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The Evolution of the Female Labour Force Participation Rate in Australia, 1984-1999

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1. Introduction

Between 1978 and 2005 the aggregate labour force participation rate of Australian women aged 15 and 64 years increased from 50.6 to 68.3 per cent. This constituted both a major change in the integration of women into the Australian workforce and a large share of the labour supply change recorded over the period.

It is important to consider the possible sources of the change in the aggregate female labour force participation rate as, for one, this type of inquiry will contribute information relevant to projections of future labour supply growth. As has been widely noted in commentaries on demographic change, any stalling of labour force growth, in the absence of substantial improvement in labour productivity, will directly reduce the potential for economic growth (see Austen and Giles, 2004, for an overview). Additionally, slow labour force growth is likely to undermine Australia's potential to take advantage of labour-augmenting technological change and this, in turn, will have adverse implications for long term growth prospects (see Beaudry, Collard and Green, 2005).

This paper contributes a cohort analysis of the labour force participation rate of Australian women over the 1984 to 1999 period with the aim of identifying the potential influence of a number of factors. Specifically, the analysis tracks the participation behaviour of representative groups (or cohorts) of Australian women over the life course. A fixed effects panel data regression model is utilized to 'decompose' the participation rate of each cohort and so identify how the participation rate observed in each year between 1984 and 1999 was affected by: i) General macroeconomic conditions prevailing in Australia at the time; ii) The age of the women in the cohort; and iii) The age-specific participation characteristics of the cohort, as compared to either younger and/or older cohorts. These effects on observed participation rates are referred to, respectively, as the 'macroeconomic effect', the 'age effect', and the 'cohort effect'.

The cohort effect is especially relevant to the identification of generational change in the labour force participation behaviour of women. It shows whether, and to

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This paper adds to a study compiled by the authors for Industrial Relations Victoria in 2005 (Austen, Birch, Giles and Mangano, 2005). The assistance of the Department in supporting this research is gratefully acknowledged. We are also indebted to the anonymous referees of this paper for their very helpful comments.

what extent, women born later in the twentieth century have higher participation rates at each age and within each macroeconomic environment than women born earlier in the century. The analysis in this paper, which is disaggregated by education, also provides insights to whether this generational change has been only associated with the experiences of women with a higher level of qualification, or whether it has been a more widespread phenomenon.

Age effects are also important in understanding the generational changes that are underway in women's participation behaviour. They measure the extent to which, within each cohort, the participation rate of women changes as they move through the life course. If these age effects are lower for women born later in the twentieth century than for other women, the implication is that women's participation behaviour is becoming less sensitive to their place in the life course. Again, by analyzing the nature of these effects separately for women with different educational characteristics it is possible to explore whether, and if so how, education affects the relationship between participation and age at different stages of the life course.

The results presented in this paper indicate that cohort effects are the likely dominant factor in explaining observed changes in the Australian Female Labour Force Participation Rate (FLFPR) in recent decades. Successive generations of Australian women, within each educational group, have increased their involvement in paid work at each stage of the life cycle and, additionally, they have become more permanently attached to the workforce over the life cycle (that is, age effects have also been an important influence). Macroeconomic effects on participation behaviour, in contrast, generally appear to be quite small.

The results also show that changes in the age distribution of women in recent decades have also contributed to increases in the *aggregate* FLFPR. Specifically, the movement of the large baby boomer generation into their forties has boosted the aggregate FLFPR as this age group is associated with a relatively high participation rate (table 1). However, in coming decades, downward pressure on the aggregate FLFPR will result from the movement of the boomer generation increasingly into their fifties and sixties, where age-specific participation rates are relatively low. Further cohort changes will thus be required if the aggregate FLFPR is to increase further and if labour supply growth is to be promoted.

Table 1 - Age Structure, Australian Women, 15-64 Years, 1978-2003

	Share of Total Population Aged 15-64						*Participation Rate in*
	1978	*1983*	*1988*	*1993*	*1998*	*2003*	*2003*
15 - 19	13.9%	12.7%	12.7%	11.0%	10.3%	10.1%	63.2%
20-29	25.8%	25.9%	24.7%	23.9%	22.6%	20.4%	76.9%
30-39	21.0%	23.4%	23.8%	24.3%	23.5%	22.6%	70.4%
40-49	16.4%	16.1%	18.3%	20.8%	21.7%	22.2%	77.1%
50-59	16.0%	15.0%	13.7%	13.8%	15.9%	18.3%	61.5%
60-64	6.7%	6.8%	6.8%	6.2%	5.9%	6.4%	26.7%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	

Source: ABS (2005)

This paper adds to a large existing literature on women's labour force participation behaviour (see Birch, 2005b, for a comprehensive overview of Australian studies and Jaumotte, 2003, for a review of international evidence). Most studies within this field are of individual differences in labour force participation and, typically, these take into account a woman's age and her education level, in addition to local labour market conditions.

A large number of studies have identified how women's involvement in the paid labour force typically changes substantially over the life course (that is, as they age). Levels of involvement in paid work are typically high when women are in their early to mid twenties; fall over the period when women have responsibility for young children; increase when women are in their late thirties and early forties; and fall again over the years until women reach 65. Heckman (1976), Heckman and Willis (1979) and Mincer and Ofek (1979) discuss this feature of women's labour supply with reference to international data. Australian studies on the issue include Austen, Jefferson and Preston (2001) and Chapman, Dunlop, Gray, Lui and Mitchell (2001). This paper adds to those findings by examining how, in an Australian context, the relationships between age and labour force participation rates have changed between recent generations of women; and how this relationship varies (and has changed) between groups of women with different educational characteristics.

Many studies have also identified large differences in the labour force participation behaviour of women according to their level of education and find that these differences persist once the influence of other factors are taken into account. For example, Gray and Hunter (2002) and Birch (2005a) both report that women's labour force participation is positively associated with years of schooling. This paper expands on those findings by documenting the differences in cohort and age effects on participation behaviour for Australian women with different educational characteristics.

Analysis of the influence of local labour market conditions is also a common feature of studies of women's labour force participation behaviour. It is typically hypothesized that economies with high levels of unemployment will produce a discouraged worker effect, whereby workers drop out of the labour market after becoming pessimistic about their employment chances (see Birch, 2005a; Bingley and Walker, 2001, and McConnell and Brue, 1995). However, studies of the influence of local economic conditions on women's labour force participation behaviour have adopted a range of alternative measures. For example, Campolieti (2001) uses regional unemployment rates of men and women. Miller and Volker (1983) and Greenhalgh (1977) use the unemployment rate of men only, whilst Fortin and Fortin (1999) use a job availability index. Despite the different measures of economic circumstances, most of these studies concur that an increase in the unemployment rate reduces the labour force participation of women (that is, a discouraged worker effect is observed). This paper employs a measure of macroeconomic conditions based on the male unemployment rate and adds new information on the relationship between this rate and the aggregate female labour force participation rate, controlling for age and cohort effects and for differences in levels of education.

Two studies that are closely linked to the current paper are Beaudry's and Lemineux's (1999) analysis of changes in the Canadian female labour force participation

rate between 1976 and 1994 and the Ravindiran, Rawnsley and Jose (2002) study of Australian unemployment rates over the 1984-2001 period. Both studies examine cohort, age and year (macroeconomic) effects on female labour force participation rates. However, the Beaudry and Lemineux study is somewhat more comprehensive in that it includes an analysis of education-based differences and allows for changes in age effects across generations of women. The current paper attempts to utilize these innovations to add extra details on the nature of age, cohort and macroeconomic effects in Australia.

2. Data and Descriptive Statistics

The analysis in this paper is based on unpublished ABS Education Survey data for the 1984 to 1999 period.[1] This data gives total annual participation rates for women by year of birth and educational attainment. This permits a study of changes in aggregate participation *rates* across educational *groups* but not individual differences in participation behaviour. For example, data was not available to identify part time versus full time employment; nor was it possible to identify categories of women according to the presence of own children.

The earliest birth year recorded in the data set was 1930 and the last one was 1967. In total, the data set contains 358 observations of participation rates with these rates being derived from survey data on between 1 and 1.6 million women in each of the years of the survey period (1984 to 1999).

Two categories of educational attainment are used. The first group of women completed, at a maximum, the last year of high school. The second group of women held a post-school qualification. Within each of these groups, the women were further categorized into two-year cohorts based on their birth year. In total, in each education group, 19 cohorts were identified, the first being women born in 1930-1931 and the last being women born in 1966-1967. In the remainder of this paper, each cohort will be referred to by the odd numbered birth year of the cohort.

The observations for each education group and cohort are their participation rates in each of the years from 1984 to 1999. As participation rate data is not available for women when they are aged over 65 years, some of the older cohorts have fewer observations than the others. For example, in each educational group there are only 12 observations for the 1931 cohort of women because women in this cohort turned 65 in 1996. Similarly, the number of observations of some of the younger cohorts is limited because only the participation behaviour of women aged over 25 is included in the study[2] and some of these cohorts did not reach this age before 1984.

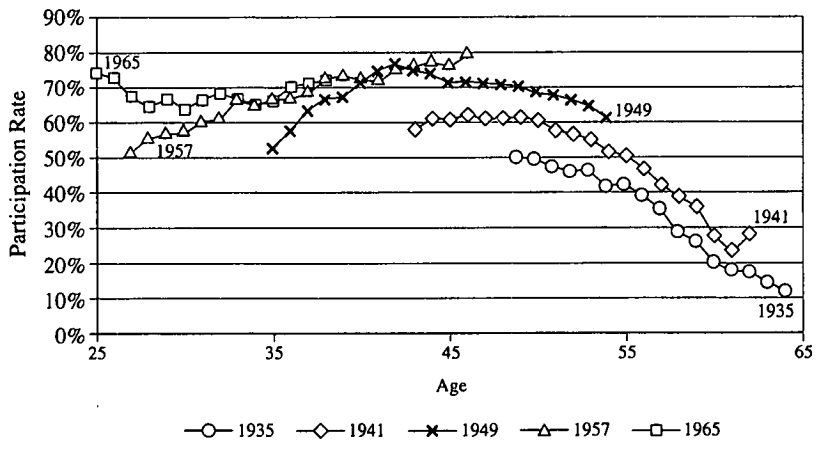
Figure 1 shows the evolution of lifecycle participation behaviour for a representative group of the cohorts that comprise this study. Reflecting the data limitations mentioned above, those women who entered the labour market first (e.g.

[1] Details on the survey are available from the ABS (ABS, 2000). Up until 2000 the survey was called the 'Transition from Education to Work' survey and it is currently called 'Education and Work'. However, the catalogue number has remained the same for the entire period of the survey.
[2] The study was limited to the participation behaviour of women over the age of 25 based on an assumption that, generally, the highest level of education is attained by this age. The restriction allows for changes in the level of education attainment between different cohorts of women to be more accurately reflected in the cohort effect.

the 1931 cohort) are only shown on the right hand side of the diagram, while those women who entered the labour market last (e.g. the 1965 cohort) are only shown on the left hand side of the figure.

The figure shows the 'M' shaped age-participation profile described in the introduction to this paper. That is, across the cohorts, participation rates are relatively high for women close to age 25; they are relatively low for women in their late twenties and early thirties; they increase with age up to around age 45; and then they fall until age 65. The figure also shows that participation rates at most ages were higher in the younger (later) cohorts than they were in the older (earlier) cohorts.

Figure 1 - Lifecycle Labour Force Participation Behaviour of Selected Cohorts of Australian Women, ABS Education Survey Data, 1984-1999



Figures 2 and 3 show how the lifecycle participation behaviour of women with different levels of education has changed in Australia over recent decades. The large, positive effects of education on the labour market participation rate of women are clearly evident from a comparison of the two charts. This is consistent with the findings of previous studies of women's labour force participation behaviour, as was summarized in the introduction.

Inspection of the data in figures 2 and 3 also reveals that, within each cohort, substantial year-on-year variations in the participation rate occur. This raises the possibility that participation rate outcomes for each cohorts at particular age levels are affected by macroeconomic conditions and further motivates the inclusion of a measure of these conditions in the regression analysis of the FLFPR changes.

Figure 2 - Lifecycle Labour Force Participation Behaviour of Selected Cohorts of Australian Women with Post School Qualifications, ABS Education Survey Data, 1984-1999

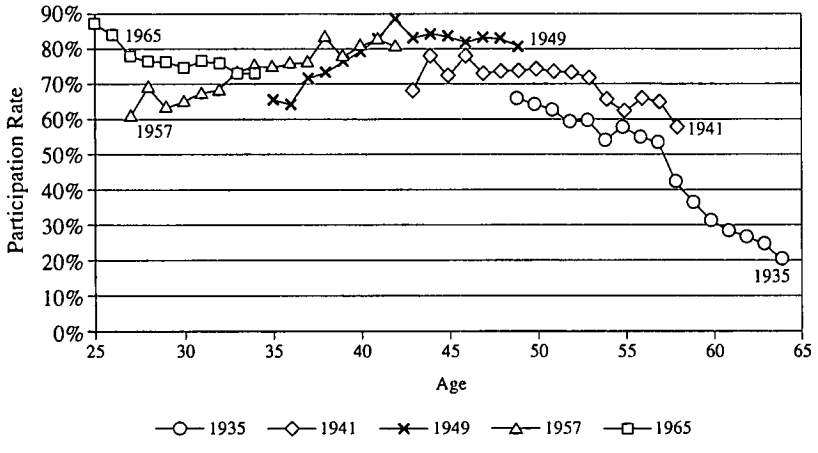
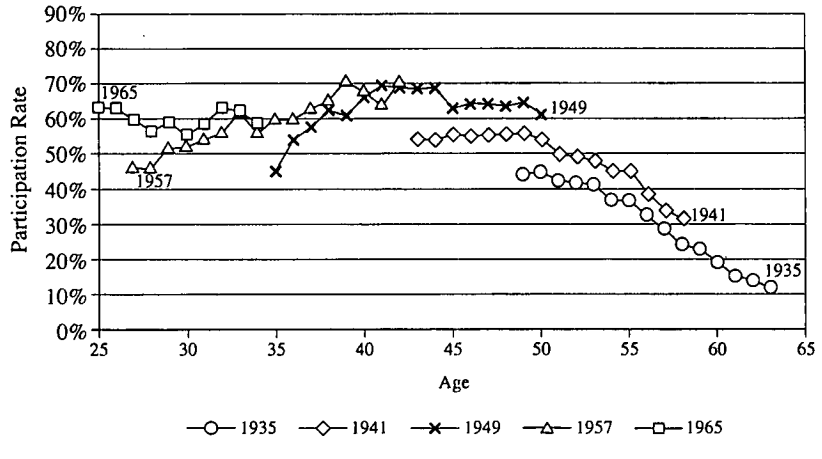


Figure 3 - Lifecycle Labour Force Participation Behaviour of Selected Cohorts of Australian Women, with High School or Lower Qualifications, ABS Education Survey Data, 1984-1999



3. Econometric Strategy

A fixed effects panel data regression model is used to perform a cohort analysis of the Education Survey data. Specifically, this model is used to estimate (for the group of all women, and for each educational sub-group separately) the cohort, age and macroeconomic effect on the labour force participation of each cohort, as expressed in the following equation.

$$P_{it} = \beta_{1i} + \beta_2 UR_t + \beta_{3i} Age_{it} + \beta_{4i} Age^2_{it} + \varepsilon_{it} \quad (1)$$

Where P_{it} is the female labour force participation rate of cohort i at time t; β_{1i} measures the cohort effect on the labour force participation of each cohort; $\beta_2 UR_t$ measures the macroeconomic effect on the labour force participation of all cohorts in a given year; $\beta_{3i} Age_{it}$ and $\beta_{4i} Age^2_{it}$ represent the effects a one-year increment in age has on the labour force participation rate of each cohort over the lifecycle of the cohort[3]; and ε_{it} is an error term for cohort i in year t.

A number of comments regarding the measures and specification employed here are warranted. First, the unemployment rate for men aged 25 to 45 is used to measure the macroeconomic environment affecting women's participation behaviour. As Beaudry and Lemineux (1999) argue, this measure is likely to capture cyclical changes in employment opportunities and is less susceptible to movements in the FLFPR than the female unemployment rate. As the discussion in the introduction to this paper indicated, other studies of participation behaviour have utilized different measures of the macroeconomic environment and, generally, achieved similar results to studies that rely on the 'prime age' male unemployment rate.

It is also worth noting that the slope coefficient on the unemployment variable, β_2, is held constant between cohorts. This reflects an assumption that changes in economic conditions in a particular year will have a similar impact on the labour force participation of all cohorts. Thus, β_2, is the average macroeconomic effect on women's labour force participation for all cohorts.

The age effect term has been defined as a second-degree polynomial based on the "U" shape (or quadratic form) of the lifecycle labour force participation profiles, as shown in figures 1-3. The two coefficients, β_{3i} and β_{4i}, in the age effect term have both been allowed to vary between cohorts, enabling a study of how these effects have changed for successive generations of Australian women.

Estimation of the model was restricted to those cohorts not exhibiting evidence of serial correlation (as identified by a Bruesch-Godfrey test). This added confidence to the reliability of the tests of significance without compromising the sample (very few cohorts[4] suffered serial correlation). It also proved to be a better option than using a first-order autoregressive error structure to resolve the serial correlation problem as the sample size of each cohort was relatively small.[5]

[3] Because the age effect term is a second-degree polynomial, the effect that a one-year increment in age has on the labour force participation rate for each cohort over the lifecycle of the cohort is equal to $\beta 3i + 2\beta 4i\ Ageit$

[4] Five cohorts from the total group and six cohorts from the analysis of participation rates of women with high levels of education were dropped. All cohorts were retained in the analysis of participation behaviour by women with lower levels of education.

[5] Using a first-order autoregressive error structure to resolve the serial correlation problem in these circumstances would have required a great deal of caution in interpreting the results.

4. Results

The results derived from the estimation of equation 1 using the Pool Estimation procedure in Eviews 5.1[6] are reported in table 2. Column 1 shows the results from the application of the equation to the total sample, whilst columns 2 and 3 show the results for the education sub-samples. In each column the coefficient on variable "UR" refers to the observed effect of a one percentage point change in the male unemployment rate (in the 25-44 year age group) on the observed participation rate in each cohort and for each age level. The coefficients on the variables 1967-C through to 1931-C show the intercept term for each cohort. The coefficients on the variables 1967-Age through to 1931-Age show the measured relationships between a one-year increment in age and the participation rate of each cohort. The coefficients on the 1967-age2 through to the 1931-age2 variables convey the same type of information but the data relates to the measured relationship between a one unit change in age squared and the participation rate.

The results reported in table 2 indicate, first, that increases in the unemployment rate for men aged between 25-44 years over the survey period generally had a weak negative effect on the female labour force participation rate (LFPR) in each cohort. The sign and magnitude of the coefficient on this variable for the sample that included all women indicate that a one percentage point increase in the unemployment rate reduced the LFPR of each cohort, on average, by 0.17 percentage points. However, it is very interesting to note that the impact of an equivalent change in the unemployment rate on the LFPR of women with relatively low levels of education was substantially larger (at negative 0.40 percentage points). In contrast, changes in the unemployment rate were an insignificant source of variation in the LFPR of women with post-school qualifications. These results indicate that the sensitivity of women's participation behaviour to labour market conditions is, in part, a function of their educational characteristics. Thus, as the average level of education grows we anticipate that the FLFPR will exhibit smaller fluctuations with the business cycle.

The data in tables 2 also show that, generally, the intercept terms for the cohorts are significantly different from zero and increase in magnitude in each successive cohort. These changes, which are graphed in figure 4, indicate that positive cohort effects did positively affect the total LFPR of Australian women over the 1984 to 1999 period. More information on the extent of these changes is provided in the next section.

The results indicate, additionally, that there were broad similarities in the nature of the cohort changes in the two educational groups. As is portrayed in figure 4, an increase in the LFPR of each age group occurred across successive cohorts in each educational category. However, a relatively large number (7/19 as compared to 2/13) of the measured cohort changes in the 'high school or less' group were not statistically significant. Furthermore, many of the non-significant cohort changes in this educational group were located in the set of younger (later) cohorts. For example, the 1967, 1963,

[6]The options selected in the Pool Estimation specification included setting the Cross-section effects option to 'Fixed', and the Weights option to 'Cross-section weights'. These were selected following a test for contemporaneous correlation. Specifically, Hill et al.'s (2001) test, where the chi-square $\chi 2$ (m) test statistic is $\lambda = T(r212 + r213 + \ldots r2nm)$, with m equal to the number of correlations, and where $r2ij = \sigma 2ij / \sigma 2i\ \sigma 2j$, and $\sigma 2ij = 1/T \sum eitejt$. Based on the options selected, Eviews 5.1 used Estimated Generalized Least Squares (EGLS).

1959 and 1957 cohort effects were insignificant, whereas all the cohort changes between 1937 and 1955 were significant.

This information suggests that whilst the participation behaviour of women with lower levels of education changed significantly between the generations born in the early 1940s and those born in the mid 1950s, it stabilized among women born in later years. In part, this may reflect a change both in the composition of the group with lower levels of education and in the educational requirements of many jobs. As a generalization, the academic ability of women born in the 1960s who limited their education to high school is likely to have been lower than that of similarly educated women in the 1940s or 1950s. Likewise, women's ability to secure work with a high school qualification fell over this time period in line with the rise in average education levels. However, the results may also reflect the influence of policy-related variables (such as marginal effective tax rates) on the participation behaviour of young women with relatively low labour market skills. Given that the labour market participation of these women will be important both to future labour supply and to future patterns of difference/similarity between women with different labour market skills and opportunities, this finding of a slow down in the change of participation behaviour of women with lower levels of education is worthy of further study.

A further result of the data analysis (shown in column 1 of table 2) is that, in the group that comprises all women, the age and age squared coefficients are significantly different from zero. This implies that age is an important predictor of participation behaviour in the large majority of the cohorts. It is also important to note that the magnitude of the age effect falls across the successive cohorts (as is summarized in figure 5). This information supports the conjecture that the participation behaviour of later generations of Australian women is less affected by life cycle stage than was the case in earlier cohorts.

The data for women in the two educational groups (in columns 2 and 3) follows a similar pattern, as is shown in figure 5. However, once again, a relatively large number of measured age effects (7/19, as compared to 3/13) were statistically insignificant in the sample that comprised women with high school or lower qualifications. As was the case in the cohort effect results, the insignificant results were most commonly found in the younger (1959-1967) cohorts. The implication of this feature of the data is that participation rates for this group of women tended to start and remain low across at least the first few decades of 'working life'. In contrast, young women with high levels of education appear to have substantially increased their involvement in paid work, but, even in later cohorts, the participation rate of this group falls away significantly as they move into age groups where children are often born.

It would be useful to examine the result of a falling significance of age in the determination of women's labour force participation behaviour with reference to data that identifies part time and full time employment. It may be the case, for example, that women in later generations have had greater access to part time jobs than earlier generations. This would contribute a greater ability to maintain employment during child-raising years and help explain the decreases sensitivity of the FLFPR to life course stage.[7]

[7] We thank an anonymous referee for identifying this possibility.

Table 2 - Least Square Estimates of FLFPRs, Macroeconomic, Cohort and Age Effects by Education Group, Australia, Education Survey Data, 1984-1999

Variable	*(1) All women*	*(2) Above High School*	*(3) High School or less*
UR	-0.1729 (0.0764)	-0.0361 (0.1264)	-0.3995 (0.0813)
1967-C	1.3299 (1.0011)		0.6835 (1.1014)
1965-C	2.7913 (0.7124)	3.2314 (0.7591)	2.0756 (0.8844)
1963-C	1.7926 (0.7119)	3.0396 (0.7194)	0.5007 (0.8474)
1961-C	1.5669 (0.2139)		1.1584 (0.4205)
1959-C	0.9083 (0.2298)	1.4284 (0.3071)	0.6034 (0.3174)
1957-C	-0.4729 (0.1951)	-0.1600 (0.3980)	-0.5278 (0.3536)
1955-C	-1.6595 (0.3865)	-1.2407 (0.5239)	-1.9579 (0.4386)
1953-C	-2.4236 (0.3090)	-1.6631 (0.4096)	-2.9207 (0.4312)
1951-C	-3.0104 (0.3162)	-2.8649 (0.3633)	-3.2949 (0.3652)
1949-C		-3.5900 (0.5274)	-4.2344 (0.5839)
1947-C	-3.2677 (0.5502)	-2.3714 (0.6238)	-3.6696 (0.6289)
1945-C	-3.2584 (0.4581)		-2.9744 (0.5813)
1943-C	-4.9476 (0.6867)		-5.1572 (0.9423)
1941-C	-3.6374 (0.2725)	-2.5708 (0.9713)	-3.6182 (0.3707)
1939-C	-4.1077 (0.4513)		
1937-C		-5.8405 (1.8908)	-2.6955 (0.6732)
1935-C	-0.9396 (0.9161)		-0.4613 (0.6164)
1933-C		-2.6043 (3.4423)	2.1383 (1.3311)
1931-C		-8.9608 (1.7569)	-0.6411 (1.6237)
1967-AGE	-0.0340 (0.0705)		0.0049 (0.0776)
1967-AGE2	0.0004 (0.0012)		-0.0002 (0.0014)
1965-AGE	-0.1369 (0.0487)	-0.1549 (0.0520)	-0.0970 (0.0604)
1965-AGE2	0.0022 (0.0008)	0.0024 (0.0009)	0.0016 (0.0010)
1963-AGE	-0.0718 (0.0471)	-0.1459 (0.0477)	0.0071 (0.0561)
1963-AGE2	0.0011 (0.0008)	0.0023 (0.0008)	-0.0001 (0.0009)
1961-AGE	-0.0619 (0.0138)		-0.0423 (0.0270)
1961-AGE2	0.0010 (0.0002)		0.0008 (0.0004)
1959-AGE	-0.0258 (0.0144)	-0.0505 (0.0192)	-0.0120 (0.0198)
1959-AGE2	0.0005 (0.000)	0.0009 (0.0003)	0.0004 (0.0003)
1957-AGE	0.0512 (0.0115)	0.0382 (0.0234)	0.0512 (0.0208)
1957-AGE2	-0.0005 (0.0002)	-0.0004 (0.0003)	-0.0005 (0.0003)
1955-AGE	0.1134 (0.0214)	0.0944 (0.0291)	0.1275 (0.0243)
1955-AGE2	-0.001 (0.0003)	-0.0011 (0.0004)	-0.0015 (0.0003)
1953-AGE	0.1504 (0.0162)	0.1153 (0.0215)	0.1732 (0.0226)
1953-AGE2	-0.002 (0.0000)	-0.0013 (0.0003)	-0.0021 (0.0003)
1951-AGE	0.1729 (0.0158)	0.1686 (0.0181)	0.1853 (0.0182)
1951-AGE2	-0.0020 (0.0002)	-0.0020 (0.0002)	-0.0021 (0.0002)
1949-AGE		0.1978 (0.0251)	0.2254 (0.0277)
1949-AGE2		-0.0022 (0.0003)	-0.0026 (0.0003)
1947-AGE	0.1750 (0.0249)	0.1345 (0.0283)	0.1936 (0.0285)
1947-AGE2	-0.0019 (0.0003)	-0.0014 (0.0003)	-0.0022 (0.0003)
1945-AGE	0.1734 (0.0120)		0.1610 (0.0252)
1945-AGE2	-0.0019 (0.0002)		-0.0018 (0.0003)
1943-AGE	0.2409 (0.0285)		0.2468 (0.0391)
1943-AGE2	-0.0026 (0.0003)		-0.0026 (0.0004)
1941-AGE	0.1812 (0.0109)	0.1396 (0.0387)	0.1794 (0.0148)
1941-AGE2	-0.0020 (0.0001)	-0.0015 (0.0004)	-0.0019 (0.0001)
1939-AGE			0.1968 (0.0173)
1939-AGE2			-0.0021 (0.0002)
1937-AGE		0.2639 (0.0697)	0.1377 (0.0248)
1937-AGE2		-0.0027 (0.0006)	-0.0015 (0.0002)

Table 2 (continued) - Least Square Estimates of FLFPRs, Macroeconomic, Cohort and Age Effects by Education Group, Australia, Education Survey Data, 1984-1999

Variable	*(1) All women*	*(2) Above High School*	*(3) High School or less*
1935-AGE	0.0738 (0.0326)		0.0532 (0.0219)
1935-AGE2	-0.0009 (0.0003)		-0.0007 (0.0002)
1933-AGE		0.1399 (0.1201)	-0.0386 (0.0465)
1933-AGE2		-0.0015 (0.0010)	0.0001 (0.0004)
1931-AGE		0.3539 (0.0602)	0.0528 (0.0557)
1931-AGE2		-0.0033 (0.0005)	-0.0007 (0.0005)
R squared	0.996	0.993	0.991
No. of obs	204	192	278
No. of cross sections	14	13	19

Notes: Method: Pooled (unbalanced) EGLS (Cross-section weights); Linear estimation after one-step weighting matrix. Standard Errors are shown in parentheses.

Figure 4 - Cohort Intercept Terms

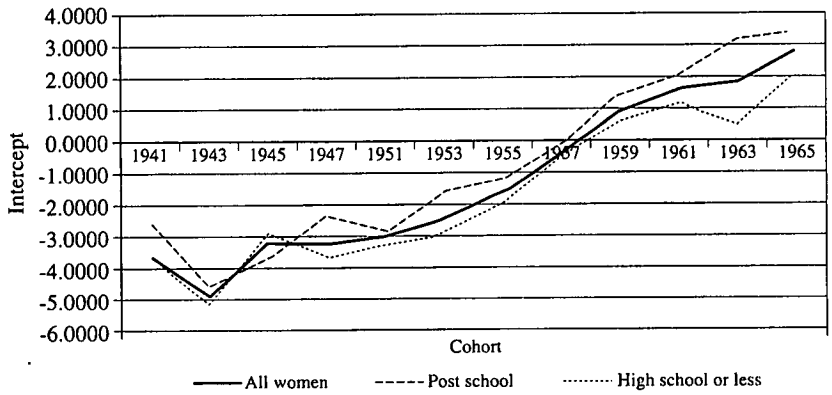
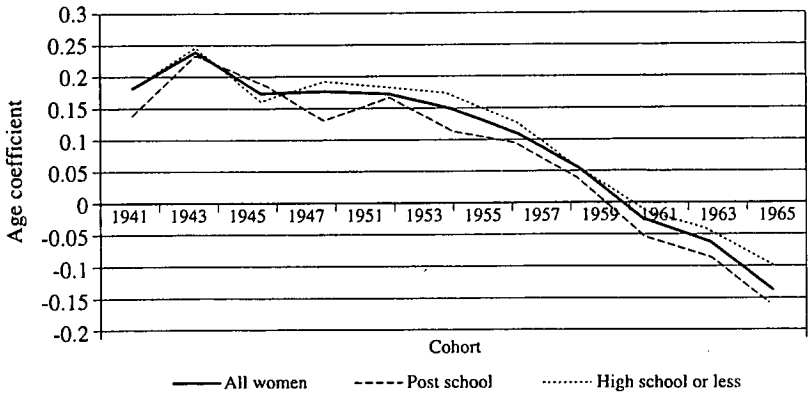


Figure 5 - Age Effects by Cohort, 1941-1965



5. Implications for the Aggregate Female Labour Force Participation Rate

The data presented thus far in this paper have several implications for the sources of changes in the aggregate FLFPR over the 1984-1999 period. Given that the cohort effects have been shown to be positive and significant they are likely to have been a major source of growth in the aggregate participation rate, especially as the changes in the age distribution during this period (as shown in table 1) were relatively small.

In this section this analysis is taken one step further. Specifically, the results from the regression analysis are used to identify the FLFPR that would have applied in 2005 if the measured cohort and age changes had *not* occurred. This analysis is restricted by the fact that observations of participation rates across the whole working life cycle are not available for any cohort. The approach taken involved, first, using the regression results in table 2 to predict participation rates for women for 4 years beyond the range of observations (for example, we predict the participation rate of women from the 1959 for the ages 40-44). Then a comparison is made of the LFPR for women aged 25-44 years that did apply in 2005 with the rate that would have applied in 2005 if women's participation behaviour had continued to follow the behaviour exhibited by the 1959 cohort.[8] A comparison is also made of the actual 2005 LFPR of women aged 45-64 years with the rate that would have obtained in 2005 if participation behaviour had not changed from that exhibited by the 1935 cohort.[9]

The specific steps involved in this part of the analysis included the use of the regression results on the cohort and age variables (as listed in column 1 of table 2) to create predictions of the participation rate at each age for the 1959 and 1935 cohorts. For example, the predicted participation rate of the 1959 cohort at age 25 is given by $(0.908 - 0.03*25 + 0.001*25^2)$, and the 25-44 participation rate for the cohort is simply the average of each year-specific rate thus derived. These figures are then applied to data on population shares from 2005 to derive an estimate of the participation rate of 25-44 year old women that would have applied in 2005 if participation behaviour had remained the same as that exhibited by the 1959 cohort. The procedure is repeated for the 1935 cohort and the 44-64 age group.

The data used in the analysis are shown in table 3. Together these figures show that, while the actual 25-44 FLFPR reached 73.0 per cent in 2005, it would have been only 69.2 per cent in this year if cohort changes affecting the participation behaviour of women born after 1959 had not taken place. Similarly, while the actual LFPR of 45-64 year old women reached 61.1 per cent in 2005, it would have been only 40.3 per cent in this year if the participation behaviour of older women had remained the same as that exhibited by women born in 1935.

Some additional features of the data in table 3 are worth noting. First, there is a relatively large (22.8 per cent) difference between the 25-29 LFPR of women recorded in 2005 and that recorded by the 1959 cohort. This represents a large change in the

[8] This is the oldest cohort with reliable participation data across the 25-44 age group. The use of earlier cohorts would involve reliance on predictions over a wider age range.

[9] As the data set is limited to the 1984-1999 period reliable participation rate data (that is, data that doesn't rely on extrapolation over a large age range) on this cohort when they are aged less than 44 is not available.

early labour market behaviour of women born only approximately 20 years apart. The analysis presented in earlier parts of this paper suggests that this change is most likely to have been produced by the growth in the number of women with higher qualifications and an increase in the 'early working life' participation rate of these women.

Table 3 - Predicted Age-Specific Female Labour Force Participation Rates and Population Data (25-64 year old women)

Age Group	*25-29*	*30-34*	*35-39*	*40-44*	*45-49*	*50-54*	*55-59*	*60-64*	*25-44*	*45-64*
LFPR Feb 2005 (%)	75.3	70.2	69.2	77.4	77.3	72.6	52.1	30.6	73.0	61.1
LFPR 1959 Cohort (%)	61.3	64.6	70.6	79.4					69.2[a]	
LFPR 1935 Cohort (%)					54.1	45.7	34.6	18.1		40.3[a]
Population in 2005 ('000)	674.9	757.8	736.6	770.2	728.7	668.1	611.3	460.8		

Notes: [a] calculated using 2005 population data
Source: Table 2 and ABS (2005)

By contrast, the 40-44 LFPR of the 1959 cohort is shown to be very similar to the rate recorded in 2005. This is likely to largely reflect the fact that the 1959 cohort has only recently left the 35-44 age group (the women in the cohort turned 46 in 2005). In other words, it was unlikely that large cohort effects would be identified in this part of the age distribution. However, the result may also reflect 'stickiness' in the LFPR of women aged in their thirties, when child care demands are often high. It will be important for future studies to examine whether the increased LFPR of women who are currently in their twenties will be maintained as they move into their thirties and early forties.

The figures in table 3 also show that the changes in the LFPR of women aged over 45 have been substantial and recent. Keeping in mind that women who are currently in the 45-49 age group were born between 1951 and 1960, we can observe that their LFPR is 42.9 per cent higher than the 45-49LFPR recorded by the 1935 cohort. This is a large change that has occurred over a 16 to 25 year time period. More dramatic still are the increases in the LFPR for the 50-54, 55-59 and 60-64 age groups in 2005 over the 1935 cohort's levels. These changes, of 58.9, 50.7 and 69.2 per cent respectively, occurred over a relatively short time period (for example, the 1935 cohort was aged 64 only six years earlier, in 1999). Although the increases occurred from a relatively low base, they may point to a substantial change in the labour market behaviour of older Australian women. This will be especially important to monitor as the 'baby boomer' generation moves increasingly into their fifties and sixties in coming years.

6. Summary and Conclusions

This paper made use of ABS Education Survey data for the 1984 to 1999 period to examine the nature and extent of generational change in the labour force participation

behaviour of Australian women. The analysis identified significant 'cohort effects', implying that, at each stage of the life course, and across macroeconomic conditions, younger cohorts of women are participating in the paid workforce at a higher rate than earlier cohorts did. The analysis also identified changes in the magnitude of 'age effects' across the cohorts, implying that the participation behaviour of younger cohorts of Australian women is less affected by their stage in the life course than was the case for older cohorts. These generational changes in participation behaviour were shown to be more important in the group of women with post-school qualifications than they were for women with high school or lower qualifications. An important conclusion of this study is that there is a need to distinguish between women with different educational levels when studying the nature of generational change in the Australian labour market.

Generally, the findings reported in this paper contribute an understanding of recent changes in the Australian FLFPR. They show that a large part of the rise in participation rates can be attributed to generational change in women's involvement in paid work – and not to changes in the age distribution or changing macroeconomic conditions. They also show that this generational change is still occurring. The 'early-working life' participation behaviour of women born in the mid 1960s is higher than that of women born in the 1950s or early 1960s. Similarly, the 'late-working life' participation behaviour of women born in the 1940s and 1950s is higher than that of women born in the 1930s. Thus, it is likely that the negative influence on the aggregate FLFPR that will be produced as the baby boomer generation moves into their fifties, sixties and beyond will, at least in some part, be offset by increases in participation rates among younger generations of women.

The findings also point to the need for further investigation of the changes occurring in the labour force participation behaviour of Australian women. For example, as data becomes available on the mid and later-working life participation behaviour of women born in the 1960s it will be important to examine whether the increased involvement in paid work that they demonstrated in their twenties is replicated in their participation in paid work in their forties, fifties and sixties. It will also be important to study changes in the labour force behaviour of younger women, such as those born in the 1970s and 1980s, to get a sense of the possible limits to generational change.

As additional data becomes available, it will be important to also explore cohort changes, by educational group, in part time and full time employment. Such studies are likely to inform us of the factors contributing to changing relationships between women's place in the life cycle and their participation behaviour. As such, they will contribute insights to the barriers to participation and, in turn, labour supply and economic growth.

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