

**CHANGING EMPLOYMENT AND INCOME
PROFILES - A NEW ENVIRONMENT FOR
TRAVEL DEMAND**

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ABSTRACT

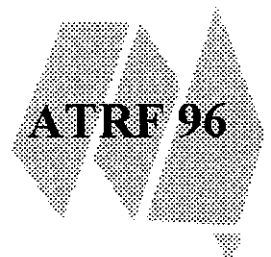
Substantial changes have occurred in the Australian labour market over the past fifteen years, with shifts in the balance between occupations and industries, changes in employment tenure, and the gradual impact of legislation on equal opportunities for wages and conditions. Such changes provide a very different market place for providers of today's transport systems.

By examining changes in the structure of employment in Australia over the past fifteen years, using Australian Bureau of Statistics Census data, the paper shows the variability of penetration into various occupations by women, and the increasing tendency for part-time employment, particularly by women. Changes in income levels are also examined by age, sex and occupations by women, and the effect of equal opportunities legislation and changing social mores are reflected in a trend towards a greater degree of wage parity, especially for younger workers.

The effects which such changes in working hours, occupations and income levels have on the demands for transport services are then highlighted, particularly with respect to the balance between public and private transport. It is concluded that conventional public transport faces severe pressures in the future, unless such employment and income trends are duly noted and new, flexible, services are designed and implemented to cater for these new needs.

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Introduction

The genesis of the research described in this paper was some analysis performed in connection with the Victorian Activity & Travel Survey (VATS) being conducted by the Transport Research Centre. In that survey, respondents were asked to provide information about their personal income, using a question very similar in design to that used by the Australian Bureau of Statistics (ABS) in recent Censuses. As often occurs with questions about income, there was a higher than average non-response to this question, with about 12% of respondents not providing an answer to this question. However, since the information about income was considered to be an important variable in the development of travel behaviour models and in the provision of policy advice based on the VATS data, it was decided to impute values of personal income for those respondents who did not provide the data directly. It was considered that they had provided enough other demographic information to enable such imputation to be reliably attempted.

The basis of the imputation was to construct statistical relationships between personal income and a range of demographic variables provided by those respondents who did provide their income, and then use these relationships to impute the personal income of those respondents who had not provided this information. In this way, it was expected that maximum use would be made of the available information when performing subsequent analyses. It was also anticipated that such imputation methods would reduce any bias which might have arisen by excluding those who declined to disclose details about their income.

The demographic information used in the construction of the income models was age, sex, work status (full-time or part-time) and occupation. The level of non-response on each of these variables was much lower than for the income question (3.4%, 0.9%, 1.9% and 3.1% respectively). Hence it was expected that income would be able to be imputed from these questions which were more readily answered.

Several results which emerged from this analysis appeared to be interesting, not only from the point of view of imputing missing incomes, but also for their more general implications for the interactions between changing work patterns and the future of urban transport systems. Four of these results are reproduced in Figures 1 through 4.

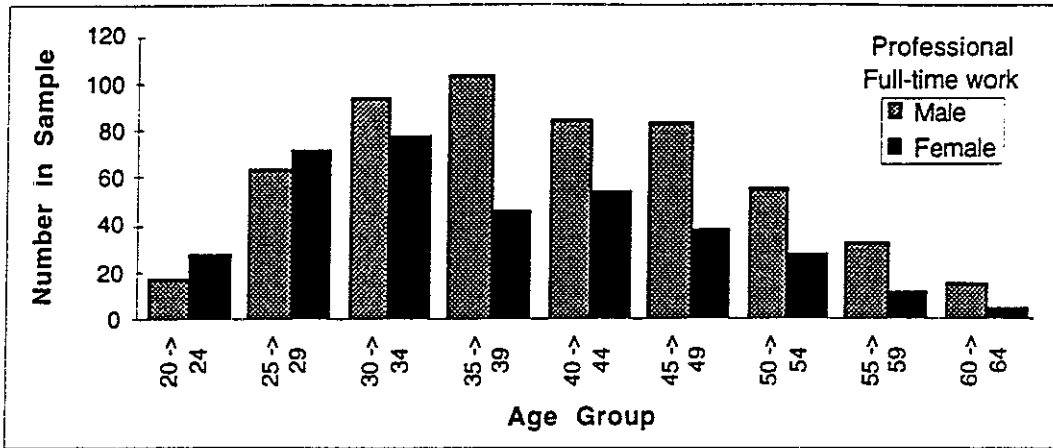


Figure 1 Full-time Professional Employment by Age and Sex

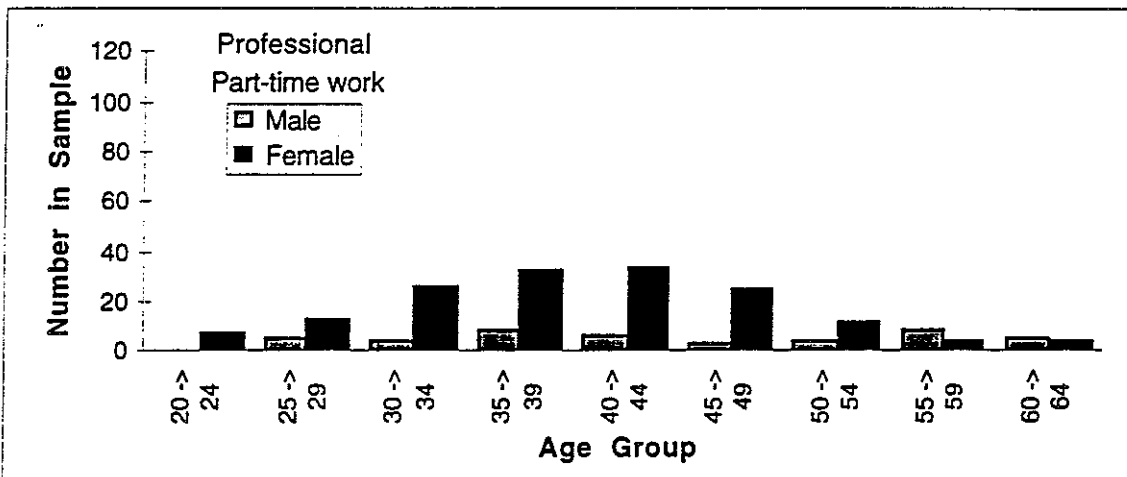


Figure 2 Part-time Professional Employment by Age and Sex

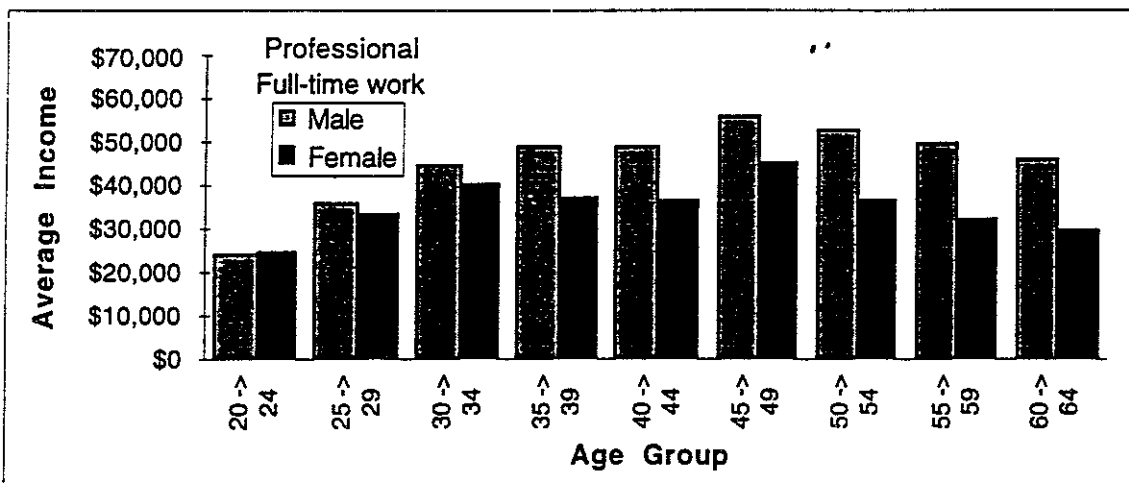


Figure 3 Full-time Professional Incomes by Age and Sex

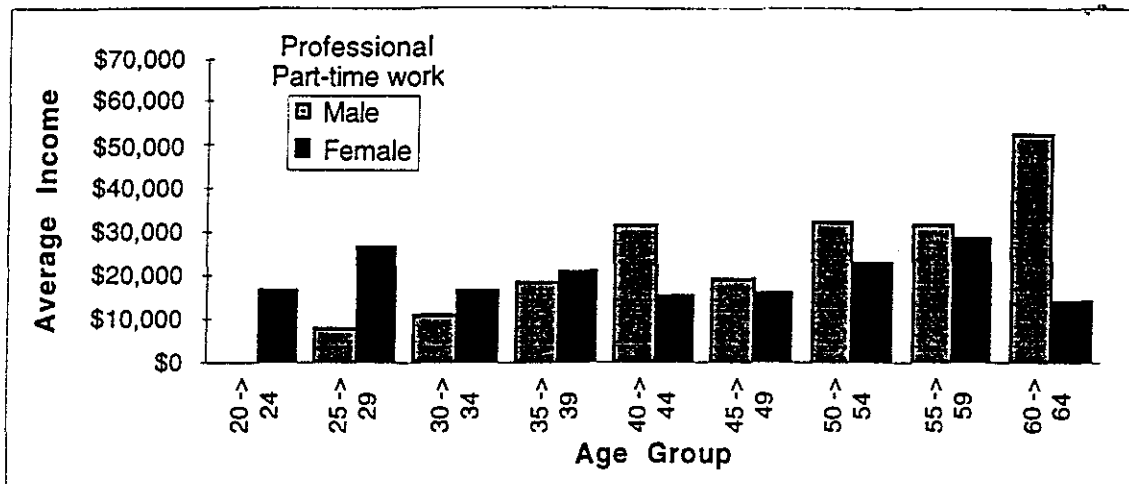


Figure 4 Part-time Professional Incomes by Age and Sex

The first observations relate to the take up of professional employment by women. Figure 1 shows that, in the VATS data, there were more full-time women professionals under the age of thirty than men. It was only over the age of thirty that men started to dominate the professions. Conversely, Figure 2 shows that women dominate the part-time professional market, but especially during the ages of thirty through fifty. When taken together, as shown in Figure 5, it can be seen that there are more women professionals up to the age of 45, after which there are more men professionals.

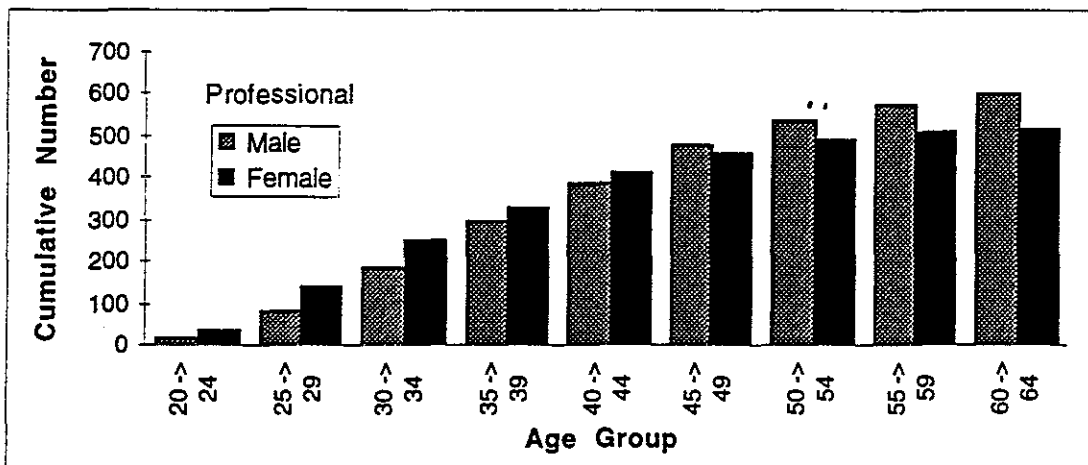


Figure 5 Cumulative Professional Employment by Age and Sex

The question which arises from these figures is whether this is a time-stationary phenomenon, where women over the age of thirty have always been dropping out of full-time professional employment, or whether it is part of a trend showing increasing female participation in the professions, which is only starting to become apparent in the younger age groups.

Similar considerations apply to the results obtained for incomes. It can be seen, from Figure 3, that professional men in full-time employment appear to be paid more than their contemporary female professional. However, for professionals under the age of thirty it would appear that men and women are paid much more comparable salaries. If one examines Figure 4, in fact, it is clear that part-time women professionals are paid more than their male contemporaries up to the age of forty (although in reality there are very few part-time male professionals). Once again, the question arises as to whether this difference has always existed, or whether we are observing the start of a trend towards gender-neutral incomes in the professions, with younger women on the leading edge of a wave which will ripple through the professions over time. It should be noted that while the above discussion has focussed on the professions, the same trends were observed in the VATS data in many other occupations and in the workforce as a whole.

The objective of the research reported in this paper therefore is to firstly determine, by examining trends over time, which of the above two hypotheses is more likely to be correct. Secondly, if there are major changes occurring in employment and incomes between the sexes, what are the implications of these changes for the provision of urban transport services?

The Data Sources

The original investigations reported above used data from the Victorian Activity & Travel Survey (Richardson and Ampt, 1995). While the VATS data provided a detailed description of employment, income and travel patterns in Melbourne in 1994, it was not satisfactory for investigating changes in these variables over time. For this analysis, it was necessary to use a dataset which covered a significant time period and which contained consistent definitions over that time period. The obvious choice was to use the ABS five-yearly Census data. Initially, it was anticipated that the analysis would examine the trends over a twenty year time period (i.e. use the last five Censuses from 1971 to 1991). However, closer examination showed that income was not collected in the 1971 Census. For this reason, the analysis was therefore restricted to the period 1976-91. Further examination showed that not all the variables were collected in a consistent manner over the Censuses, and even where they were consistently collected, the methods of reporting the results varied over the years.

The analysis required information on incomes, occupation category, employment status, age and sex. In terms of definitions, the latter two variables proved to be no problem. However, the first three variables were defined somewhat differently over the years. With respect to income, the main differences were in terms of the range of income values used to collect the information. The categories used in each year are shown in Table 1. As well as changing to reflect the effects of inflation, the structure of the categories changed in 1991 by the omission of a "None" category and the inclusion of these responses in the "less than \$3001" category. In addition, while these categories were used for the collection of data, they were not always used for the reporting of data. For example, the income cross-tabulations available for 1981 only go as high as a "\$18001+" category, and this provides major problems when reporting incomes for some occupation groups (e.g. for full-time managers, 65% of incomes were in the open-ended top category!). For

this reason, detailed trends in income changes are only possible from the 1986 and 1991 data where the income categories adequately cover the range of actual incomes, with the end categories containing only a reasonable number of observations.

Table 1 Income Categories Used in the ABS Census, 1976-91

1976	1981	1986	1991
None	None	None	Less than \$3001
\$1-\$1500	\$1-\$1000	\$1-\$2000	\$3001-\$5000
\$1501-\$2000	\$1001-\$2000	\$2001-\$4000	\$5001-\$8000
\$2001-\$3000	\$2001-\$3000	\$4001-\$6000	\$8001-\$12000
\$3001-\$4000	\$3001-\$4000	\$6001-\$9000	\$12001-\$16000
\$4001-\$5000	\$4001-\$6000	\$9001-\$12000	\$16001-\$20000
\$5001-\$6000	\$6001-\$8000	\$12001-\$15000	\$20001-\$25000
\$6001-\$7000	\$8001-\$12000	\$15001-\$18000	\$25001-\$30000
\$7001-\$8000	\$12001-\$15000	\$18001-\$22000	\$30001-\$35000
\$8001-\$9000	\$15001-\$18000	\$22001-\$26000	\$35001-\$40000
\$9001-\$12000	\$18001-\$22000	\$26001-\$32000	\$40001-\$50000
\$12001-\$15000	\$22001-\$26000	\$32001-\$40000	\$50001-\$60000
\$15001-\$18000	\$26001+	\$40001-\$50000	\$60001-\$70000
\$18001+		\$50001+	\$70001+

The occupation categories also varied over the Censuses, as shown in Table 2. The 1976 categories are not applicable since the data on occupations was not readily available in cross-tabulations with the other variables. Given the differences between the 1981 categories and later years, the occupations have been grouped into four main categories: Professional, Administrative, Clerical, sales & services, and Blue collar occupations.

Table 2 Occupation Categories Used in the ABS Census, 1976-91

1976	1981	1986	1991
N/A	Professional, Technical	Managers & administrators	Same as 1986
N/A	Administrative	Professionals	Same as 1986
N/A	Clerical Workers	Para-professionals	Same as 1986
N/A	Sales Workers	Tradespersons	Same as 1986
N/A	Farmers, Fisherman	Clerks	Same as 1986
N/A	Miners, Quarrymen	Sales & personal service workers	Same as 1986
N/A	Transport, Communication	Plant & machine operators, drivers	Same as 1986
N/A	Tradesmen	Labourers & related workers	Same as 1986
N/A	Service, Sport, Recreation		
N/A	Members Armed Services		
N/A	Not Stated		

With respect to employment status, the 1986 and 1991 tabulations listed workers as being either full-time or part-time. In 1981, the employment status was specified by means of the number of hours worked. For comparison with later years, full-time work was defined as 35 hours or more per week.

While the analysis reported in this paper has been conducted for all Australian capital cities, this paper will concentrate on the results obtained for Melbourne. Very similar results were obtained for the other cities, and, for reasons of limited space, will not be

provided in this paper. The use of the Melbourne data will also allow comparison with the later results obtained from the 1994 VATS data.

Gender Differences by Occupation

The first question to be addressed is the extent to which women have taken up work in the various occupations over the past 15 years. The break-up of employment by occupation and gender is shown for the period 1981-91 in Table 3. The first point to note is the changing composition of occupations as highlighted in Figure 6. In the space of ten years, blue collar jobs have fallen from 40% to 34%, while managerial jobs have risen from 5% to 11%. This change in the nature of work has been accompanied by a rise in the number of working women from 38% of the workforce in 1981 to 44% of the workforce in 1991. This rise in female employment has not been confined to one occupation category. Increases have occurred in occupations traditionally dominated by women (e.g. clerical, sales and service) as well as in areas where women were not previously well represented (e.g. managerial).

Table 3 Occupation by Gender, 1981-91

1981	Male	Female	TOTAL	% of Jobs	% Female
Professional	102,473	82,746	185,219	16%	45%
Managerial	56,038	5,211	61,249	5%	9%
Clerical, sales & service	174,714	265,523	440,237	38%	60%
Blue Collar	378,687	83,266	461,953	40%	18%
TOTAL	711,912	436,746	1,148,658	100%	38%
1986	Male	Female	TOTAL	% of Jobs	% Female
Professional	147,854	103,171	251,025	21%	41%
Managerial	88,471	22,453	110,924	9%	20%
Clerical, sales & service	127,052	261,979	389,031	32%	67%
Blue Collar	359,586	111,049	470,635	39%	24%
TOTAL	722,963	498,652	1,221,615	100%	41%
1991	Male	Female	TOTAL	% of Jobs	% Female
Professional	153,539	126,231	279,770	23%	45%
Managerial	101,545	34,256	135,801	11%	25%
Clerical, sales & service	120,517	277,607	398,124	32%	70%
Blue Collar	317,083	101,512	418,595	34%	24%
TOTAL	692,684	539,606	1,232,290	100%	44%

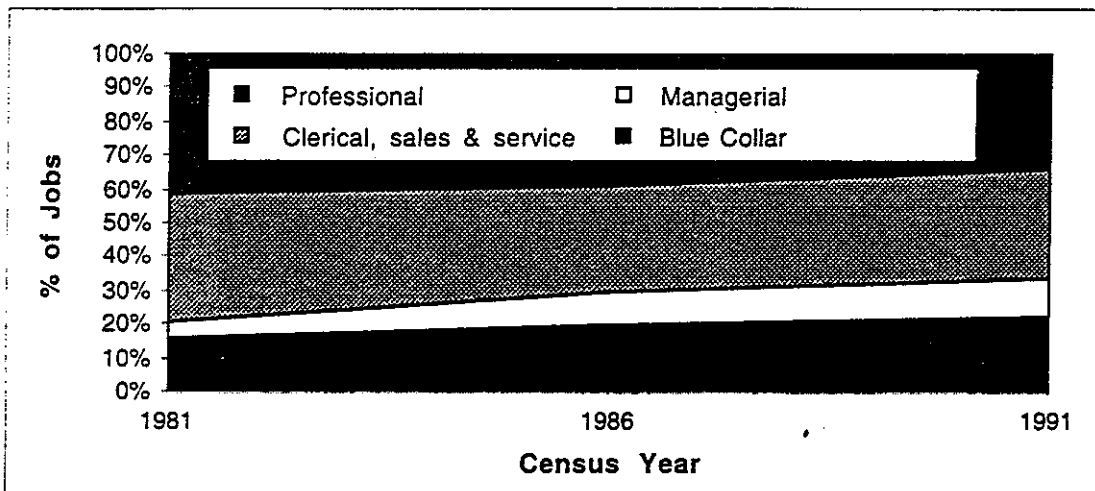


Figure 6 Changes in the Composition of Occupations, 1981-91

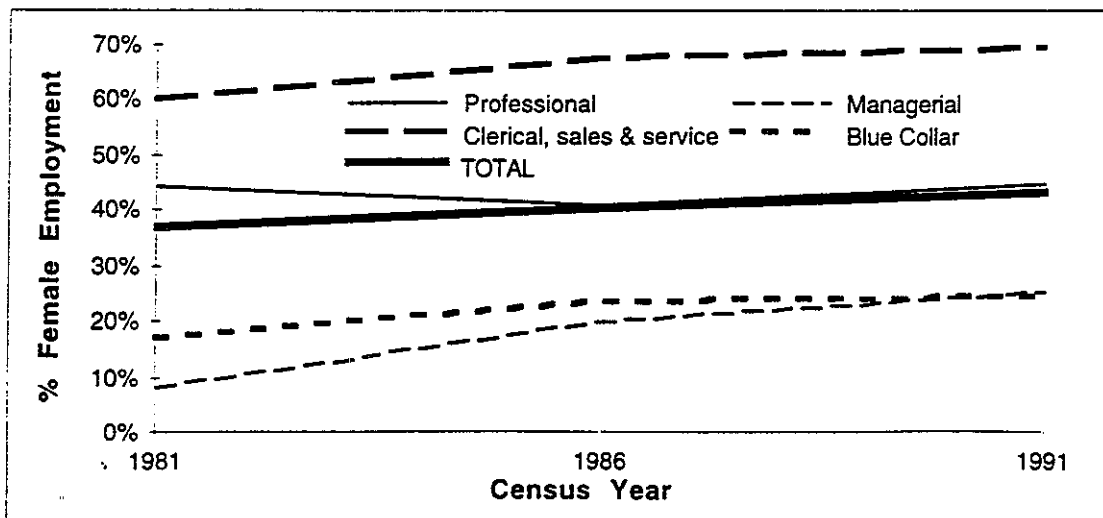


Figure 7 Female Employment in the Occupations, 1981-91

The Rise of Part-time Work

As well as the feminisation of the workforce, the other major change in employment over the past decade or so has been the rise in part-time employment. This has occurred for two reasons. Firstly, the economic recession of the late 1980s forced many people to take up part-time work as a second-best alternative to full-time work. Secondly, and more fundamentally, many people found a preference for part-time work over full-time work, thus allowing them time to do other things in their life. The increase in part-time work can be viewed from three perspectives: occupation, gender and age.

The changes in the extent of part-time work in the various occupations over the period 1981-91 is shown in Table 4. It can be seen that the proportion of part-time employment rose slightly from 1981 to 1986 (from 19% to 21%) and then substantially from 1986 to 1991 (from 21% to 26%). This rise was not spread uniformly over the occupations. While professional and managerial jobs retained the same levels of part-time employment (about 22% and 10% respectively), other white collar jobs rose substantially in part-time employment (from 26% to 37%) and blue collar jobs also became more part-time (from 12% to 23%).

Table 4 Part-Time Employment by Occupation, 1981-91

1981	Full-time	Part-time	All Jobs	% Part-time
Professional	142,750	42,469	185,219	23%
Managerial	56,232	5,017	61,249	8%
Clerical, sales & service	323,761	116,476	440,237	26%
Blue Collar	406,943	55,010	461,953	12%
TOTAL	929,686	218,972	1,148,658	19%
1986	Full-time	Part-time	All Jobs	% Part-time
Professional	197,163	53,862	251,025	21%
Managerial	100,677	10,247	110,924	9%
Clerical, sales & service	274,058	114,973	389,031	30%
Blue Collar	389,464	81,171	470,635	17%
TOTAL	961,362	260,253	1,221,615	21%
1991	Full-time	Part-time	All Jobs	% Part-time
Professional	215,151	64,619	279,770	23%
Managerial	121,493	14,308	135,801	11%
Clerical, sales & service	251,884	146,240	398,124	37%
Blue Collar	321,482	97,113	418,595	23%
TOTAL	910,010	322,280	1,232,290	26%

The take-up of part-time work has also not been uniform across the genders. As shown in Table 5, the extent of part-time work among males has risen by 4% from 11% in 1981 to 15% in 1991, while the extent of part-time work among females has risen by 8% from 33% in 1981 to 41% in 1991. This increase in part-time work within the genders has also been spread differentially across the occupations. As shown in Table 6, male employment in the professions and managerial jobs has retained essentially the same relative share of full-time employment. The same applies to female employment in the professions (albeit at a higher part-time rate than for men). Interestingly, female employment in managerial jobs became more full-time between 1981 and 1986 and retained that extent of full-time

employment through 1991. This could be due to the pressures on women who want to work in managerial roles to work full-time since it is clearly, from the male figures, an occupation which requires full-time commitment. It is in the other white collar and blue collar jobs where part-time work has expanded, especially since 1986 for men and especially in blue collar jobs for women.

Table 5 Part-Time Employment by Gender, 1981-91

1981	Full-time	Part-time	All Jobs	% Part-time
Male	636,516	75,395	711,911	11%
Female	293,170	143,577	436,747	33%
1986	Full-time	Part-time	All Jobs	% Part-time
Male	642,404	80,559	722,963	11%
Female	318,958	179,694	498,652	36%
1991	Full-time	Part-time	All Jobs	% Part-time
Male	590,995	101,689	692,684	15%
Female	319,015	220,591	539,606	41%

Table 6 Part-Time Employment by Occupation by Gender, 1981-91

1981	Male % Part-time	Female % Part-time
Professional	12%	36%
Managerial	6%	30%
Clerical, sales & service	13%	36%
Blue Collar	10%	21%
TOTAL	11%	33%
1986	Male % Part-time	Female % Part-time
Professional	11%	36%
Managerial	6%	23%
Clerical, sales & service	13%	37%
Blue Collar	12%	35%
TOTAL	11%	36%
1991	Male % Part-time	Female % Part-time
Professional	13%	36%
Managerial	6%	23%
Clerical, sales & service	19%	44%
Blue Collar	17%	44%
TOTAL	15%	41%

The final dimension to be examined with respect to part-time employment is the age profile of people in part-time jobs. Unfortunately, a cross-tabulation of age by employment status was not available for the 1981 data, and hence the following analysis is restricted to 1986 and 1991. This may not be too great a restriction, however, since it was observed above that most of the changes in part-time employment occurred after 1986. If one calculates the proportion of people in each five-year age cohort who are employed part-time, the results are as shown in Figure 8 for the years 1986 and 1991. It can be seen that while there has been an increase in part-time employment at all age levels, the main groups affected are those under 25, and particularly those under 20, while those over 50 are also slightly more likely to have entered part-time employment.

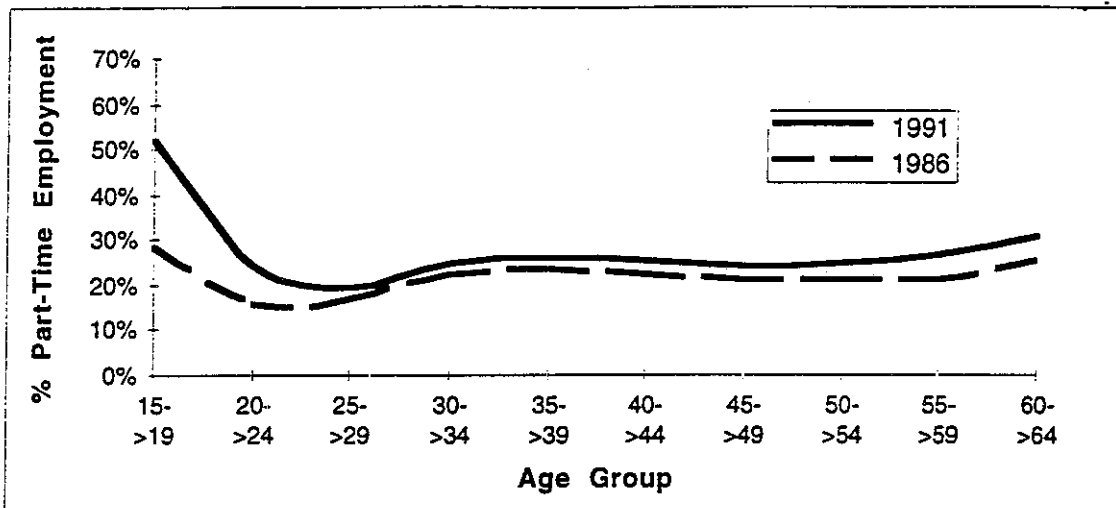


Figure 8 Part-time Employment among the Age Cohorts, 1986-91

These changes in part-time employment within the age cohorts are also not uniform across genders. As shown in Figure 9, the patterns of part-time employment across the age cohorts within each gender are very different from each other, and have changed in different ways in the period 1986-91. For example, male part-time employment has increased across all age cohorts between 1986 and 1991. As shown in Figure 10, this increase is about 20% for all ages above 25, and up to 85% for males under 20. Males under 20 in 1991 participated in part-time work as much as females under 20 in 1986. On the other hand, the increase in female part-time employment has essentially been confined to those under 25 and those over 45. Women between the ages of 25 and 45 have not increased their participation in part-time work, although as seen in Figure 9 their participation in part-time work during these years is already quite high.

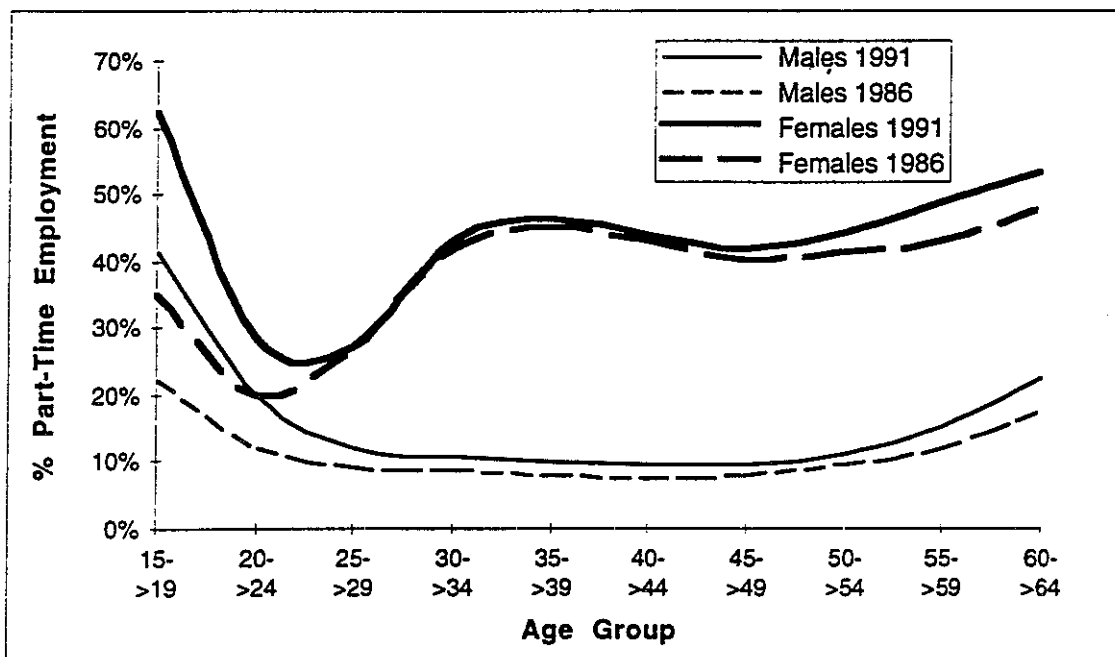


Figure 9 Part-time Employment by Age and Gender, 1986-91

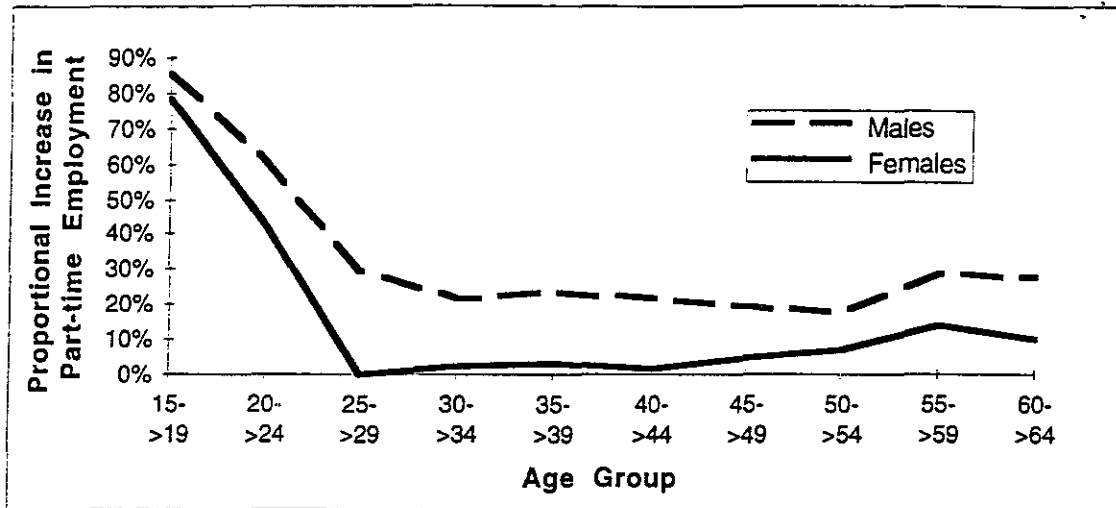


Figure 10 Proportional Changes in Part-time Employment, 1986-91

Changes in Income by Age, Gender and Occupation

The previous sections have shown that significant changes have occurred in the patterns of employment over the past 10 years, both with respect to the increases in working women and the increases in part-time employment. While these two trends are partly related, in that women are also more likely to work part-time, they are not the same trend. For example, it has been shown in Figure 10 that males have been more significantly affected by the increases in part-time work, and that the major increases in part-time work have been shouldered by young workers, irrespective of their gender.

A related question, which accompanies these changes in the structure of employment, is what has been happening to incomes over this same time period. Using the data from the four Censuses between 1976 and 1991, the distributions of personal income have been calculated and are plotted in Figure 11.

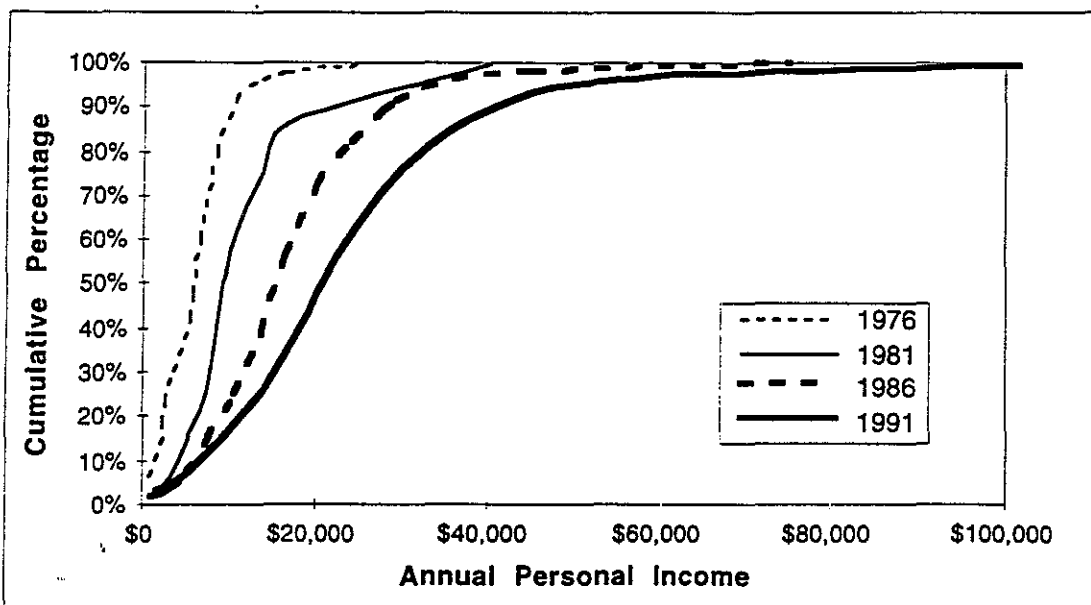


Figure 11 Changes in Personal Income, 1976-91

In making these calculations, it has been necessary to assume average values of income within each of the income categories recorded in each Census. For 1991, the average income within each category has been derived by the ABS from information obtained from the May 1988 Supplement to the Labour Force Survey (ABS, 1991). For most categories, the mean income is very close to the mid-point of the category range, with the exception of the top category where the mean income is approximately 50% greater than the range boundary (i.e. \$107,000 compared to \$70,000). This same assumption has been applied to the other Census years, although in 1981 it has been applied to the upper category value of \$26,000 used for collecting the data, rather than the upper category value of \$18,000 used for reporting the data. This difference gives rise to the strange shape of the curve in the upper 15% of the distribution for the 1981 data in Figure 11.

Clearly, incomes have risen dramatically over this fifteen year period. The question remains, however, as to whether this change has been uniform, or whether it has been differentiated by gender, age, occupation and employment status. To start answering this question, the mean income has been calculated for each year for full-time workers, part-time workers and all workers within each gender. The ratio of average female income to average male income within each category has then been calculated as a measure of wage equality across the genders. The results are shown in Figure 12. It can be seen that, over time, the ratio of female to male income has been increasing. In 1976, the ratio across all workers was 56% and this had risen to 67% by 1991. This ratio across all workers (both full-time and part-time), however, hides the true story since it is already known that part-time work is much more prevalent among women. This fact alone would reduce the average income of women compared to men. Therefore, the same ratio is calculated for full-time and part-time workers separately. For full-time workers, the ratio is higher and has risen from 64% in 1981 to 77% in 1991. For part-time workers, the ratio has risen from 56% in 1981 to 72% in 1991. Clearly, within each category of worker, the male and female incomes are moving closer, and the gap has been decreasing more quickly over the fifteen years than might be indicated by the average incomes across all workers.

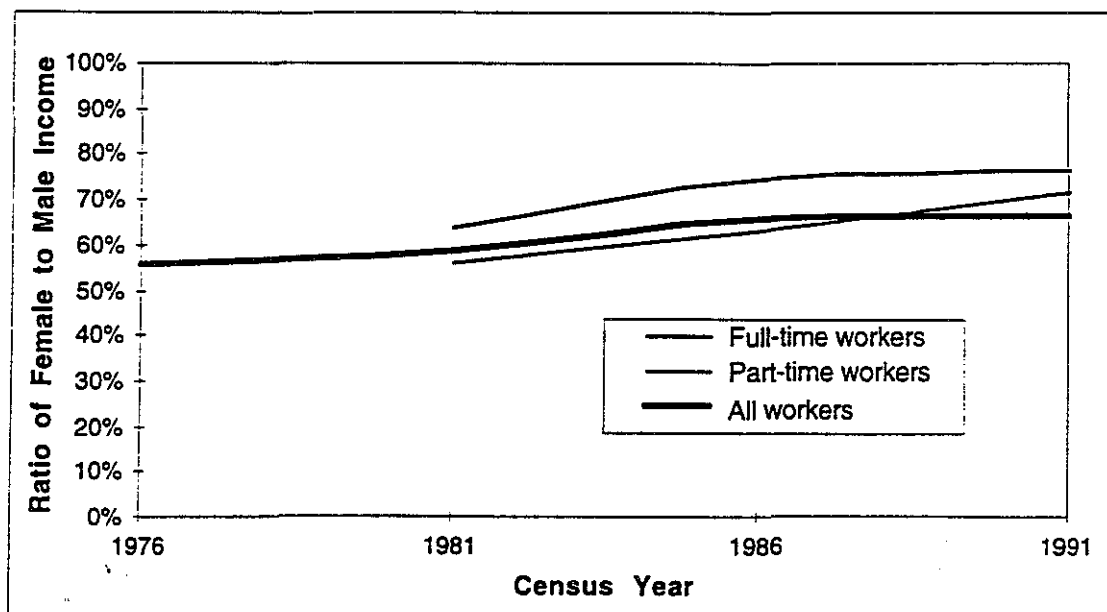


Figure 12 Changes in Ratio of Female to Male Incomes, 1976-91

Even when disaggregated by type of worker, as shown in Figure 12, the ratio of incomes still conceals a good deal of information. For example, it is known that the income received by an individual is strongly related to the person's age. Since the average age of male workers is higher than the average age of female workers, this will bias higher incomes towards males. Therefore, an analysis has been conducted to examine the changes in income by gender and age for full-time workers over the period 1986-1991 (this cross-tabulation was not available for earlier years). This analysis was restricted to full-time workers to eliminate the variation caused by part-time men and women workers possibly working a different number of hours, and hence earning different annual incomes. Figure 13 shows that while the average income for females working full-time in 1986-91 was about 75-77% of the male income (see Figure 12), this ratio varies substantially by age. Younger female full-time workers have a much higher ratio (>90%), while middle-age female workers have a much lower ratio (<70%). Figure 13 also shows that in this five year period, the ratio of female salaries to male salaries rose by about 4-5% up to the age of 45, and above the age of 60. This would appear to indicate that there is a trend toward an increasing degree of equity between male and female incomes.

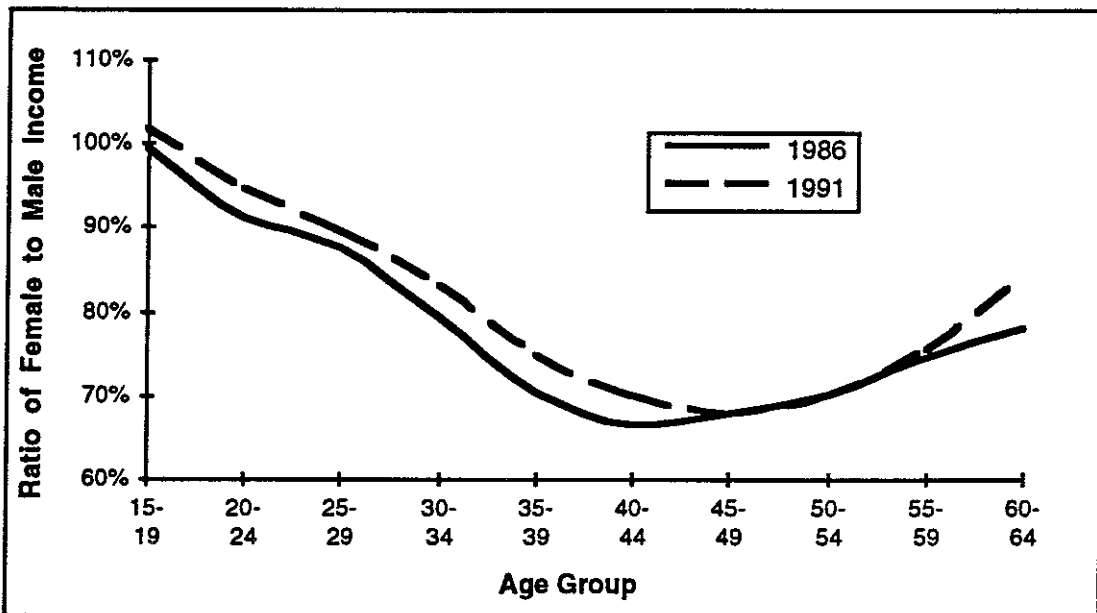


Figure 13 Ratio of Female to Male Full-time Incomes, 1986-91

However, a somewhat different perspective can be obtained by considering each age group cohort in 1986 and seeing what happened to their income parity five years later in 1991. By lagging the data shown in Figure 13 by 5 years, one obtains Figure 14 which shows the income ratios for the same cohort separated by five years. It can be seen that for women aged under 40 in 1991, their income ratio was approximately 5% less than it had been in 1985 when they were five years younger. For women over 40, their income ratio has increased as they have grown older. Thus, over time, the income ratio for younger women is decreasing for a specific cohort as it grows older. However, within an age group the income ratio is increasing over time. Whether Figures 13 and 14 indicate greater or lesser income parity depends on your perspective. The time frame used in this analysis also needs to be extended beyond five years, with reliable data prior to 1986 being obtained to gain a picture of income relativities over a longer time period.

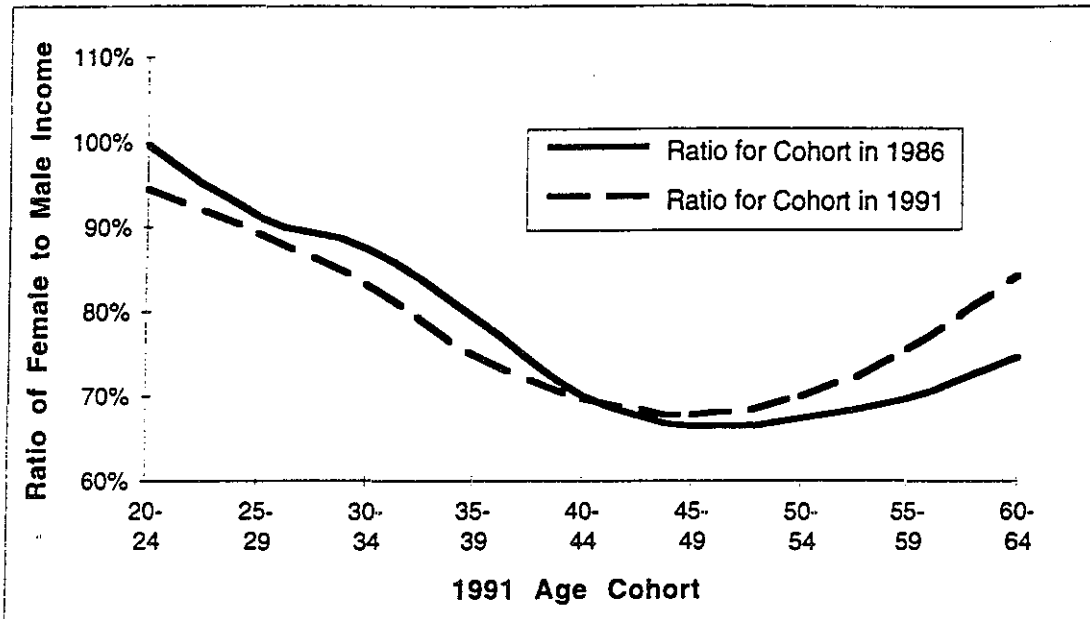


Figure 14 Cohort Change in Ratio of Female to Male Incomes, 1986-91

Figures 13 and 14 still conceal some of the changes because it is also known that the income received by a male or female depends on the occupation in which they work. As noted earlier in Table 4, there has been some movement between occupations for each of the genders over the years, and this may also be affecting the changes in the income ratios over time. Therefore the above analysis was repeated for each of the occupation categories to control for these variations. Because of the stability in the Professional occupation category over the years, this occupation is chosen for reporting in this paper. Figure 15 shows that the income ratio within each age group has not varied significantly between 1986 and 1991, with minor fluctuations above and below the 1986 line for different age groups. By comparison with Figure 13, the Professional occupations are not as egalitarian for younger age groups, nor as discriminatory for middle-aged groups.

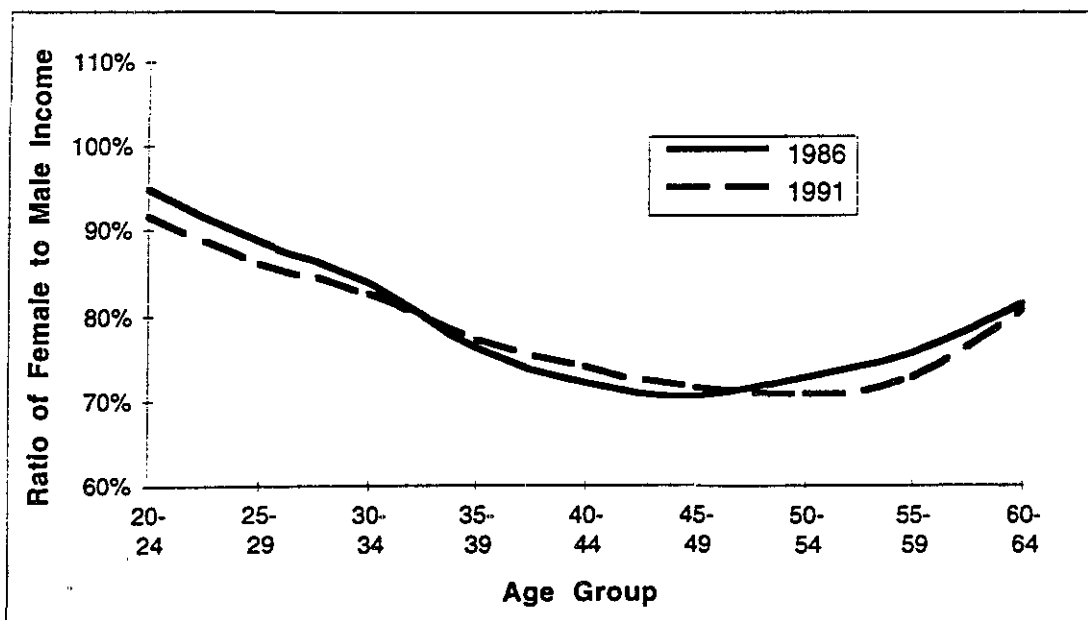


Figure 15 Ratio of Female to Male F-T Professional Incomes, 1986-91

However, when viewed from the point of view of an age cohort over time, Figure 16 shows that women professionals under the age of 45 in 1991 appear to have fallen behind where they personally were five years earlier. The younger women professionals have lost ten percentage points in terms of income equality over the five years. For example, a woman full-time professional aged 23 was earning 95% of her male contemporary in 1986. Five years later, that woman, now aged 28, is earning 86% of her male contemporary. There are many possible reasons for this change concerned with possible changes in the mix of professionals among men and women over the five years. Nonetheless, it would appear that while younger women professionals are better off, compared to their male contemporaries, than middle-aged women professionals, they may be losing this comparative advantage over time.

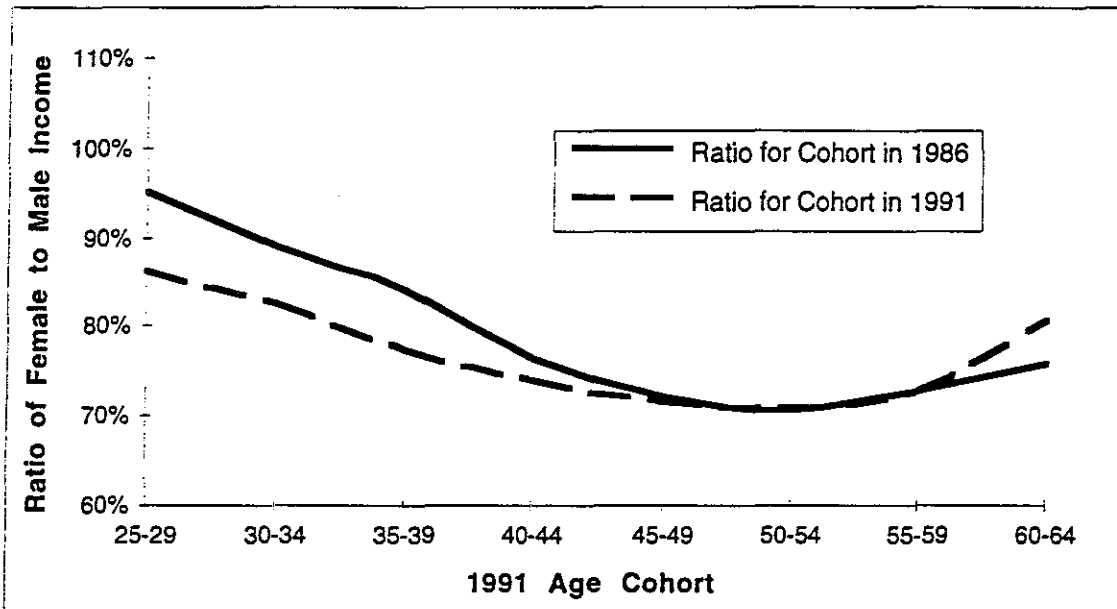


Figure 16 Cohort Change in Ratio of Female to Male Full-time Professional Incomes, 1986-91

Patterns of Travel Behaviour

It is clear from the above analysis and discussion that the patterns of employment have been changing over time, and that these changes have been accompanied by changes in income within and between the genders, the age groups, the occupations and the status of employment (full-time or part-time). For these changes to have any relevance to transport planning, however, it must now be shown that these characteristics are related to travel behaviour, and that changes in the underlying variables are likely to create changes in travel behaviour in the future. This section will examine how travel behaviour is related to two of these parameters: employment status and gender.

Trip Purpose

The purpose of trips made by people of working age of different employment status and gender in various Australian cities is shown in Table 7. The results show some remarkable similarities across the cities, and some consistent differences in trip-making across the employment and gender groups.

Table 7 Trip Purposes by People of Working Age (20-65 years)

Purpose	Full-time Worker		Part-time Worker		Not employed		TOTAL	
	Male	Female	Male	Female	Male	Female	Male	Female
Canberra								
Work	29%	24%	22%	15%	1%	1%	22%	12%
Education	1%	1%	8%	2%	15%	10%	4%	5%
Shopping	13%	16%	6%	16%	10%	15%	12%	16%
Home	33%	33%	33%	35%	41%	40%	35%	36%
Chauffeuring	7%	7%	3%	13%	5%	10%	6%	9%
Personal Business	3%	4%	5%	4%	4%	5%	3%	4%
Social/Rec	14%	15%	22%	15%	25%	20%	17%	17%
Sydney								
Work	30%	25%	19%	14%	1%	1%	22%	12%
Education	0%	1%	5%	2%	17%	10%	5%	5%
Shopping	10%	14%	10%	14%	11%	15%	10%	15%
Home	36%	36%	38%	38%	43%	41%	38%	39%
Chauffeuring	7%	7%	9%	14%	5%	10%	7%	10%
Personal Business	3%	3%	2%	3%	3%	4%	3%	4%
Social/Rec	14%	14%	18%	15%	20%	19%	16%	16%
Meibourne								
Work	28%	23%	19%	15%	3%	1%	22%	12%
Education	1%	1%	6%	3%	17%	10%	5%	6%
Shopping	11%	14%	11%	15%	10%	18%	11%	16%
Home	36%	36%	40%	36%	42%	41%	37%	39%
Chauffeuring	6%	6%	6%	13%	5%	9%	6%	9%
Personal Business	3%	3%	2%	4%	3%	3%	3%	3%
Social/Rec	15%	16%	17%	14%	22%	17%	17%	16%
Brisbane								
Work	30%	23%	19%	15%	2%	1%	22%	11%
Education	0%	1%	4%	1%	14%	7%	4%	4%
Shopping	10%	13%	11%	16%	12%	17%	11%	16%
Home	36%	37%	39%	37%	42%	39%	38%	38%
Chauffeuring	7%	7%	6%	13%	6%	12%	7%	10%
Personal Business	3%	3%	3%	5%	3%	4%	3%	4%
Social/Rec	14%	18%	18%	14%	20%	19%	16%	18%
Adelaide								
Work	29%	26%	18%	14%	3%	1%	22%	11%
Education	1%	0%	5%	1%	13%	9%	4%	5%
Shopping	10%	12%	11%	16%	10%	17%	10%	15%
Home	35%	35%	36%	38%	40%	39%	36%	38%
Chauffeuring	7%	7%	8%	13%	5%	10%	6%	10%
Personal Business	3%	3%	5%	4%	4%	4%	3%	4%
Social/Rec	16%	18%	18%	14%	25%	20%	18%	18%
Perth								
Work	29%	24%	25%	13%	1%	1%	22%	11%
Education	0%	1%	6%	2%	13%	7%	4%	4%
Shopping	10%	14%	10%	17%	9%	16%	10%	16%
Home	34%	35%	36%	38%	41%	39%	36%	38%
Chauffeuring	6%	7%	5%	12%	6%	11%	6%	10%
Personal Business	3%	3%	3%	4%	3%	5%	3%	4%
Social/Rec	16%	17%	15%	14%	26%	20%	18%	18%
Hobart								
Work	33%	19%	31%	19%	1%	4%	25%	13%
Education	1%	0%	4%	1%	17%	10%	5%	5%
Shopping	10%	13%	12%	16%	14%	15%	11%	15%
Home	32%	35%	35%	37%	37%	40%	34%	38%
Chauffeuring	6%	9%	1%	11%	3%	9%	5%	9%
Personal Business	3%	3%	5%	2%	3%	3%	3%	3%
Social/Rec	15%	21%	13%	14%	25%	19%	17%	18%
Darwin								
Work	35%	23%	36%	13%	3%	2%	28%	12%
Education	0%	1%	0%	1%	14%	8%	4%	4%
Shopping	11%	12%	17%	17%	11%	17%	11%	15%
Home	32%	33%	31%	37%	43%	40%	34%	37%
Chauffeuring	4%	11%	2%	14%	4%	11%	4%	11%
Personal Business	4%	6%	7%	6%	6%	3%	5%	5%
Social/Rec	13%	15%	7%	13%	19%	17%	14%	16%
ALL CITIES								
Work	29%	24%	21%	14%	2%	1%	22%	11%
Education	1%	1%	5%	2%	15%	9%	4%	5%
Shopping	10%	14%	10%	15%	10%	17%	10%	15%
Home	35%	36%	37%	37%	42%	40%	37%	38%
Chauffeuring	7%	7%	6%	13%	5%	10%	6%	10%
Personal Business	3%	3%	3%	4%	3%	4%	3%	4%
Social/Rec	15%	16%	17%	14%	22%	19%	17%	17%
TOTAL	100%	100%	100%	100%	100%	100%	100%	100%

Source: FORS 1985-86

Women consistently make more shopping trips than men, irrespective of whether the women are working full-time, part-time or not in paid employment. Women working part-time or not employed undertake more chauffeuring trips than their male counterparts, but women in the full-time workforce tend to do less of the chauffeuring. When men or women enter the workforce, either part-time or full-time, they tend to perform more complex trip chains, as reflected in the reduced proportion of their trips which go back home. Fewer of their trips are for social and recreational purposes, while women tend to reduce the proportion of trips for shopping. Men in full-time and part-time employment make proportionally more work trips than women in equivalent employment. This, however, may not mean that men make more work trips, but that women in employment make more trips for other purposes (such as shopping and chauffeuring). Clearly, there are differences in trip purpose depending on the gender and the level of employment, and changes in these factors may well bring about changes in trip purpose in the future.

The information provided in Table 7 is based on a Survey of Day-to-Day Travel undertaken for the Federal Office of Road Safety (FORS) in 1985-86. This survey is similar in design to VATS, being a self-completion, mail-back questionnaire, covering details of all trips made by members (over 9 years of age) of the sampled households during a randomly chosen day in the year-long survey period. The survey information was collected from a total of 18,000 households throughout Australia, selected on the basis of a geographically stratified, random sample (SOCIALDATA Australia, 1987).

Travel Mode

Changes in the employment status of men and women also has important implications for the mode of travel used. In comparison with men, women continue to place greater reliance on public transport for work trips, especially in the well-serviced inner areas and the less affluent outer suburbs of Melbourne (Morris et al., 1996). However, it would appear that the appeal of public transport is confined to only specific segments of the female workforce. By and large, this does not include the main growth area of mothers in part-time work, who place great value on convenience, flexibility, reliability and door-to-door travel time. Table 8 illustrates the pattern of mode usage among men and women of working age (20-65 years old) of differing employment status in Australian cities in 1985-86.

It can be seen that public transport is used principally by women in full-time work, men in part-time work and persons not in the work-force. Conversely, males in full-time employment are predominantly car drivers, while women in part-time work also place heavy reliance on the car (both as drivers and, to a lesser extent, as passengers). The importance of car passenger journeys for females is apparent, irrespective of their employment status.

These findings are highly consistent with the patterns of mode usage identified for Melbourne almost a decade later using the VATS data (Morris and Richardson, 1995). The importance of the car to women who work part-time is abundantly clear. This is presumably linked to their diverse travel needs and complex travel patterns. As we have seen, women who work part-time perform more non-home based trips, indicating a greater propensity to link their activities. Furthermore, women who work part-time (and

those not in the workforce) tend to have more localised travel patterns (Morris and Richardson, 1995), which are often less suited to public transport.

Table 8 Mode Use by Sex and Employment Status (20-65 years old)

Mode	Full-time Worker		Part-time Worker		Not employed		TOTAL	
	Male	Female	Male	Female	Male	Female	Male	Female
Canberra								
Non-Motorised	13%	9%	19%	9%	33%	24%	18%	16%
Public Transport	4%	5%	17%	2%	13%	8%	7%	6%
Car Driver	72%	62%	39%	65%	10%	32%	56%	49%
Car passenger	8%	24%	25%	24%	43%	35%	17%	29%
Other	3%	0%	0%	0%	1%	0%	2%	0%
Sydney								
Non-Motorised	11%	15%	17%	11%	30%	20%	16%	17%
Public Transport	9%	14%	11%	8%	20%	13%	12%	12%
Car Driver	70%	48%	53%	61%	19%	33%	57%	43%
Car passenger	7%	24%	17%	20%	30%	34%	13%	28%
Other	4%	0%	3%	0%	0%	0%	3%	0%
Melbourne								
Non-Motorised	10%	12%	18%	12%	38%	24%	17%	18%
Public Transport	5%	11%	8%	6%	15%	10%	8%	9%
Car Driver	75%	52%	59%	65%	16%	35%	60%	46%
Car passenger	7%	25%	15%	17%	30%	31%	13%	26%
Other	2%	0%	2%	0%	1%	0%	2%	0%
Brisbane								
Non-Motorised	9%	11%	17%	10%	27%	18%	14%	14%
Public Transport	6%	10%	12%	8%	15%	8%	9%	9%
Car Driver	72%	54%	46%	60%	20%	39%	58%	48%
Car passenger	8%	25%	25%	22%	35%	36%	15%	30%
Other	5%	1%	0%	0%	2%	0%	4%	0%
Adelaide								
Non-Motorised	10%	13%	11%	9%	33%	23%	16%	17%
Public Transport	4%	6%	3%	7%	9%	11%	5%	9%
Car Driver	76%	57%	77%	64%	25%	32%	63%	47%
Car passenger	7%	24%	7%	20%	33%	34%	14%	28%
Other	3%	0%	1%	0%	0%	0%	2%	0%
Perth								
Non-Motorised	8%	11%	20%	8%	36%	19%	16%	14%
Public Transport	3%	5%	6%	5%	8%	5%	4%	5%
Car Driver	77%	62%	56%	66%	23%	40%	62%	53%
Car passenger	8%	22%	13%	20%	32%	35%	14%	28%
Other	4%	0%	6%	0%	1%	0%	4%	0%
Hobart								
Non-Motorised	11%	17%	21%	14%	30%	23%	16%	18%
Public Transport	4%	5%	27%	4%	20%	12%	9%	8%
Car Driver	75%	50%	35%	65%	17%	33%	58%	47%
Car passenger	8%	28%	14%	17%	32%	32%	14%	26%
Other	3%	0%	4%	1%	1%	0%	2%	0%
Darwin								
Non-Motorised	10%	12%	12%	14%	42%	27%	17%	18%
Public Transport	1%	3%	0%	3%	9%	6%	3%	4%
Car Driver	78%	63%	74%	57%	18%	35%	65%	50%
Car passenger	7%	22%	5%	25%	30%	32%	12%	27%
Other	4%	0%	10%	0%	0%	1%	3%	0%
ALL CITIES								
Non-Motorised	10%	12%	17%	11%	33%	21%	16%	16%
Public Transport	6%	9%	9%	6%	14%	10%	8%	9%
Car Driver	74%	54%	56%	63%	19%	35%	59%	47%
Car passenger	7%	24%	16%	20%	32%	34%	14%	28%
Other	3%	0%	3%	0%	1%	0%	3%	0%
TOTAL	100%	100%	100%	100%	100%	100%	100%	100%

Source: FORS 1985-86

According to the VATS data, women of working age (20-65 years) are not overly dependent on public transport for their total travel movements, with the possible

exception of buses. This reflects the high levels of car use (including travel as car passengers) among women for much of their travel needs. Women in this age bracket make only slightly greater use of walking in their total trip-making compared to men.

Conclusions

This paper has demonstrated that significant shifts have occurred in the structure of employment in Australia over the past 15 years, and are likely to continue into the future. These shifts include the nature of occupations, the gender composition of the occupations, the shift towards part-time work (especially for women, the young and the old), and the changes in income relativities between men and women. It has also been shown that gender and employment status are important determinants of travel behaviour.

Many of these changes have significant implications for public transport. As women, particularly, enter the workforce in part-time positions, while generally retaining responsibility for a variety of family roles, the constraints upon their time increases dramatically. This creates a demand for means of transport which are flexible, at-call, convenient and safe. In addition, the extra income generated by taking up part-time work means that women are now more able to afford their own private means of transport. In addition, older women are now more likely to have a driver's licence than was the case just 15 years ago. All these changes point in the direction of a reduced demand for conventional public transport, which is no longer able to meet the requirements being placed on it by the new generation of women workers. Future public transport systems will need to adapt to these changed conditions, or suffer the consequences.

The changes in the structure of employment also have implications for how transport systems are analysed and modelled. As part-time work becomes a substantial component of all work, the assumption that most work travel occurs in the peak periods is less true. It will therefore be necessary to explicitly model non-peak conditions and to better understand the time-of-travel decision process. As more women enter part time work, while retaining family responsibilities, the patterns of journeys are becoming more complex as they try to fit all their required activities within a limited travel time budget. Complex trip chaining is now the norm, with as many trips being non-home-based as there are trips with an origin at home or trips with a destination at home. Our modelling practice therefore needs to explicitly account for the connectivity between trips made by one person, rather than assuming that all trips are independent of each other. Similarly, as working mothers try to perform chauffeuring and childcare duties on their way to and from work, the interconnectedness of trips between family members becomes more and more important as a determinant of any one person's travel behaviour.

Consideration of the interactions between the structure of employment, the nature of family responsibilities, the gender roles adopted in society, and the consequent demands placed upon transport systems make one realise that transport planning has come a long way from simply considering transport as providing for the "safe and efficient movement of goods and people". Rather, to quote Waller (1994), transport "is an essential component of health care, education, employment, recreation, culture, the maintenance of ties with family and friends, and all that makes life worthwhile".

References

Australian Bureau of Statistics (1991). *1991 Census Dictionary*. ABS Catalogue No. 29010. (AGPS: Canberra)

Morris, J.M. and Richardson, A.J. (1995). "Women in transit". *Women on the Move Conference*, Adelaide, October 1995.

Morris, J.M., Richardson, A.J., and McPherson, M. (1996). "The emerging needs of the majority - women, young and old". *20th Australasian Transport Research Forum*, Auckland.

Richardson, A.J. and Ampt, E.S. (1995). "The application of total design principles in mail-back travel surveys". *7th World Conference of Transport Research*, Sydney.

SOCIALDATA Australia (1987). *Survey of Day-to-Day Travel in Australia 1985-86 - a data base for the evaluation of road user risk in Australia*. Report to the Federal Office of Road Safety, Canberra.

Waller, P.F. (1994). "IVHS and Social Policy". *IVHS Review*, Winter/Spring, pp 13-18.

