and highly-paid jobs.

Basic descriptive statistics on the industrial and occupational composition of wage and salaried employment (Table 6) suggest that in the period from 1997 to 2003, the employment mix shifted towards higher proportions in agriculture, construction, retail trade, accommodation, cafés and restaurants, education, and health and community services. Male employment grew particularly strongly in agriculture, retail trade, and health and community services. Female employment expanded most rapidly in the health and community services industry.

Turning to the occupational data, the figures for women's employment show a fairly pronounced shift towards a higher proportion of jobs in service and sales occupations.

⁶ See, for example, Joshi and Paci (1998).

⁷ In earlier work I attempted to estimate the contribution of gender differences in life-time employment experience to the gender pay gap and its reduction during the 1980s and 1990s (Dixon, 2001).

Professional occupations, and agricultural, forestry and fishing occupations, were the largest relative growth areas for males.

Table 6: Changes in the industrial and occupational employment distribution

	Males		Females		Change in proportions	
	1997/98	2002/03	1997/98	2002/03	Males	Females
	%	%	%	%	%	%
Industry						
Agriculture, Forestry, and Fishing	5.7	7.0	2.9	3.4	1.2	0.5
Manufacturing	24.9	24.0	11.5	9.6	-0.9	-1.9
Construction	8.3	8.6	1.2	1.3	0.3	0.1
Wholesale Trade	6.2	5.8	3.9	3.5	-0.4	-0.4
Retail Trade	12.0	12.9	14.6	13.8	0.9	-0.8
Accommodatn, Cafes and Restaurants	3.2	3.7	5.9	6.6	0.5	0.6
Transport and Storage	6.2	5.7	2.2	2.3	-0.5	0.1
Communication	2.0	2.0	1.8	1.9	-0.1	0.0
Financing and Insurance	2.8	2.3	4.9	3.8	-0.5	-1.0
Property and Business Services	8.1	8.3	10.2	9.6	0.1	-0.6
Government and Defense	5.3	4.1	6.6	5.1	-1.2	-1.6
Education	5.2	5.3	12.9	13.7	0.1	0.7
Health and Community Services	2.2	2.9	14.5	18.1	0.7	3.6
Cultural and Recreational Services	2.2	2.3	2.2	2.6	0.1	0.3
Personal and Other Services	3.4	3.5	4.0	4.1	0.1	0.1
Occupation						
Managers	12.9	13.2	7.5	8.4	0.3	0.8
Professionals	11.8	13.2	17.1	18.2	1.4	1.2
Techn & Assoc Professional	11.8	9.8	13.0	12.5	-2.1	-0.4
Clerks	6.3	6.7	26.6	23.7	0.4	-2.9
Service and Sales Workers	11.2	11.1	21.1	23.7	-0.1	2.6
Agric and Fishery Workers	6.0	7.1	2.3	2.6	1.1	0.3
Trades Workers	15.5	15.8	1.2	1.1	0.3	-0.1
Plant and Machine Operators	14.3	14.6	4.1	4.0	0.2	-0.2
Elementary Occupations	9.7	8.2	6.8	5.6	-1.5	-1.3

The 'growth areas' which increased their employment shares over the period included a mixture of relatively low paid sectors and occupation, such as agriculture, forestry and fishing; retail trade and accommodation, cafes and restaurants, and relatively higher paid sectors and occupations such as health and community services and professional occupations. The net impact of these changes in the employment structure on the aggregate gender pay gap is difficult to predict from the descriptive statistics alone, as both the male and female workforces show movement towards a mixture of higher-paying and lower-paying industries and occupations.

Evidence on the effects of changes in workforce attributes and job composition

A decomposition analysis was carried out to estimate how much of the contraction in the gender pay gap between 1997/98 and 2002/03 could be explained in terms of changes in the underlying average characteristics and employment profiles of male and female employees. This took the form:

$$(\ln w_{m2} - \ln w_{m1}) - (\ln w_{f2} - \ln w_{f1}) = [\beta_{m1}(X_{m2} - X_{m1}) - \beta_{f1}(X_{f2} - X_{f1})] + [X_{m2}(\beta_{m2} - \beta_{m1}) - X_{f2}(\beta_{f2} - \beta_{f1})]$$

where m = males, f = females, the subscripts 1 and 2 refer to the 1997/98 and 2002/03 years respectively, w = wages, β = the vector of estimated coefficients and X = the vector of the means of the explanatory variables. The first term of the decomposition captures the change in the wage gap that is due to changes in the male-female gap in average characteristics, evaluated at the base period prices for each gender. The second term captures the effect of changes in coefficients. The explanatory factors

included in the decomposition model were age; highest qualification; ethnic group; marital and parental status; whether employed part-time; and industry and occupation of employment (both measured at 2-digit level). No information is available in the Income Survey on years of employment experience, and therefore age was included as a proxy for experience.

Estimates of the wage gap reduction due to changes in the male-female gap in average characteristics (ie, the first term of the decomposition) are summarised in Table 7. These suggest that the changes in workforce characteristics and employment patterns over this period, while small, made a positive contribution to the reduction of the gender pay gap. The estimates suggest that about 25 percent of the contraction was due to shifts in demographic or educational profile, and 20 percent was due to changes in the distribution of men and women across jobs with different rates of pay. These numbers should be interpreted with caution and treated as broadly indicative only, because of the likelihood that the model is mis-specified (due to missing explanatory variables). The key message to take away is simply that increases in the human capital of women, relative to men, *and* changes in the employment distribution of men and women, seem to have made positive and reasonably substantial contributions to the reduction of the gender pay gap in this period.

Table 7: Contribution of observed changes in sample characteristics to the reduction in the aggregate gender pay gap

	Log points	%
Raw log wage gap in 87/98	0.1619	
Raw log wage gap in 02/03	0.1280	
Total change in log wage gap	-0.0339	
Explained change	-0.0155	45.6
Age	-0.0023	6.8
Education	-0.0032	9.5
Other demographics	-0.0032	9.3
Job characteristics (industry, occupation, part-time proportion)	-0.0068	19.9

Changes in the returns of skills

There have been few recent analyses of changes in the structure of returns to skills. Maani and Maloney (2004) have examined educational earnings differentials in the period 1997-2002, using the Income Survey as their data source. Their findings suggest that returns to education – estimated in terms of the earnings differentials that are associated with broad categories of qualification such as vocational qualifications, bachelors’ degrees and post-graduate degrees – were basically stable in this period.

This is relevant because it suggests the progress women made in terms of their average level of educational attainment, relative to men, was likely to have been translated into earnings gains rather than offset by unfavourable price changes. (A rise in returns to education would tend to reward men for their higher initial level of post-school qualifications).

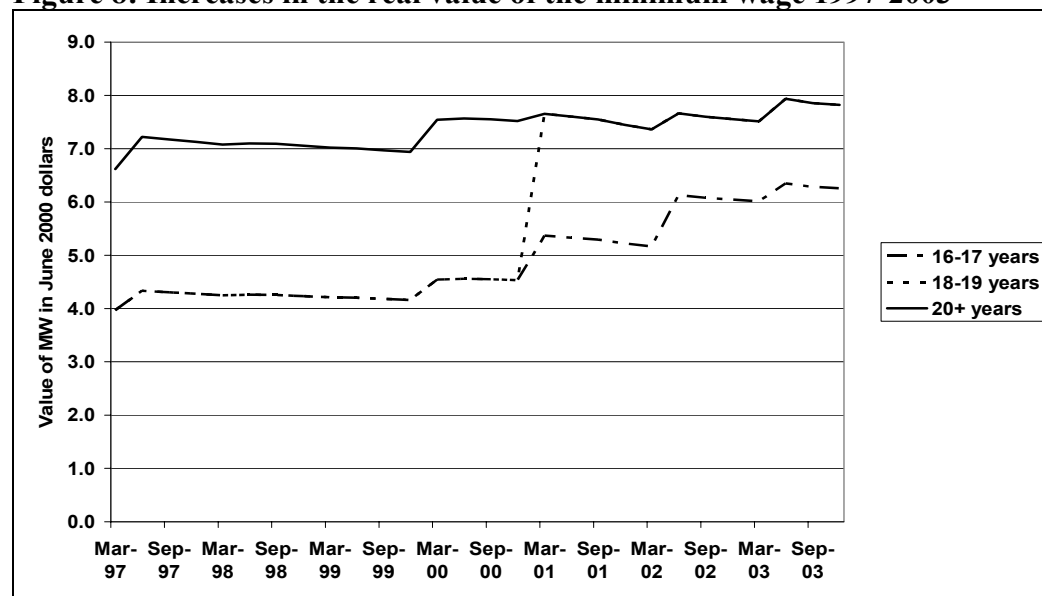
Increases in the real value of the minimum wage

Minimum wage regulations have the potential to reduce the male-female earnings gap by improving the earnings of low-paid women. The size of the impact is likely to depend on a number of factors, including the level at which the minimum wage is set, and therefore the number of employees whose earnings are affected by it; the relative proportions of men and women among very low paid employees – those whose earnings are below or near to the minimum wage; and the extent to which minimum wage entitlements are enforced.

A series of increases to the adult minimum wage rate between 2000 and 2003 raised its value, in constant dollars, by 9.9 percent. In the same period, a series of adjustments to the level of the youth minimum wage, which applies to 16-17 year olds, raised the minimum wage faced by this group by 46 percent in real terms. From March 2001, 18-19 year olds became entitled to the adult minimum wage. As a result, the real value of the minimum wage applying to 18-19 year olds had increased by 83 percent by 2003. These adjustments to the real value of the minimum wage are plotted in Figure 8.

Hyslop and Stillman (2004) have analysed the impact of the youth minimum wage reforms on the wages and employment rates of young people. They find evidence of reductions in the proportion of young workers who were earning wages below the new, higher minimum wage thresholds, following the reforms. Their findings suggest that the reforms were at least partially effective in shifting the wage distribution of youth towards a higher mean level.

Figure 8: Increases in the real value of the minimum wage 1997-2003



Note: Before March 2001, 18-19 year olds were eligible for the youth minimum wage rate. After that date, they became eligible for the adult rate.

Interestingly, Income Survey data on changes in the gender pay gap for 16-19 year olds (graphed in Figure 2) suggest that the youth minimum wage reforms had no great impact on the gender pay gap for this age group. However, that gap was already very

small (around 3 percent in 1997/98), which may have limited the scope for any further improvement.

The potential for adjustments to the *adult* minimum wage to have influenced the aggregate gender pay gap was somewhat greater, because women make up a larger proportion of very low-paid adults, whose wages are below or near the minimum wage, than their proportion of low paid youth. In the June quarter of 1999, for example, when the adult minimum wage was set at \$7.00 an hour, 57 percent of the employees who earned between \$7.00 and \$8.00 an hour (but only 50 percent of those who earned less than \$7.00 an hour) were female. On the other hand, the *size* of the increases in the real value of the adult minimum wage were far smaller than those affecting youth.

To date, there has been no rigorous attempt to estimate the effects of the recent rise in the real value of the adult minimum wage on the adult wage distribution or gender pay gap. Some insights can be gained from recent research on the impact of the introduction of the national minimum wage in Britain (Robinson, 2002). Taking into account circumstances here and the evidence on minimum wage impacts elsewhere, it seems reasonable to conclude that the impact of the minimum wage increases on the gender pay gap is likely to have been positive but very small, probably contributing only a fraction of 1 percent of the total contraction in the gender pay gap in this period.

5. Summary and conclusion

The ratio of female to male average hourly earnings increased by around 4 percentage points during the six years from 1997 to 2003. Particularly large improvements in women's relative pay were recorded for employees in the 40-54 year age range, and employees in the middle to upper-middle range of the earnings distribution. Women of most demographic groups, and at most levels of earnings, experienced some degree of improvement in their relative earnings, due to real wage growth or employment changes.

In a simple analysis of the sources of the gap reduction, it was estimated that shifts in the demographic profiles of male and female employees (particularly the faster ageing, and more rapidly rising educational attainment of the female workforce) could explain about 25 percent of the total reduction. Shifts in the industrial and occupational employment distribution of male and female employees could account for another 20 percent. These numbers should be interpreted with caution because of data limitations. The key message to take away is simply that increases in the human capital of women, relative to men, and changes in the employment distribution of men and women, are likely to have made a fairly substantial contribution to the reduction of the aggregate gender pay gap in this period.

There is not enough research evidence on recent changes in the wage structure (that is, prices for skills) to draw firm conclusions about the contribution of those changes to the gender gap reduction. Recent increases in the real value of the adult minimum wage may have had a positive impact in helping to reduce the gender pay gap, but

circumstantial evidence suggests that impact, if accurately estimated, was probably quite small.

Future research

New Zealand research on the gender pay gap has been hampered by the absence of datasets that contain detailed information on employees' human capital, skills, family responsibilities, past employment histories, and current job and employer characteristics, as well as their earnings. Fortunately, the opportunities for productive research in this field will expand over the next few years, once data from the newly developed Survey of Family, Incomes and Employment, a general-purpose longitudinal household survey, is available for research. Using that new official data source, it should eventually be possible to derive better measures of the skills of each gender and the effect of skills on earnings. It will also be possible to investigate the impact of lifecycle events such as movement between jobs, spells out of the labour force, and childbirth on the earnings and earnings growth of women and men. Hopefully, new insights will emerge from those research opportunities.

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Appendix: Description of the data

The Income Survey is a survey of private households that is carried out by Statistics New Zealand each June quarter. The total sample size is around 15,000 households and 28,000 individuals.

The sample used in this study comprised all wage and salary earners who were aged 16-64 years and had valid earnings data recorded or imputed by Statistics New Zealand. Steps taken to derive the study sample and the measures of real hourly and weekly earnings are outlined below.

Inflation adjustment

The CPI (all groups) was used to adjust the nominal earnings data to June 2003 values.

Adjustment of usual earnings estimates in 1997

Between 1997 and 1998, a change was made in Statistics New Zealand's editing procedures, affecting records that contained a positive response for actual earnings in the reference week but no information on usual earnings. From 1998 onwards, the relevant information on actual earnings and actual hours worked in the reference week was transferred to each of the blank 'usual' fields, thus expanding the sample of respondents with useable usual earnings data. The records affected are not tagged. In order to increase the comparability of the 1997 sample with subsequent years, similar adjustments were carried out by the author. This affected 1630 records.

Exclusion of outliers

The following cases were excluded from the sample because of very low or very high earnings:

- individuals with usual hourly earnings of less than \$1 or more than \$500 (after adjustment to June 2003 values);
- individuals whose usual weekly earnings were less than \$1 or more than \$10,000; and
- individuals whose usual hours per week were 100 or more.

The following table gives the number of cases that were excluded as outliers by gender and year.

	1997	1998	1999	2000	2001	2002	2003	Total
Males	22	4	11	5	10	17	31	100
Females	17	8	8	2	6	15	23	79
Total	39	12	19	7	16	32	54	179

Retention of imputed records

Approximately 15 percent of wage and salary earner responses in the Income Survey are imputed by Statistics New Zealand, because of the agency's failure to make personal contact with the individual concerned. Responses are imputed by drawing information from another person's record that has been randomly selected from the sub-set who matched the missing respondent in terms of their key demographic and job characteristics, including age, gender, labour force status, full-time/part-time status, highest qualification, ethnic group and area of residence.

The imputed responses were retained in this study because their exclusion would have made the sample unrepresentative.

Final sample

Sample sizes by gender and year are given below.

	1997	1998	1999	2000	2001	2002	2003	Total
Males	6,542	6,189	5,813	6,195	6,391	6,927	6,857	44,914
Females	6,364	6,099	5,927	6,294	6,550	7,057	7,028	45,319
Total	12,906	12,288	11,740	12,489	12,941	13,984	13,885	90,233