PROJECT 26:
EFFECTS OF EDUCATION, FERTILITY AND DIVORCE ON MARRIED WOMEN'S EMPLOYMENT: PATTERNS PAST, PRESENT AND FUTURE

Revised final report

M.D.R. Evans

Jonathan Kelley

Melbourne Institute of Applied Economic and Social Research

University of Melbourne

Summary

This project examines the effects of education, fertility, and divorce on married women's workforce engagement – both participation and intensity. It focuses particularly on how patterns have changed between 1984 and the present, and on projections for the future. It uses IsssA data, because these representative national samples have the widest range of relevant variables over the longest period of any currently available.

Our models suggest that characteristics of the **family of origin** fail to have a significant long-range impact on women's labour force participation or on women's hours of work as adults, all else equal.

Education is a major influence on workforce engagement both in the models of labour force participation and in the models of hours worked weekly. Its importance is highlighted by its having the largest standardised regression coefficient in the large model of objective influences. The estimates suggest that each additional year of education leads to 1.4 hours more work per week, on average and all else equal. Importantly, the project's estimates suggest that the influence of education has not significantly declined over time. Moreover, reciprocal causation estimates suggest that education influences hours worked weekly (but not vice versa) and that education strongly influences attitudes towards female employment (but not vice versa).

Being married, on its own, according to the results in the models estimated in this report, does not significantly affect women's degree of workforce engagement (either labour force participation or hours worked weekly). Similarly, divorce influences neither hours worked weekly nor attitudes towards female employment (nor do hours worked or attitudes to women's employment have any influence on divorce, at least with the measures and models in this project).

But particular aspects of marriage do have effects on workforce engagement and/or associations with it. Women whose husbands have higher income are less likely to work, but, all else being equal, women are more likely to work when their husbands are also employed, according to the models employed in this project.

Children have an important influence on workforce engagement, at its greatest when they are pre-schoolers, still present but only one third as strong when they are school age, and still detectable but very small after the children have grown. These effects have not significantly declined over time. Family size has changed (so, for example, more a larger fraction of today's mothers of preschoolers have just one child than was true in the middle 1980s), but the impact of family composition has not changed significantly in the models estimated in this project. In terms of reciprocal influences, there is strong evidence that increasing hours of employment does not decrease fertility desires (nor is there any influence in the opposite direction. The models also find that decreasing actual fertility generates, at most, a tiny increase in support for female employment. It is

possible that women's employment has a moderately large effect on actual fertility outcomes, but as the best models estimate a non-significant effect, this issue will require further analysis in future projects.

There are few **age** differences, net of other influences, but women aged 55 to 64 work almost 8 hours less a week, and also participate at a substantially reduced rate, on average, net of other influences, according to these models.

The **time trends** revealed by the model, particularly the rather dynamic increases in both participation and hours worked weekly from generation to generation, to the extent that they persist into the future, will continue to generate rises in women's workforce engagement. There were no evident time effects associated with particular policy initiatives, but some of these are too colinear with time to analyse separately. The project tested many interactions with time to assess in particular whether the effects of education and of family situation are declining over time, but no significant interactions with time were found. Thus, there are now many more highly educated women, leading to higher rates of women's employment overall, but the relative importance of education has not changed significantly. Similarly, there are now more childless women, and women with children have fewer of them, so declining fertility has elevated employment, but the impacts of childlessness and of diverse family sizes have not changed.

INTRODUCTION

Objective

As agreed in the accepted proposal, this project has examined the effects of education, fertility, and divorce on married women's labour force participation, focusing particularly on how patterns have changed between 1985 and the present, and on projections for the future. The project first developed quantitative estimates of the magnitude of the impacts of education, fertility, and divorce on women's labour force participation, and how these have changed over time, on the simple assumption that they shape women's employment. Education and fertility used to exert an enormous influence on married women's labour force participation in Australia, and the possibility that their effects are waning has important implications for FaCS. This possibility was addressed using interactions and multigroup analyses. Next, the project explored the more complex but realistic possibility of reciprocal causation: that women's labour force participation is in part a cause (as well as a consequence) of their fertility and marital stability, using reciprocal causation models. For the latter purpose the project used structural equation models with instrumental variables for identification; these models also permitted the project to estimate coefficients with corrections for attenuation due to random measurement error.

Motivation

FaCS identifies three key social policy outcomes in its Strategic Statement for 2002-2005: strong families, strong communities, and individuals reaching their potential. The outcomes are achieved through capacity building and early intervention; promotion of independence , choice and self-reliance; and maintaining a strong and sustainable social safety net. The motivation for this project is to explicate some links between key aspects of two of the three policy outcomes: women's economic participation and the size and stability of her family.

The project examined how these links are changing over time, how they might be expected to change in the future, and how they reciprocally influence each other. In terms of FaCS's policy priorities as enunciated in their Priorities Plan 2002-2003, this research relates substantially to the Structural Ageing area, especially by providing knowledge concerning the workforce attachment of women and exploring its linkages to falling fertility.

Plan of the report

The first section of this report gives the background and an overview of the project, describes the data, and gives details on measurement and statistical models. The second section presents the basic results about women's economic

participation and how it is changing over time, how it might be expected to change in the future. These are based on ordinary least squares (OLS) regression estimates of a conventional recursive model. The third section presents the results about reciprocal influences between women's economic participation, education, and the size and stability of her family. These are based on structural equation (LISREL) models. The paper concludes with a discussion.

DATA, MEASUREMENT, AND MODELS

Background and Overview of the Project

The project began by data preparation of the variables agreed in the original proposal and subsequent discussions. In this phase the project tailored data from a large-scale database specifically for this project.

The data are representative national samples, from the IsssA-Pool Database, 1984-2002. Most analyses are based on the 9,412 women, age 25 to 64, in the database. However, the variables required for some of the models are not available for all years, so the number of cases available varies from model to model, to make use of the maximum available amount of information. The restriction to women age 25 or older is necessary to ensure that they have had time to complete their education.

Note that not all the variables included in the models are of interest to FaCS, but some of these "apparently irrelevant" variables are necessary to avoid omitted variables biases in the estimates of the models, and others are included for statistical reasons (because they act as instrumental variables that allow identification of the simultaneous models involved in the reciprocal causation; details on these were discussed and agreed in connection with earlier progress reports). A detailed list of measures used in the models is provided in the "Data and Measurement," and groups of them are represented schematically in Figure 1. It should be noted that where Figure 1 mentions "Fertility Attitudes and Behaviour", these are actually separate measures, simply grouped in order to keep the fairly complex model visible on one page.

FaCS has provided details on the timing of relevant changes in benefits and this has been incorporated into the model-building process.

Unfortunately, childcare data at the postcode level from the FaCS childcare census are not available for the full span of the study, so it was not practical to incorporate local availability of childcare into the models for this project. If, however, in the future, data could be produced from the childcare census giving availability of childcare by postcode by year for the dates when this is available, a follow-up project could augment the models from this project with that additional data and re-estimate the models to discover (1) the impact of the availability effect and (2) whether including that alters the estimates of effects of variables included in the models in this report. The role of these variables in the model is reviewed in Figure 1 below.

The project re-estimated the step 2 models envisioned in the original proposal to accommodate the history of benefits information that was received from FaCS, wherein it was suggested that the changes of 1996 and 2000 deserve special attention. In light of detailed information on changes in age pension eligibility,

we attempted to incorporate cohort age at access to the age pension into the models, but this proved not to be statistically feasible.[1]

During the project's estimation process, the models were revised from those originally proposed, with concurrence from FaCS, with the final intended version as shown in Figure 1. (For the original model see the proposal, or Progress Report Number 1.[2] In examining the strong increases in women's workforce participation over this period, it should be noted that there have been strong increases in education and in a number of other characteristics influencing women's workforce participation, but that there seem to be some cohort changes above and beyond these measured compositional changes (with little or no temporal change common to all cohorts).

We also estimated step 2 models analysing of education, fertility, and divorce effects on married women's labour force involvement at different time-periods by estimating pooled models with interactions. Among the analyses we have conducted here are regression estimates for the pooled sample:

Work = f(Education, Children, Marital status, Spouse characteristics, Family background, Policy Context, Time, Controls) *(Eq. 1)*

and estimates of how these effects vary over time:

Work = f(Education, Children, Marital status, Spouse characteristics, Family background, Policy Context, Time, Time X Other Characteristics, Controls) *(Eq. 2)*

In light of previous comments from FaCS, we added more potential causal variables that might be of interest. Current rural/urban residence proxies availability of office work, and can be complemented with postcode industrial composition.[3] The benefit history information from FaCS is incorporated in these models. As FaCS responses to the first progress report indicated that they did not regard the proposed proxy for the changing family-friendliness of workplaces [the annual average job satisfaction of employed women with young children at the postcode level] as persuasive, we have eliminated them from the analyses, and they are now absent also from the model in Figure 1. To confirm the robustness of the models, we conducted sensitivity tests using alternative dependent variables including a trichotomy (full-time labour force participation, part-time labour force participation, no labour force participation) and a continuous measure of hours worked.

[1] Unfortunately, age at eligibility for age pension turns out to be correlated r=.91 with year born, so multicollinearity problems make it impossible to get a reliable estimate of its separate effect, even with our large sample.

[2] The differences between the original and current models were notified in Progress Report number 2.

[3] In their response to the proposal, FaCS also suggested investigating whether policy changes in the social security system since 1985 -- paying income support payments separately to both members of a couple, paying family allowance to the primary carer, and introduction of Family Tax Benefit (particularly part B) – have influenced these matters, so we included dummy variables representing particular time periods in exploratory models. Comments on our first progress report indicated that FaCS no longer considered the introduction of the Family Tax Benefit (B) of interest, and the exploratory analysis found no effect, so its exclusion from the final models makes no difference empirically.

Because such a variety of possible temporal effects related to policy changes had been discussed over time, in the end, the project estimated models with a full set of annual dummy variables for year of survey. This eliminated the need to decide *a priori* which timing changes would be privileged in the specification of time, but rather allowed any time pattern existing in the data to be revealed.

The next phase was principally concerned with two tasks. (1) Finishing the stage 2 models in accordance with the revisions agreed at the end of November 2002 (and partially implemented by the end of that quarter). (2) Estimating the reciprocal effects models (the "Step 3" models of the agreed proposal). These focus on the mutual influence of women's workforce participation, fertility, fertility attitudes, work-related attitudes, and divorce. The models estimated here are LISREL models, simultaneous equations that are estimated using maximum likelihood structural equation methods, with model identification achieved by instrumental variables (constraining some effects, in light of prior theory and research, to be zero). They were estimated as agreed in the proposal, with the emendations agreed in November, but some of them required some further modification because of statistical problems in the planned estimations.

Data

The data used in this report are from the International Social Science Survey/ Australia (IsssA) conducted by the International Survey Centre under the auspices of the Melbourne Institute of Applied Economic and Social Research at the University of Melbourne. The IsssA collects a variety of types of data, those used in the body of this report are simple pooled cross-sections of primary respondents selected at random from the electoral rolls. The IsssA also collects data on primary respondents' siblings, but those are not used in this report, in order to enhance comparability with other projects FaCS might want to conduct and compare on this topic (for example using data from HILDA or from the FaCS longitudinal survey of children treated as a cross-section). The IsssA also collects panel data, but we do not use those in the body of the report as they are not pertinent to the issue at hand. We do use some of the panel data later to assess the reliability of some of our retrospective measures.

Population sampled

The population sampled by the IsssA consists of citizens of Australia who reside at the address which they have provided to the Electoral Office, who can read English sufficiently well to answer a self-completion questionnaire, and who are not too cognitively impaired to answer a self-completion questionnaire. For simplicity, we refer to this population as "Australians". The selection on citizenship should have little effect, since prior research shows that non-citizen immigrants differ from citizen immigrants principally in their duration of residence, with few or no differences in issues that would be more relevant to this report, namely marital status and stratification characteristics (Evans 1988)

A note on sample size

The IsssA, unlike most social surveys, is based on a simple random sample. This is the optimal type of sample for most purposes, and the type of sample implicitly assumed by most statistical packages, so ordinary standard errors based on it are correct and do not require the inflating factors that cluster samples do. Simple random samples such as the IsssA are more efficient than the cluster samples used in almost all face-to-face surveys.

A reasonable rule of thumb for high quality cluster designs is that they are worth approximately two-thirds as much as simple random samples (NORC 1987: 435). Thus an IsssA sample of about 9,400 (as for this report) would provide as reliable information as a good cluster sample of around 14,000 cases.

Population analysed in this report

This analysis is based mainly on the IsssA-Pool file's 9,412 women, aged 25 to 64. Some analyses in the second section make use of instrumental variables which are available only in some surveys, and so are further restricted.

The restriction to women under age 65, the notional retirement age for men and for women in more recent cohorts, is because almost all older women have retired by that age, so that labour force involvement is no longer an issue.[4]

The omission of women under age 25 is necessary to ensure that they have had time to complete their education. The database includes 18 to 24 year-olds but we have not included them in the analysis because many are still in tertiary education. It is well known in the status attainment literature that including them could seriously bias estimates of education's causes and consequences, which are important here.[5]

Data collection procedures: IsssA

The IsssA surveys are from simple random samples of Australian citizens drawn by the Electoral Commission from the compulsory electoral roll, a public document. They are conducted by mail using a minor modification of Dillman's (1993) Total Response Method. First, a personally-addressed preliminary letter announces the survey; offers a free telephone contact number for queries; and provides information on how to decline to participate . Then the survey booklet itself arrives in the post about two weeks later (together with its pre-paid return envelope and a further cover letter). These average around 64 pages, ranging

[4] There is an argument for including older women nonetheless, since "0 hours worked" is a perfectly good answer and the larger sample size would give greater precision in estimates of, for example, correlations among family background variables. The offsetting disadvantage is due to social change: older cohorts have rather different attitudes, values, and life histories in a number of relevant ways. Those would need to be modelled. The uncertainty introduced by that would, in our judgment, more than offset any gains in precision from the larger sample size.

[5] There is still some residual bias for the youngest groups because some complete tertiary qualifications as adults, after age 25.

from 32 to 84 pages, are attractively laid out, and are printed in black and white. The covers feature a map of Australia and are usually glossy white, with the map in a colour that varies from year to year . For non-respondents, this is typically followed by four follow-up mailings, two with fresh copies of the questionnaire, over a 6 to 12 month period.

The data entry process is too elaborate to cover in detail here, because it changes over time , but it is worthwhile giving a sketch of current practices. Because the IsssA relies almost entirely on closed-ended questions (because of their superior analytic properties), data processing is relatively straightforward. Upon receipt, the answers from the survey booklets are entered into a specialised computer program that flags out-of-range codes (usually keypunching errors), and has column location checks at the end of every page to guard against the keypuncher missing a question and thus punching answers to subsequent questions in the wrong fields, a problem sometimes known as "off-column" errors. Double answers (respondent circles two adjacent answer categories) are randomly assigned to one or the other answer (with special arrangements for a few unusual items). Experienced coders work with an automated occupation-coding program to transform open ended occupation questions into ABS 4-digit occupational codes. Experienced coders also convert open ended questions on industry educational qualifications into standard ABS codes. Throughout the data entry process, coders and data-entry personnel flag all confusing or unclear cases which are subsequently dealt with in problem-resolution sessions with experts. All personnel are carefully trained and supervised to maintain high standards of data-quality. With these procedures, we estimate that the data entry errors are substantially less than one per thousand questions (based on a sample of questionnaires that were entered twice, with different personnel performing the two entries).

Representativeness

A very important feature of samples is their representativeness, for it is on this basis that one can make generalisations to the large population which is a key goal of most survey research. Indeed, modern survey research textbooks generally emphasise that completion rates/ response rates are only of interest because a very low completion rate may be a symptom of non-representativeness (e.g. Babbie 1995: 262). The representativeness of IsssA achieved samples has been clearly established in prior research (Bean 1991; Sikora 1997), and analyses using IsssA data appear regularly in the world's leading sociology journals.[6]

Here, we take two approaches to the issue of representativeness (also sometimes known as survey response bias): (1) comparisons of IsssA survey results with the Australian Census, and (2) comparisons of prompt respondents with tardy respondents (who would have been non-respondents if not for our extensive follow-up procedures).

[6] For example: Evans, Kelley, and Kolosi (1992); Kelley and De Graaf (1997); Kelley and Evans (1993, 1995).

Results for IsssA surveys conducted around the time of the 1991 Australian census show that the survey samples (1989-1993; 8234 cases) are representative of the population (Evans and Kelley 2002: Table 28.1).[7] There seem to be slightly conflicting results in assessing representativeness according to education: on "age left school" measures, the IsssA and the Census match very closely, but there is somewhat more discrepancy on other measures, with IsssA respondents slightly better educated than usual.[8]

Variable definitions

Women's Employment Variables

Labour force participation [*LfQ*] is defined as a dichotomous (dummy) variable scored 1 for women who are unemployed and looking for work or who are engaged in any amount of work for pay, and zero for everyone else.

Hours worked [*hrs_wkq*] is a count of the hours respondent normally works per week in her current job (even if temporarily away from her job at survey date).

Preliminary analyses and sensitivity tests using alternative dependent variables including (i) the labour force participation dummy variable; (ii) a trichotomy (full-time labour force participation=1, part-time labour force participation=0.5, no labour force participation=0) and (iii) the continuous measure of hours worked suggests that the continuous measure is the most revealing. The labour force participation dichotomy, although widely used in the field, is too crude, missing important distinctions between those who work only a few hours a week and those working full-time. The trichotomous variable is also cruder than hours worked, without any compensating advantage. So our analysis focuses mainly on hours worked.

Pro-career attitudes [*career2*] is a multiple item scale. The items are from a well-known set of seven questions about women's careers and family, which have been asked repeatedly in Australia, the USA, and many other countries.

Factor analysis suggests that there are in fact two dimensions in these items. One measures views about a woman working outside the home, a matter on which Australians tend to be favourable:

Name	Mean	Wording (abbreviated)
WDEVFAMQ	56	A woman should devote all time her time to family
WEARNQ	66	OK if wife earns, even if has husband to support her
WCARBADQ	62	Married women should not attach importance to a career

The second dimension relates to perceptions of the cost of a woman's career to her family:

[7] More extensive comparisons show this as well (Bean 1991; Sikora 1997).

[8] Some 65% in the IsssA complete secondary school, whereas the ABS, using a slightly different definition, estimates 61%. The IsssA has 35% with tertiary education while the ABS has 29%, again using a slightly different definition.

Name	Mean	Wording (abbreviated)
FAMSUFFQ	44	Family life suffers if the woman works
MOWKWRMQ	57	Working mother can establish warm relationship with children
CHHARDFQ	32	Hard to raise children if both parents work full-time
PRESSUFQ	45	Pre-school child suffer if mother works

We assume that this scale reflects perceptions about one of the important determinants of views about women's careers, and so can, for the purposes of the present analysis, be ignored. (In other words, this index should have no direct effect on employment, in contrast to an anticipated direct effect for the first index.)

Exploratory and confirmatory factor analysis of attitudes toward women working outside the home. Standardized loadings from (1) a exploratory principal components factor analysis with varimax rotation and (2) a confirmatory structural equation (LISREL) model. Australia, various years. N=7932.

	(1) Exploratory factor analysis		(2) Structural equation factor loading	
	Career costs	Pro-career	Career costs	Pro-career
WDEVFAMQ	0.31	**0.71**	0.00	**0.69**
WEARNQ	0.21	**0.74**	0.00	**0.63**
WCARBADQ	0.14	**0.79**	0.00	**0.63**
FAMSUFFQ	**0.81**	0.32	**0.85**	0.00
MOWKWRMQ	**0.75**	0.27	**0.72**	0.00
CHHARDFQ	**0.79**	0.14	**0.70**	0.00
PRESSUFQ	**0.84**	0.21	**0.81**	0.00

For clarity and convenience, we score these items on a scale of 0 to 100, where 0 is strongly opposed to women working and 100 is strongly for women working, with other answers at equal intervals in between. For example, respondents who "strongly agree" that it is "A woman should devote all her time to her family" are scored 0; those with mixed feelings on that are scored 50, and those who "strongly agree" are scored 100.

We combine these items into a simple, additive (Likert) scale. We could simply add them up. But averaging works equally well and has the advantage of retaining the intuitive 0 to 100 metric:

Pro-career scale "career2" = mean(WDEVFAMQ, WEARNQ, WCARBADQ)

The multiple item scale greatly reduces measurement error (Cronbach's alpha = .67), but does not eliminate it.

Family Background Variables

Father's Occupational Status/ Social Class [*fastatm*] The effects of father's occupational status been widely studied, most notably in the vast tradition of sociological research stemming from the Blau-Duncan paradigm (Blau and Duncan 1967; Featherman and Hauser 1978). There are many available

measures of occupational status, mostly highly correlated. Here we use the Worldwide Status Scores (Evans and Kelley 2002: Appendix). Test-retest reliability over a 5 year period is good (r=.81, based on over 1,100 cases).

Parents' age when respondent was born [*pntagem*] There is some suspicion that older parents are more successful in raising children than are young parents, especially teen-aged parents. Parents age was measured by direct questions about mother's age when respondent was born, and father's age, with the two answers averaged to give parents' age.

Whether or not a respondent's **parents divorced** [*pntdv14x*] by the time respondent was age 14 was measured by a direct question.[9] The contrast group is non-divorced families. These are mostly intact married couples, but they also include situations where a parent died and situations where a parent never married.

Whether or not respondent **lived with a step parent** [*steppntx*] at age 14 is measured by a direct question.

Number of siblings [*nsibsm*] is also measured by a direct question.

Migrants in the first generation [*mig1genq*] are those born overseas. **Second generation migrants** [*mig2ndq*] are those born in Australia, one or both of whose parents were born overseas.

Parents church attendance [*lnpntchm*] is the log of number of services attended per year (counting half per year for the lowest category), from direct questions. For some surveys this refers particularly to mother's church attendance; for others to separate questions on mother's and father's, averaged; and for yet other surveys it refers to a global "parents". Preliminary analysis shows that the log specification is superior to simple count of number per year. Test-retest reliability over a 5 year period is good (r=.71, based on over 1,100 cases).

Catholic [*pcathq*] is measured by a specific question on parents' denomination (or in some surveys, to mother's denomination). **Anglican** [*panglq*] is measured in the same way. For both the reference (or omitted) category is other Protestants, together with "no religion" and a few non-Christians. Test-retest reliability for denomination over a 5 year period is good (r=.87 for Catholic and r=.78 for Anglican, based on over 1,100 cases).

Christian belief [*cbeliefm*] is a reliable 4 item scale covering belief in God, heaven, hell, and life after death (Kelley, Evans, and Headey 1993). Test-retest reliability over a 7 year period is very good (r=.85, based on 826 cases).

[9] A large majority of children of divorce reside with their mothers, so the case base for assessing the differential effect of living with a father rather than a mother is small.

Socio-economic and Life-Cycle Variables

Size of place where family lived when respondent was age 14 (**urban at age 14**) [*lnurb14m*] and now (**urban resident**) [*lnurbanm*] are defined as the natural log of the number of people living in that place. The answers are categorical bands of numbers of people "a Farm or property" (arbitrarily assigned a population size of 10), a "Village (under 1,000)"; "Town (to 20,000)"; 11.00 "Mid-sized city (to 100,000)"; "City (to 500,000)"; Metropolitan (500,000+)." Preliminary analysis showed that log place size was a better measure than raw number of residents.

Respondent's education [*educm*] was ascertained by a series of questions on years of primary and secondary schooling and details on highest educational qualification. These were coded into the Australian Bureau of Statistics' 3 digit educational code and then recoded into usual years of schooling. Test-retest reliability over a 5 year period is very good (r=.87, based on over 1,100 cases).

Life cycle position derived from questions on marriage and number and ages of children. We distinguish **never married** (the omitted or reference category); **single mothers** (unmarried with children of any age); **young married without children** (married, under age 40, no children yet); **married, children under 5**; **married, school age children**; and **married, children grown** (married, over age 40, all children beyond school age). [The variable names are, respectively: *sngl_mox, marnox, kid5x, kid10x, kidgonex*].

Spouse's income [*sp$1km*], in thousands of dollars per year, is from a direct question. **Spouse employed** [*sp_lfm*] includes spouses working full-time, part-time, or unemployed.

Age and Time Variables

Age is age at the time of the survey. Preliminary analysis suggested that the crucial age bands for this analysis (which is restricted to people 25 to 64) are **age 45 to 54** and **age 55 to 64** [*age4554q* and *age5564q*].

Year born [*yrbornq*] is date of birth. Note that the surveys on which this analysis are based were conducted over many years, from 1984 to 2002, so age and year of birth are not colinear, as they would be in a single survey. There are, for example, 30 year olds in the 1990 survey (born in 1960) and 30 year olds in the 2000 survey (born 1970) as well as 40 year olds in the 2000 survey (from the same 1960 cohort who were 30 year olds in the earlier survey).

Year of survey [*year80q*] is the year the survey was conducted. To reduce rounding error, and without loss of generality, it is rescored so that 1980 is 0; 1981 is 1; etc.

Fertility related variables

Preferred family size [*famprefq*] is from a series of questions asking respondent to evaluate having 6 children; 5 children; 4 children; 3 children; 2

children; 1 child; or no children.[10] Respondents were scored according to which family size they liked best – for example, someone who gave their highest rating to a 2 child family was scored as 2, while someone giving their highest rating to a 4 child family was scored 4.[11]

Actual fertility [*famszq*] was measured by number of children ever born. It will be something of an underestimate for younger respondents.

Divorce variable

Ever **divorced** [*divorceq*] are those divorced or separated in their first marriage, regardless of their current marital status.

Variables of interest that could not be used in the analysis

There are a number of variables that we wanted to use but were unable to use, either through lack of data or because of multicollinearity problems.

Eligibility for the age pension varies (for women) from age 60 for older cohorts to age 65 for younger, with a gradual transition for those born after July 1935 and before January 1949. It would be desirable to estimate the impact of this change on women's labour force involvement. However, age of eligibility is correlated r=.91 with year born. The multicollinearity between the two variables make it impossible to reliably separate their effects even with a sample as large as ours. We therefore omit this variable from the analysis.

Social context, specifically the **prevalence of employed role models while respondent was growing up**, could be a valuable variable for the analysis. We measured it by the percent with working mothers among those in respondent's birth cohort. So, for example, 13% of respondents born in 1935 had mothers who worked during respondent's childhood, while 22% of those born in 1945 had working mothers, as did 28% of those born in 1955, and so on. So there were more working role models for those in recent cohorts than in the past. The usual measure of the context is simply this percent. Unfortunately, this measure is too highly correlated with year of birth, r=.88, for us to reliably separate their effects, even with our large sample size. We therefore (reluctantly) omit this variable from the analysis.

Policy context would also be a valuable variable, with substantial changes taking place at various dates. Policy changes in the social security system since 1985 -- for example, paying income support payments separately to both members of a couple and introduction of Family Tax Benefit (particularly part B) – and especially reforms around 1996 may be important. FaCS provided a detailed overview of the timing and content of relevant changes in benefits and

[10] "If you could start life over, how many children would you like to have altogether (regardless of how many you actually have)? Would you like to have ..."

[11] Ties were scored high. So, for example, someone giving equal highest ratings to 2 child and to 3 child families was scored 3.

we had hoped to analyse them via a set of dummy (indicator) variables picking out key dates such as 1996. However analysis of year-by-year changes (as we will see in Table 2) does not reveal any straightforward pattern of change corresponding to these policy changes.

Moreover, all changes over time taken together are only marginally significant ($F=9.75$, 11 df, $p<.01$) despite the large sample size. We have therefore omitted these variables from the analysis.

Local availability of childcare We had hoped to estimate the impact of local availability of childcare. Unfortunately, it turns out that childcare data at the postcode level from the FaCS childcare census is not available for the full span of the study, so it would not be practical to include it into the models for this project.[12]

If, however, a file/table could be produced from the childcare census giving availability of childcare by postcode by year for the dates when this is available, a follow-up project could augment the models from this project with that additional data and re-estimate the models to discover the impact of the availability effect and to discover whether including that alters the estimates of effects of variables now included in the model.

Instrumental variables and reciprocal causation

A number of variables, not part of the main model, are used for special purposes at particular points in the analysis. Mostly these are used as instrumental variables to identify reciprocal effects, and appear only in connection with one reciprocal effect. The logic of this is discussed in the text. Briefly these variables are as follows.

For estimating the effect of labour force involvement in models with reciprocal causation: (1) **Mother worked for pay** [*mo_workm*] when respondent was growing up. Mean of three variables: mother worked for pay full-time (=1.0), part-time (=0.5), or not at all (=0) when respondent was of pre-school age; mother worked for pay when respondent was about age 6 to 9; and mother worked for pay when respondent was around age 10 to 14. (2) **Percent of the labour force in respondent's postcode in "female" industries** [*fem#indm*]. Data are ABS 1995 postcode level census figures. Female industries are defined as those that with a disproportionately female labour force. Specifically, these are retail, accommodation and restaurants, government administration, education, health and community services, culture and recreation, and personal and other services. (3) We had also hoped to use a measure of the *prevalence of employed role models while respondent was growing up*, but that was not possible for the reasons noted above. (4) Preliminary analyses of a measure of *job values* suggested that they were not closely enough related to labour force involvement to be suitable instruments.

[12] The lack of suitable data was confirmed in the First Quarter of 2003.

For estimating education's effects in models with reciprocal causation: (1) **Parents' education** [*pntedyrm*]: years of education of respondent's mother and father, averaged. (2) Natural log of the **number of books in the home** [*book14m*] when respondent was 14, based on a direct question Preliminary analysis showed that the log of the number of books in the house was a better measure than a simple count of books. (3) We had hoped to use a time-related measure of the relevant policy context but that proved impossible for the reasons set out above.

For estimating the effect of fertility related variables in models with reciprocal causation, we use (1) **number of siblings** [*nsibsm*] as an instrument. It is measured by direct questions about number of brothers and number of sisters. The rationale is basically parallel to that for including maternal employment in the models of labour force involvements: that most people tend to role model on their family of origin (2) We had hoped to use a time-related policy context variable reflecting the size of the family allowance, but that proved impossible for the reasons set out above. The fertility of Australian native-born Catholics has long converged to that of Protestants in Australia (Caldwell 1982; Caldwell 1984; Caldwell et al 1988), so it would not make a suitable instrumental variable here.

For estimating the effect of divorce in models with reciprocal causation, we use as instruments (1) parents divorced, as defined above. (2) Living with step-parents at age 14, also defined above. (3) Parents Catholic, as defined above. (4) Sexual **permissiveness** [*permis2*], a reliable (Cronbach's alpha = .89) three item scale measuring attitudes to pre-marital sexual permissiveness. Sexual permissiveness is included on the grounds that people who hold sexually permissive attitudes might be more likely to have extra-marital affairs, which in turn might enhance the risk of marital dissolution. Note that nothing in the model presupposes that this result would be found, but including sexual permissivness in the model permits us to find it. (5) We had hoped to use several other time-related measures of relevant policy contexts, but they proved unsuitable for reasons noted above.

Methods

Since the IsssA-Pool database provides a very large sample – over 9,000 cases for most analyses – we use the conservative the .001 level as the criterion of statistical significance.

Recursive models

Estimates for the recursive models in the first part of the paper are by ordinary least squares regression (for hours worked and other continuous dependent variables) and logistic regression (for labour force participation, a dichotomous dependent variable). Given the causal order and recursive model we have assumed, these are optimal.

The basic model (Table 1) is:

LfQ or hrs_wkq =
fastatm + pntagem + pntdv14x + steppntx + nsibsm + + mig1genq + mig2ndq
+ lnpntchm + pcathq + panglq + cbeliefm + lnurb14m + lnurbanm + educm +
+ sngl_mox + marnox + kid5x + kid10x + kidgonex + sp$1km+ sp_lfm
+ age4554q + age5564q+ yrbornq + year80q + e_1 *(Eq. 3)*

Where the variables are those given above in the measurement section, and e_1 is a random error term with the usual properties.

The model of Table 2 extends the age and time variables to include dummy variables for each survey year, so capturing all measurable time effects without any assumption as to their exact description:

LfQ or hrs_wkq =
fastatm + pntagem + pntdv14x + ...etc... + yrbornq
+ dummy variables for year of survey + e_2 *(Eq. 4)*

The model of Table 3 extends the basic model of Eq. 3 to cater for the possibility that the impact of key variables are different in different time periods. It does that by including multiplicative interaction terms with year of survey. For example, for education:

*EducXYear = Education * Year_of_Survey* *(Eq. 5)*

This allows the effect of education to be larger ($b_{EducXYear} > 0$), the same ($b_{EducXYear} = 0$), or smaller ($b_{EducXYear} < 0$) in recent years than it was in the past.

Reciprocal causation: Structural equation (LISREL) models

The models in the second part of the paper raise the more complex, but also probably more realistic, possibility of reciprocal causation. These are not recursive models and cannot be estimated by OLS or similar methods. Instead they require structural equation (LISREL) models as sociologists call them. (Arbuckle and Wothke 1999; Bollen 1989; Joreskog and Sorbom 1993). Instrumental variable and many other standard econometric models are special cases. Estimation is typically by maximum likelihood.

Estimates in this paper use AMOS (Arbuckle and Wothke 1999).

The models estimated are given in Tables 4 to 7. For example, the reciprocal effects of hours worked and education are estimated from the following simultaneous equations:

hrs_wkq = educm + *cbeliefm +lnurbanm +age4554q +age5564q +yrbornq +year80q*
+marr_q +divorceq +kid0t5q +kid6t16q + **mo_workm** + **fem#indm** + *z1* *[Eq. 6]*

educm = **hrs_wkq** + *cbeliefm +lnurbanm +age4554q +age5564q +yrbornq +year80q*
+marr_q +divorceq +kid0t5q +kid6t16q + ***pntedyrm*** + ***book14m*** + *z2* *[Eq. 7]*

Here hours worked (***hrs_wkq)*** is influenced by education (***educm)*** in Eq. 6, while education influences hours worked in Eq. 7. Thus, the model allows each of

these variables to influence the other.[13] The models are identified because some variables influence hours worked but not education (mother worked and percent of labour force in female industries, ***mo_workm*** and ***fem#indm)*** while others are assumed to influence education but not hours worked (parents' education and the number of books in the parents' home, **pntedyrm** and **book14m**). These assumptions cannot be verified empirically but must be assumed true on theoretical grounds. Without strong assumptions like this, the models are not identified.

[13] This specification would allow us to discover for example, that the more highly educated the woman, the longer the hours she works (a positive coefficient on "educm" in equation 6). Simultaneously, we could learn that working long hours encourages women to extend their education (perhaps because they would then get higher pay for working those long hours), via a positive coefficient on "hrs_wkq" in equation 7. The specification would also allow us to discover many other possibilities, for example that more highly educated women work longer hours, but that working long hours does not spur women to extend their education. Finally, note that the model does not assume that either effect exists: it would allow us to find out if neither variable influenced the other.

Figure 1: Logic of the models for reciprocal causation

Background

Before turning to the detailed examination of married women's labour force engagement (participation and hours worked), it is worthwhile developing a context by comparing the long-term trends in participation for both married and non-married women. For this purpose, appropriate data are available from the Australian Bureau of Statistics, which conducts a large monthly survey of workforce participation and related issues. For present purposes, this project averaged these monthly rates for each year. The ABS data are of very high quality, involving well-trained interviewers, straightforward questions, and large samples based on good sampling frames.

There are a few caveats here.

1) The definition of labour force participation changed slightly in April 2001, so it is not clear whether the subsequent rise is genuine or an artefact of definitional change. It should also be noted that the ABS data consistently show slightly lower employment rates than do non-governmental surveys. To what extent this reflects people's greater willingness to report "grey" employment to non-governmental surveys, to what extent it reflects the generously resourced governmental surveys' greater success in contacting difficult-to-locate respondents is not known. For present purposes, that does not much matter, because the focus is on changes within the ABS series, so, to the extent that the biases are consistent over time it will not distort the results.

2) Another data limitation that should be noted here is that this series does not differentiate married women according to the presence and ages of children, so married women are a very heterogeneous category including the full spectrum of family sizes (and this is, to a lesser extent, true of non-married women).

3) The ABS includes de facto women in with married women, whereas in the rest of the paper, we have grouped the de facto women into the non-married category, for substantive reasons. This makes for some non-comparability between this section and the rest of the paper.

Consider first the overall rates of workforce participation of married and unmarried women. To compare them over time, they were adjusted using the method of direct standardisation so that both groups have the same age structure over the entire time period. This standardisation is needed in order to "net out" (1) the differences in age composition between married and unmarried women and (2) changes over time in age composition.

The chosen age structure is a uniform age structure with equal numbers in each age group across the prime working ages. The age-specific rates of workforce participation available from the ABS are then aggregated up using this imaginary age structure for each marital status group for each year. The

advantage of this procedure is that the issue of interested here is not the changing age structure, but the implication of the underlying pattern of age-specific trends. This standardisation provides a simple simulation of what the overall participation rates would have been if the age specific rates had remained as they actually were, but the imaginary uniform age structure had prevailed across the entire span.

In 2002, if the participation rates of married and unmarried women in each age group had remained as they actually were, but the age composition of both the married and unmarried groups had been transformed to have equal numbers at each of the prime working ages, then the workforce participation rate for unmarried women age 25 to 64 would have been 64 per cent, and the corresponding rate for married women would have been nearly the same, 62 per cent. Thus, the underlying patterns of participation have become strongly similar (although this can be temporarily disguised in the raw figures by changes in age composition).

Convergence occurred gradually across the whole period, with the gap beginning at 10 or 11 percentage points throughout the early 1980s. It then declined to 6 or 7 percentage points through the late 1980s and early 1990s, and shrank further to 4 or 5 percentage points in the middle and late 1990s. The gap finally became essentially nugatory at about 2 points in the new century. More details on these changes are available in (Evans and Kelley 2003).

Note that this change was not simply a matter of married women becoming more like unmarried women. Instead, unmarried women's rates and married women's rates were both rising over most of the period (except for an apparent stall in the early 1990s), but married women's rates were rising faster.

Married women's rates have climbed at all the prime working ages, with the most notable rises being a gain of twenty five percentage points at ages 45 to 54 and a gain of twenty three percentage points at ages 55 to 59. Among unmarried women, the age group 55 to 59 experienced the largest change, with a 20 percentage point rise being nearly as large as the gain among married women. Thus, the changes of the past two decades have been to a substantial degree changes in the employment patterns of middle-aged women. These changes have previously been noted in IsssA data (Evans and Kelley 2001a).

In terms of long-term trends, prior research has investigated continuity and change in public attitudes towards paid work for mothers of young children between 1984 and 2001, using the wide range of measures on this topic available in the International Social Science Surveys of six large representative national samples of Australia (Evans and Kelley 2001b). The results confirm earlier research suggesting that most Australians are generally supportive of female employment, but that most think full-time homemaking is better when there are preschoolers at home. Only around one third of Australians feel confident that young children would not suffer as a result of maternal employment, and only about one fifth think that full-time maternal employment does not make childrearing difficult. The research probed more deeply into the reasons for

people's concern about deleterious effects of maternal employment on young children, and found that the most widespread concern is that maternal employment impairs mothers' teaching activities, but that there is also concern about the likelihood of emotional deprivation and concern that employment erodes the level of energy needed for good discipline.

Overall, attitudes toward maternal employment have shown a gradual shift toward more supportive views of 4 to 8 percentage points per decade. This shift is most rapid with respect to general attitudes toward women working. It is less rapid with respect to perceptions of conflict between work and family and least with respect to hours of work.

It is important to emphasise that there is diversity of opinion on all these issues, so that no "one size fits all". Thus for example, excluding mothers of young children from employment would violate the moral feelings of some people (even many people who find it undesirable), and providing benefits available only to employed mothers violate other people's moral feelings. The balance of opinion is clearly that it is best for young children if their mothers stay home with them, and so "evidence-based policy making" ought to take special care that women enacting our most widely held social ideal are not disadvantaged.

This report turns next to the question of how strong are the influences exerted by different social forces on married women's workforce engagement over this period.

RESULTS 1:
INFLUENCES ON WOMEN'S WORKFORCE ENGAGEMENT, NO RECIPROCAL EFFECTS

This section presents the simple models of women's workforce engagement – both participation and hours worked. The general expectation when presenting such models in parallel is that they will show broadly the same results, but with more significant results evident in the more powerful OLS regression analysis of hours worked than in the logistic regression analysis.

Table 1 presents the results of our basic model of women's labour force engagement, including both potential long-term effects of characteristics of the respondent's family of origin and effects of respondent's current situation. These are estimates that assume no reciprocal effects – for example, they posit that the partial correlation between education and hours worked comes about entirely because education influences hours worked. This report formally tests some of these assumptions later, but many of the variables here are those for which, because of temporal ordering or basic logic there can be no reciprocal causation (for example, it is a nonsense to think of an adult's hours worked as potentially causing her father's occupational status decades before, or to think of year of survey as influenced by hours worked). For the other variables, those potentially subject to reciprocal causation, the estimates of effects shown here in this forced one-way causation model provide an upper bound on the true effect. In other words, if there is reciprocal causation on these variables, their genuine effect on hours worked cannot be larger than that shown here.

Family of origin

The first important point in Table 1 is that there are no statistically significant direct effects of any of the characteristics of the family of origin either in the OLS estimates of effects on women's hours worked for pay (left panel of Table 1) or in the logistic regression estimates of women's probability of being in the labour force (right panel of Table 1). In detail, neither father's occupational status, nor parents' age when respondent was born, nor whether respondent's parents were divorced, nor whether respondent lived with a step-parent, nor respondent's number of siblings, nor whether respondent was a first generation migrant, nor whether respondent was a second generation migrant, nor the frequency of church attendance of respondent's parents, nor religious denomination has a statistically significant effect on either hours worked for pay or labour force participation in these models. Because the IsssA-Pool provides a very large sample, over 9,000 cases for this analysis, this report used the .001 level as its criterion of statistical significance, but even less stringent criteria would lead to the decision that most of these effects cannot reliably be distinguished from zero.

These null effects are important because they suggest that models of women's workforce engagement in other datasets lacking family background variables are probably not seriously mis-specified by the omission of those variables.

There is also an important substantive point about these findings, namely that the way of life in one's family of origin, insofar as that is represented by the extensive set of variables in these models, is probably inconsequential for women's labour force engagement as adults.

Table 1. Basic model of women's workforce involvement. OLS regression on hours worked for pay; logistic regression on labour force participation. Women, age 18 to 65. Australia 1984-2002. N=9,412.

	Hours worked (OLS)				Labour force participation (Logistic regression)			
	B	SE B	Beta	T	B	S.E.	Wald	Exp(B)
Father's occupational status	ns	ns	ns	-0.06	ns	ns	5.17	ns
Parents' age when R born	ns	ns	ns	-1.48	ns	ns	0.99	ns
Parents divorced	ns	ns	ns	-0.30	ns	ns	0.14	ns
Lived with step parent	ns	ns	ns	-0.08	ns	ns	0.24	ns
Number of siblings	ns	ns	ns	-0.41	ns	ns	0.01	ns
Migrant: First generation	ns	ns	ns	0.43	ns	ns	2.15	ns
Second generation migrant	ns	ns	ns	-1.56	ns	ns	6.16	ns
Parents church attendance (ln)	ns	ns	ns	2.27	ns	ns	2.19	ns
Catholic	ns	ns	ns	-0.34	ns	ns	0.00	ns
Anglican	ns	ns	ns	0.64	ns	ns	0.09	ns
Christian belief	ns	ns	ns	-2.97	ns	ns	3.72	ns
Urban at age 14 (ln)	-0.18	0.05	-0.04	-3.45	ns	ns	0.86	ns
Urban resident (ln)	0.27	0.05	0.05	4.96	0.04	0.01	33.23	1.04
Education	1.36	0.07	0.20	18.79	0.17	0.01	267.59	1.19
Never married (reference)	0.00	--	--	--	0.00	--	--	--
Single mother	-8.06	0.83	-0.10	-9.71	-0.81	0.11	53.01	0.44
Young married, no children	ns	ns	ns	1.14	ns	ns	1.56	ns
Married, children under 5	-17.62	0.68	-0.32	-25.94	-2.16	0.10	507.21	0.12
Married, school age children	-5.68	0.58	-0.12	-9.81	-0.60	0.08	53.60	0.55
Married, children grown	-2.33	0.54	-0.06	-4.32	-0.41	0.07	30.81	0.66
Spouse's income	-0.06	0.01	-0.09	-8.49	-0.01	0.00	43.27	0.99
Spouse employed	3.37	0.48	0.08	7.08	0.74	0.07	122.24	2.10
Age: 45 to 54	ns	ns	ns	0.19	ns	ns	3.44	ns
Age: 55 to 64	-7.79	0.98	-0.16	-7.99	-0.99	0.13	56.97	0.37
Year born	0.27	0.04	0.16	7.41	0.04	0.01	62.33	1.04
Year of survey	-0.18	0.04	-0.05	-4.22	ns	ns	4.38	ns
(constant; R-squared)	-510.5		(20%)		-80.13			

ns -- not statistically significant at p<.001, two-tailed.

n = 9412

Note: Hours worked is the number of hours worked weekly, and labour force participation is scored 1 for those working any hours for pay or profit and zero for others (see the "Variable Definition" section).

The other noteworthy aspect of these findings is that the pattern is essentially identical for hours worked and for labour force participation. In other words, there is not one effect that is significant on hours of work, but not on labour force

participation, and, conversely, there is not one effect that is significant on labour force participation but not on hours worked.

Education

Education has a substantial influence in this model, as indeed it normally does in models assuming this causal direction on both labour force participation and on hours worked weekly (Table 10, Panels A and B). This is a large association, as shown by the standardised regression coefficient of 0.20. The coefficient estimates suggest that each additional year of education increases hours worked as an adult by 1.4 hours a week, on average, all else equal. So, for example, a university graduate (15 or 16 years of education) can be expected to work 8 to 10 hours a week longer than an otherwise comparable woman who left school at the end of year 9. Note that here again, parallel results are found for labour force participation and for hours worked.

This report will revisit these estimate later in the reciprocal causation section, entertaining the possibility that some of the effect comes about because women who plan extensive involvement with paid work therefore choose to acquire more education by way of preparation.

Marital situation

A woman's marital situation appears to be influential in some respects, but not in others. The comparison (or reference) group for these effects is never married, childless women under age 40.

The non-significant regression coefficient on hours worked for the category "**married, no children**" means that we cannot reject the hypothesis that this effect is zero. Thus the evidence suggests that women in this category do not systematically differ from non-married women in the number of hours they work each week, all else equal. Nor do they differ in the probability of being in the labour force. Thus, at least in these models, there is no compelling evidence that childless married women work more (or less) than childless non-married women, all else equal.

However, some of the husband's workforce-related behaviours do have statistically significant connections to women's workforce engagement. The models estimate that there is a positive association between the **husband's being employed** (rather than unemployed or out of the workforce) and his wife's labour force participation (Table 1, Panel B), and the number of hours she works (Table 1, Panel A), all else equal. In substantive terms, the regression coefficient in the model of hours worked implies that wives of employed men work 3.37 hours a week more than do others, *ceteris paribus*. It is worth noting that the causality in this connection is not clear; disentangling it does not form a part of this project, but it is one that would certainly merit exploration in a future project.

By contrast, the magnitude of the **husband's income** is associated with lower levels of women's workforce engagement. The models discover significant positive links between husband's income and wife's labour force participation (Table 1, Panel B) and between husband's earnings and wife's hours worked (Table 1, Panel A), all else equal. In substantive terms, the -.06 estimated regression coefficient suggests that each extra $1000 the husband gets reduces his wife's weekly hours of employment by .06 of an hour or 3.6 minutes, all else equal and assuming that the causal direction posited by the model is correct.

Although marriage per se appears to have no significant independent influence on women's participation, most married women have working husbands, and these husbands earn an income. The net effect of these three variables is that married women's labour force participation is higher than that of their peers, according to the coefficients in this model, and with other variables set to their sample means (details of the simulation in the Methods section and in Table 4).

Note that, once again, exactly the same patterns of effects hold for labour force participation and for hours worked weekly.

Although statistically significant, the coefficients representing the influence of husband's income and the influence of husband's being employed are of only of small importance, as shown by their standardised regression coefficients a little under 0.10

Children

Children, by contrast, are quite consequential for women's workforce engagement in these models.

First note that the statistically significant negative coefficient estimates representing the effect of being a **single mother** both in the model of hours worked weekly (Table 1, panel A) and in the model of labour force participation (Table 1, Panel B) single mothers work significantly less than do non-married childless women, all else equal. The coefficient estimate of the effect on hours worked weekly suggests that the difference amount to about 8 hours a week, on average, and all else equal. Even in this large sample, there were not enough single mothers to enable reliable estimation of differences according to the ages of the children.

According to these models, **married women with preschool children** are significantly less likely to be in the workforce and work significantly fewer hours than do non-married childless women, all else equal (Table 1, Panel B and Table 1, Panel A). To the extent that the coefficient estimate from the model of hours worked weekly is correct it suggests that married women with preschool children, on average, work 17.6 hours a week less than non-married childless women, *ceteris paribus*. This is the single most important influence in the model, as shown by the fact that its standardised regression coefficient of 0.32 is half again as large as the next largest influence (0.20 for education).

Of course, other variables are normally not equal, so being a married mother with preschool age children normally entails being under age 40, having a husband in the labour force, and a husband's income. The joint effect of these three variables is to lower the labour force participation and hours worked weekly of married women with preschool age children below that of their peers, according to the coefficients in this model, and with other variables set to their samples means (see Table 4, below).

The coefficient estimates for **married women with children of school age** are statistically significant both in the model of labour force participation and in the model of hours worked weekly (Table 1). According to the model of hours worked weekly, married women with children of school age work 5.7 hours a week less than do non-married childless women, on average, all else equal. That is about one third the size of the effect of having preschool children. This is a moderately important effect, having a standardised regression coefficient larger than that of husband's income and employment, but smaller than the standardised regression coefficients for preschool children and for education.

Turning again to the simulation, consider a married mother under age 40 with school age children, whose husband is in the labour force and has an income. In this case, working jointly, these variables would raise labour force participation back to the level prevailing for young non-married childless women, and hours worked weekly a long way back towards the level prevailing for young non-married childless women according to the coefficients in this model, and with other variables set to their samples means (see Table 4, below). For 2002, that would mean a labour force participation rate of 68% for married mothers of school age children and for young non-married women (details of simulation in the methods section and in Table 4). The simulation also indicates that under its assumptions, married women with school-age children would be working somewhat shorter hours than young non-married childless women – 18 versus 22 hours weekly-- in 2002 all else equal.

Moreover, there appears to be some small persisting difference in preferences associated with children, or some lingering effect of employment choices while children were young. The coefficient estimates suggest that married women with **grown children** work about 2 hours less a week, than do unmarried childless women, on average, all else equal. The standardised regression coefficient of just –0.06 emphasises that, although statistically significant, this is an effect of small importance.

To develop a sense of how this effect combines with the others in the model, the simulation may again be useful. For this purpose, let us focus on a married mother with grown children, whose husband is in the labour force and has an income, and is average on all other variables in the model. The joint effect of these variables is to raise labour force participation slightly above the level prevailing for young non-married women, according to the coefficients in this model, and with other variables set to their sample means (see Table 4, below). In terms of hours worked weekly, a married woman with grown children would be working the same number of hours a week as a young, non-married, childless

woman, on average, and all else equal, according to the model. For 2002, that would mean a labour force participation rate of 72% for married mothers of grown children compared to 68% for young non-married women, and 22 hours worked weekly, on average, for both groups (details of simulation in the methods section and in Table 4).

Age

There are few **age** differences per se, in these models. The life course stage differences just described account for most apparent age differences, but not quite all.

Even net of marital status, ages of children, and workforce involvement of the husband, there is still a negative effect of being age 55 to 64 on both workforce participation and on hours worked weekly. The coefficient estimates in these models suggest that, compared to women aged 25 to 44, women age 45 to 54 do not differ significantly in their work hours, but women age 55 to 64 work 7.8 hours less on average, all else equal (Table 1). This is in conformity with prior research highlighting the drop in workforce involvement at these ages (e.g. Evans and Kelley 2002c). The standardised regression coefficient of -0.16 makes it tied for 3rd most important determinant of hours worked weekly in the model: less important than being married with preschool age children; less important than education; tied with year of birth; more important than husband's income; more important than husband's employment; more important than having school age children; more important than having grown children; more important than being married or not; more important than urban residence; more important than family background or religion; and more important than year of survey.

To develop a sense of how this effect combines with the others in the model, the simulation may again be useful. For this purpose, let us focus on a 60 year old married woman with grown children, whose husband is in the labour force and has an income, and is average on all other variables in the model. According to the simulation (Table 4, below), her labour force participation would be sharply lower than that of an otherwise similar woman 10 years younger, according to the coefficients in this model, and with other variables set to their samples means (see Table 4, below). In terms of hours worked weekly, by the time she reached this life course stage, a married woman with grown children would be working about two thirds as many hours a week as a young, non-married, childless woman or a married women with grown children aged 50, on average, and all else equal, according to the model. For 2002, that would mean a labour force participation rate of 49% for 60-year-old married mothers of grown children compared to 75% for 50-year-old married mothers of grown children and 68% for young non-married childless women. Applying the simulation to hours worked weekly in 2002 gives 14 hours a week on average for 60-year-old married mothers of grown children compared to an average of 22 hours worked weekly by 50-year-old married mothers of grown children and young non-married childless women (details of simulation in the methods section and in Table 4).

Time

The pattern of time effects is complex and interesting, in part because different currents seem to be pulling in difference directions. The two aspects of time that focused on in this report are "period effects" or year of survey, and "vintage" or "birth cohort" effects. Note that age, which, in a way is another dimension of time is controlled in the models.

One of the striking and important results in Table 1 is the strong effect of **year of birth**. In these models "vintage" or "birth cohort" has a strong positive estimated coefficient representing its effects on both labour force participation and hours worked weekly. The coefficient suggests that each year later in the 20th century that a women was born would raise her weekly hours worked by about 15 minutes (0.27 of an hour), on average, and all else equal. The moderately large standardised regression coefficient of 0.16 indicates that this variable is tied for third place in importance among the many variables in this model as an influence on hours worked weekly. The IsssA-Pool data used here cover a 17 year span, which gives us many occasions on which to view these cohort differences, so this large effect is based on a firm evidentiary foundation. It means, in effect that each succeeding generations or cohorts has a slightly higher probability of being in the work forces and engages in slightly more work each week, throughout their working lives, and apart from general "period effects" that have a common effect on the workforce as a whole at a particular time (e.g. business cycles).

Eligibility for the age pension varies (for women) from age 60 for older cohorts to age 65 for younger, with a gradual transition for those born after July 1935 and before January 1949. Unfortunately, age of eligibility is correlated r=.91 with year born. The high correlation between the two variables make it impossible reliably to separate their effects even in this large sample, so age at eligibility had to be omitted from the analysis.

In contrast to the strong positive effect of year of birth, there is something of a partially countervailing current in that, net of these vintage or cohort effects, **year of survey** has a smaller negative effect on hours worked weekly, in this model. The effect on labour force participation is not statistically significant in this model. Note that the specification of year of survey in this model is as a linear effect which only allows the model to detect an influence that exerts a constant strength over time.

Because this may not be realistic, and because there have been a number of important policy changes that might be expected to exert rather strong effects at particular times, it also behoved this project also to examine a more flexible specification of year of survey. A great many different such specifications are possible, but all the issues that have been raised in FaCS comments can be answered by a full dummy variable specification.

Accordingly, the model of hours worked weekly in Table 1 was re-estimated with the linear term for year of survey replaced by a full set of dummy variables

representing each survey year, with 1984 being the reference (or omitted) category. The results are shown in Table 2.

The main message from Table 2 is that there is no very consistent effect of time on hours worked weekly, net of the gradually growing intensity of work across cohorts, on average and all else equal.

There is a fairly clear pattern of increase in the late 1980s. The metric regression coefficient for 1986 indicates a two hour rise in hours worked weekly compared to 1984, on average and all else equal. Similarly the corresponding coefficients for 1987 and 1989 indicate that, all else equal, women were working three more hours a week than in 1984, on average.

But, thereafter, the coefficients either do not differ significantly from the 1984 baseline, or are even below it. Note that this in no way implies that women's workforce engagement has not increased since the early 1980s, but rather suggests that the changes are due to changing composition (more education, fewer children, cohort replacement as less work-oriented cohorts leave the working ages and more work-oriented cohorts succeed them, etc). As noted earlier, there are a large number of policy initiatives which might have been expected to influence women's workforce engagement, but the evidence here does reveal any upward shifts at any of the times that might have been expected.

Table 2. Changes over time in hours worked. Australian women, age 25 to 64, in 1984 to 2002. N=9,412.[1]

Year of survey	b	s.e.	t	Signif-icance
1984 (Reference)	0	--	--	--
1986	2	0.90	2.75	p<.01
1987	3	0.86	3.21	p<.01
1989	3	0.73	4.01	p<.01
1990	-4	1.02	-4.39	p<.01
1993	0	0.87	-0.10	ns
1994	1	0.99	0.91	ns
1995	0	0.86	-0.09	ns
1996.5	0	0.84	-0.20	ns
1999	-1	0.96	-0.77	ns
2001	0	1.08	0.00	ns
2002	-3	1.01	-2.62	p<.01
Joint significance test for differences over time				*F=9.75, 11 df, p<.01*
Controled but not shown: All variables in the model of Table 1.				

ns -- not statistically significant at p<.01, two-tailed

[1] The model is that of Table 1, first panel, with year of survey replaced by a set of dummy (indicator) variables, with 1984 the reference category. R-squared: 21%.

Note that this project had originally intended to include several other causal variables that represent some important substantive changes over time. In particular, the **prevalence of employed role models while respondent was growing up**, could be a valuable variable for the analysis. This project measured it by the percent with working mothers among those in respondent's birth cohort. So, for example, 13% of respondents born in 1935 had mothers who worked during respondent's childhood, while 22% of those born in 1945 had working mothers, as did 28% of those born in 1955, and so on. Unfortunately, this measure is too highly correlated with year of birth, r=.88, for the models reliably to separate their effects, even with this large sample size. We therefore (reluctantly) omitted this variable from the analysis.

Returning to the linear specification, it is also possible that time might operate more subtly – not as a sweeping effect that shapes the destinies of women in all walks of life in the same ways and to the same degree, but rather as a social force that has differential effects on women with different socio-economic resources, or in different stages of life.

Accordingly, this project also investigated the possibility of interaction effects. To this end, the model of Table 1 was re-estimated to include a new set of interaction variables representing the multiplicative interactions of time with many of the focal variable in the project. The results are shown in Table 3.

The augmented model (Table 3) included interactions of time with education, being a single mother (compared to being non-married and childless), being a married mother with children under school age (compared to being non-married and childless), being a married mother with school age children (compared to being non-married and childless), being a married mother with grown children (compared to being non-married and childless), being age 45 to 54 (compared to being age 25 to 44), or being age 55 to 64 (compared to being age 18 to 44). As Table 3 shows, not one of these interactions has a significant t-value at $p<.001$. But even more strikingly, inclusion of the entire group of them does not significantly improve the fit of the original model, as show by their joint F-value of 2.64 with 8 degrees of freedom. The absence of significant interactions here suggest that time has not had differential effects on different groups of women (remember that this is time net of cohort which has strong positive effects on both participation and on hour worked). This issue is taken up further in the discussion.

Table 3. Changes over time in the impact of key determinants of women's workforce involvement. OLS regression on hours worked for pay with multiplicative interactions. Women, age 25 to 64. Australia 1984-2002. N=9,412.

	b	s.e.	t
Father's occupational status	0.00	0.01	ns
Paarents' age when R born	-0.04	0.03	ns
Parents divorced	-0.15	0.74	ns
Lived with step parent	-0.06	0.73	ns
Number of siblings	-0.05	0.10	ns
Migrant: First generation	0.17	0.44	ns
Second generation migrant	-1.21	0.75	ns
Parents church attendance (ln)	0.27	0.12	ns
Catholic	-0.27	0.48	ns
Anglican	0.20	0.45	ns
Christian belief	-0.02	0.01	ns
Urban at age 14 (ln)	-0.18	0.05	-3.37
Urban resident (ln)	0.28	0.05	5.01
Education	1.32	0.17	7.80
Single mother	-12.57	1.91	-6.57
Young married, no children	3.67	2.19	ns
Married, children under 5	-20.72	1.51	-13.75
Married, school age children	-7.40	1.39	-5.32
Married, children grown	-5.46	1.36	-4.03
Spouse's income	-0.06	0.01	-8.59
Spouse employed	3.54	0.48	7.32
Age: 45 to 54	-0.22	1.41	ns
Age: 55 to 64	-7.10	1.76	-4.03
Year born	0.27	0.04	7.31
Year of survey	-0.37	0.17	ns
Interactions with year of survey: *(Joint significance test)*			*F=2.64, 8 df, ns*
Education X year of survey	0.00	0.01	ns
Single mother X year of survey	0.39	0.14	ns
Young married, no children X year	-0.19	0.16	ns
Married, children under 5 X year of survey	0.29	0.12	ns
Married, school age children X year of survey	0.15	0.10	ns
Married, children grown X year of survey	0.24	0.09	ns
Age: 45 to 54 X year of survey	0.04	0.09	ns
Age: 55 to 64 X year of survey	-0.05	0.11	ns
(constant; R-squared)	-507.78	(20%)	

ns -- not statistically significant at p<.001 two-tailed.

To the extent that these models are capturing real effects and real absences of effects, the results can be summarised by saying that all else equal there is no very consistent pattern of changes over time (recall that this is net of composition and "vintage" changes), and that the effects of education and life course stage have not substantially altered over this 18-year period.

Thus, the results suggest stability in several important effects over time. Education is an important effect whose influence has not significantly declined over time. Similarly, being married with young children has not, over time, significantly reduced its influence on weekly hours worked.

Projections to 2020

Next, this report discusses some of the substantive implications for the future of the time patterns discovered here. To do so, we examine the predicted values that hours worked weekly and labour force participation would have in 2002 and projected forward to 2020 for women in different family arrangements, if everyone had the average values on the variables in the model other than year of birth, year of survey, age, and family arrangements, and if these variables were translated into weekly hours worked accordingly to the weights indicated by the regression coefficients in Table 1. The results are shown in Table 4.

Table 4. Predicted values from Table 1 for women's labour force participation and hours worked per week, by life cycle stage, for women average in family background, religion, place of residence and other respects.[1]

	Age and life-cycle stage						
	Young single	Young married, no children	Young married, children under 5	Married, children in school	Married, children past school	Age 50, married, children past school	Age 60, married, children past school
Panel A: In 2002							
Predicted labour force participation	0.68	0.77	0.31	0.68	0.72	0.75	0.49
Predicted hours worked	22	25	6	18	22	22	14
Panel B: Projected for 2020							
Predicted labour force participation	0.78	0.84	0.43	0.78	0.81	0.83	0.61
Predicted hours worked	23	26	8	20	23	23	15

[1] Predicted values from the equations given in Table 1, adjusting all other factors to the population mean. Assmes that after marriage the husband works and earns $25,000 per year. Education, fertility, and cohort differences are assumed to remain unchanged through 2020. Young are those under 40. The assumption that future birth cohorts will continue to shift toward employment at the same rate past cohorts have done so, net of educational and other compositional changes, may be problematic.

For present purposes, the key feature of Table 4 is that it traces through the joint implications of the year-of-birth and year-of-survey trends for future workforce engagement, were the levels of other variables to remain at their sample means, and were the causal linkages between each variable and workforce engagement to be specified by the coefficient estimates in Table 1. To make these changes less abstract, the simulation produces values for young, non-married, childless women, young married women with no children, young married women with preschool children, married women with children of school age, married women with grown children past school age, and married women around age 60 with grown children. For all the married women, the husband's employment situation is set to currently working and his income is set to $25,000 annually.

According to the simulation in Table 4, young non-married, childless women would have a labour force participation rate of 68% in 2002 if they had the average sample values on other variables, and this would rise to 78% in 2020, if the trends prevailing in Table 1 were to continue to hold into the future. For this same group over this same period, hours worked weekly would rise by 1 from 22 to 23, according to these same assumptions.

Under these same conditions, young married, childless women would have a labour force participation rate of 77% in 2002 and this would rise to 84% in 2020. Their average hours worked weekly would rise from 25 to 26. (Note that, in the simulation, the husband's employment situation is set to currently working and his income is set to $25,000 annually.)

Still according to these same assumptions, young, married women with working husbands earning $25,000 per year and preschool age children would have a work force participation rate in 2002 of 31% which would rise to 43% by 2020. On average, their hours worked weekly would rise from 6 to 8.

Continuing with the same stipulations on the simulation, married women with working husbands earnings $25,000 per year and school age children would be participating in the work force at 68 percent in 2002, climbing to 78 percent by 2020. There would be a two hour gain in hours worked, from 18 to 20, on average.

As the children grow up past school age, married women's labour force participation would climb from 68% to 72% in 2002, and from 78% to 81% in 2020, all else equal, according to the simulation (including the assumptions that their husbands are employed and that their husbands earn $25,000 annually). Hours worked weekly would rise from 18 to 22 across this life course transition in 2002 and from 20 to 23 in 2020, on these same assumptions.

As aging continues, according to the simulation, participation turn down again. Married women age 50 (whose husbands work and have annual incomes of $25,000) with grown children would have a labour force participation rate of 75% in 2002, under the assumptions of the simulation, which would decline to 49% at age 60. According to the simulation, the rate for married women age 50 with grown children would climb to 83% in 2020, and the rate for their peers age 60 would be 61%. Hours worked weekly for married women age 60 with grown children would climb from 14 to 15, on average, on these same assumptions.

RESULTS 2:
RECIPROCAL INFLUENCES

An issue that often arises in assessments of changes in women's workforce engagement is one of causal direction. For example:

- Is it the case that more highly educated women work more hours, because their education leads them to do that? That could come about because of the higher wages the well-educated can command as a result of their education, or because education inculcates a taste for work and achievement, or for many other reasons.

- Or is it that working a lot – or planning to do so – leads women to pursue further education? Perhaps those who are committed to careers plan to get better jobs and higher pay by acquiring more skills and educational credentials.[14]

- Or are both sets of social forces operating at the same time?

The issue is particularly vexed with regard to attitudes (which is why there were no attitude measures in our basic model of Table 1), but it is also present in the case of objective variables.

It is this kind of question that is addressed in this section of the report. We turn so far as possible to structural equation models here, but in some cases stable estimates could not be obtained from the structural equation models, so instead we present upper-bound estimates from models of one-way causation. These estimates represent the maximum size that the estimate from the reciprocal causation models could attain under normal circumstances, and the lower bound estimate in these unstable models is zero. Further details are in the methods section. This is not as satisfying as a full structural equation estimate, but it does allow one to rule out a number of potential causal paths, which in turn, simplifies the course of future research which need not pursue them nor worry about omitted variables problems when using data sets that do not include them. Further details are in the methods section.

Identification of the paths in the reciprocal causation models is by instrumental variables. The choice of instrumental variables, as noted in the methods section follows that of the original accepted proposal, together with modifications agreed by FaCS. These are admittedly difficult issues.

For each effect or group of effects to be studied, a table is presented that provides the estimates of the reciprocal effects if available. If those are not available, the

[14] For example, someone who is determined to be a lawyer must therefore study law; her schooling is then a consequence of her commitment to a legal career, not a cause of it. Conversely, if someone studied law for no particularly careerist reason, perhaps because her friends did it, but then found she really enjoyed the law and eventually decided to practice, her career would be a consequence of her education, not a cause of it.

table presents the upper-bound estimates from the one-way OLS estimates, the equation representing the model from which the effects are taken.

To begin, the next section discusses reciprocal causation effects involving education.

Education

Education has long been known to have strong associations with variables related to women's employment, so it is important to understand the causal flows in order to be able to make correct causal interpretations of effects. The standard interpretations have been that education increases workforce opportunities and leads people to adopt more pro-employment attitudes, but one could also imagine causal flows in the opposite direction. For example, it might be that a women who is working a good deal is motivated to get further education because that will facilitate her advancement at the workplace. Similarly, women with strong pro-employment attitudes might also be more likely to seek further education

To answer such questions, Table 5 presents the structural equation estimates of the reciprocal effects between education and hours worked weekly. The effect of education on hours worked weekly is large and statistically significant, but the effect in the opposite direction, the effect of hours worked weekly on education is not statistically significant. Indeed, the structural equation model estimate of an increase of 1.16 hours worked per week for every year of education (Table 5.) is only slightly smaller than the upper bound estimate of 1.36 in Table 1.

Table 5. Reciprocal effects of employment and education: Structural equation (LISREL) estimates .Australian women, 1984-2002.

	b	s.e.	beta	t	Chi-square	d.f.	RMSEA	cases
1. Hours worked & education					32.3	3	0.041	5,780
Education ---> hours worked	1.106	0.239	0.17	4.62				
Hours worked ----> education	ns	ns	ns	0.56				

Model: [1]

hrs_wkq = **educm** + cbeliefm +lnurbanm +age4554q +age5564q +yrbornq +year80q +marr_q +divorceq +kid0t5q +kid6t16q +***mo_workm*** +***fem#indm*** + z1

educm = **hrs_wkq** + cbeliefm +lnurbanm +age4554q +age5564q +yrbornq +year80q +marr_q +divorceq +kid0t5q +kid6t16q + ***pntedyrm*** +***book14m*** + z2

2. Career attitudes & education					35.1	3	0.043	5,780
Education ---> career attitudes	0.027	0.003	0.37	10.45				
Career attitudes ----> education	ns	ns	ns	-2.11				

Model: [1]

career2 = **educm** + cbeliefm +lnurbanm +age4554q +age5564q +yrbornq +year80q +marr_q +divorceq +kid0t5q +kid6t16q + ***mo_workm*** +***fem#indm*** + z1

educm = **career2** + cbeliefm +lnurbanm +age4554q +age5564q +yrbornq +year80q +marr_q +divorceq +kid0t5q +kid6t16q + ***pntedyrm*** + ***book14m*** + z2

ns -- not statistically significant at p<.001 two-tailed.

[1] Variables involved in **reciprocal** relations are bold face and ***instrumental variables*** in bold italic**.**

To the extent that the model is correct, the coefficient estimate implies that each year of education is associated with a 1.1 hour increase in hours worked weekly, all else equal. In a 48-week working year, that would make about 53 extra hours, or about two extra part-time weeks worth of employment per year.[15] Over a 40 year career span that would make 80 extra weeks on average and all else equal, or about 1.7 extra person-years of part-time work in a working life-time.

The fact that the causal force in the reverse direction, from hours worked to education is non-significant, means that one cannot be certain that it is non-zero. In practical terms, this suggests the working hypothesis that it is zero, although this will need to be tested on other datasets and ideally also in other models to be sure. More specifically it suggests that the traditional specification allowing an effect of education on workforce engagement (but not the reverse) is probably correct. The evidence here does not support the claim that an omitted path from education to workforce engagement is biasing the effect of education in workforce engagement in the one-way estimation.

[15] This assumes a 26.5 hour part-time week. If the part-time working week were 20 hours, the 53 extra hours per year would be equivalent to 2.65 extra weeks of work per years. Over a 40 year span that would be equivalent to 106 extra 20 hour weeks, or 2.2 extra person years of 20 hours a week employment in a working life time.

Panel 2 of Table 5 gives the results of the estimation of reciprocal effects linking education and career attitudes (a multiple-item index, see the Data section for the wording of the specific items).

The coefficient estimate of the effect of education on the degree to which one supports or opposes women's careers suggests that each year of education increases one's support for women's employment by about .027 points out of 1. Put another way, to the extent that this reciprocal effects model correctly captures the causal process, each additional year of education that a woman completes moves her 2.7 points out of 100 closer towards complete approval of female employment. The standardised regression coefficient of 0.37 emphasises that this is a really important effect.

By contrast, the estimation finds that the reciprocal path from attitudes towards women's careers towards education is not statistically significant, so the possibility that it is zero cannot be ruled out. This result can be taken as evidence supporting prior models that predicted attitudes towards women's employment from education as a one-way effect.

Thus, the evidence on these relationships with education is (1) that education influences hours worked weekly, but that the reverse is not true, and (2) that education influences attitudes towards women's employment, but that the reverse is not true.

Fertility

As is well known, the past several decades have witnessed major rises in women's workforce engagement and major declines in fertility, but are these two related, or are they both symptoms of some larger underlying change, or is their covariation mere coincidence? This project takes some preliminary steps towards addressing these issues by investigating the reciprocal influences of hours worked, actual fertility, preferred family size, and attitudes towards women's employment.

Panel 1 of Table 6 presents the coefficient estimates and significance tests concerning the links between hours worked weekly and preferred number of children. In the reciprocal causation model (Model C), both effects were not

Table 6. Reciprocal effects of employment and fertility: Structural equation (LISREL) estimates. Australian women, 1984-2002.

	b	s.e.	beta	t	Model fit: Chi-square	d.f.	RMSEA	cases
Panel 1. Hours worked & preferred family size								
Model A. Preferred family size --> hours worked, no reciprocal effect	ns	ns	ns	-2.23	1.20	3	0.000	2,008
Model B. Hours worked --> preferred family size, no reciprocal effect	ns	ns	ns		1.13	3	0.000	2,008
Model C. Reciprocal effects					1.13	2	0.000	2,008
Preferred family size ---> hours worked	ns	ns	ns	0.15				
Hours worked ----> preferred family size	ns	ns	ns	-0.01				

Model C: [1]

hrs_wkq = famprefq +cbeliefm +lnurbanm +age4554q +age5564q +yrbornq +year80q +marr_q +divorceq +educm +***mo_workm*** +***fem#indm*** + z1

famprefq = **hrs_wkq** + cbeliefm +lnurbanm +age4554q +age5564q +yrbornq +year80q +marr_q +divorceq +educm + ***nsibsm*** + z2

Panel 2. Career attitudes & preferred family size								
Model A. Preferred family size --> pro-career attitudes, no reciprocal effect	-0.014	0.003	-0.10	-4.89	0.83	3	0.000	2,008
Model B. Pro-career attitudes --> preferred family size, no reciprocal effect	-0.861	0.176	-0.12	-4.88	0.87	3	0.000	2,008
Model C. Reciprocal effects					0.76	2	0.000	2,008
Preferred family size ---> career attitudes	ns	ns	ns	-0.34				
Career attitudes ---->preferred family size	ns	ns	ns	-0.27				

Model C: [1]

career2 = **famprefq** + cbeliefm +lnurbanm +age4554q +age5564q +yrbornq +year80q +marr_q +divorceq +educm +***mo_workm*** +f***em#indm*** + z1

famprefq = **career2** + cbeliefm +lnurbanm +age4554q +age5564q +yrbornq +year80q +marr_q +divorceq +educm + ***nsibsm*** + z2

Panel 3. Hours worked & actual fertility								
Model A. Actual fertility --> hours worked, no reciprocal effect	-2.000	0.183	-0.16	-10.94	4.22	3	0.008	5,699
Model B. Hours worked --> actual fertility, no reciprocal effect	-0.010	0.001	-0.13	-10.93	4.31	3	0.009	5,699
Model C. Reciprocal effects					3.98	2	0.000	5,699
Actual family size ---> hours worked	ns	ns	ns	-0.58				
Hours worked ----> actual family size	ns	ns	ns	-0.49				

Model C: [1]

hrs_wkq = **famszq** + cbeliefm +lnurbanm +age4554q +age5564q +yrbornq +year80q +marr_q +divorceq +educm +***mo_workm*** +***fem#indm*** + z1

famszq = **hrs_wkq** + cbeliefm +lnurbanm +age4554q +age5564q +yrbornq +year80q +marr_q +divorceq +educm + ***nsibsm*** + z2

Panel 4. Career attitudes & actual fertility								
Model A. Actual fertility --> pro-career attitudes, no reciprocal effect	-0.011	0.002	-0.08	-5.57	2.42	3	0.000	5,699
Model B. Pro-career attitudes --> actual fertility, no reciprocal effect	-0.489	0.090	-0.07	-5.44	3.79	3	0.007	5,699
Model C. Reciprocal effects					1.98	2	0.000	5699
Actual family size --->career attitudes	ns	ns	ns	-1.34				
Career attitudes ---->actual family size	ns	ns	ns	0.65				

Model C: [1]

career2 = **famszq** + cbeliefm +lnurbanm +age4554q +age5564q +yrbornq +year80q +marr_q +divorceq +educm +***mo_workm*** +***fem#indm*** + z1

famszq = **career2** + cbeliefm +lnurbanm +age4554q +age5564q +yrbornq +year80q +marr_q +divorceq +educm + ***nsibsm*** + z2

ns -- not statistically significant at p<.001 two-tailed.

[1] Variables involved in **reciprocal** relations are bold face and ***instrumental variables*** in bold italic**.** Models A and B, which are recursive, are identical to Model C except for omitting one of the (boldface) variables involved in reciprocal relations in one of the two equations**.**

statistically significant. Accordingly, the next step was to estimate one-way causation models (just like Model C, but omitting the reciprocal paths), in search of an upper bound on the effects. In this approach, as well, the coefficients on the relevant variables were not statistically significant, so one is not entitled to reject the hypotheses that (1) hours worked weekly does not influence the preferred number of children, and (2) the preferred number of children does not influence hours worked weekly. This suggests that patterns of increasing work intensity do not necessarily generate lower fertility desires.

The next panel, Panel 2, investigates the mutual influences of preferred number of children and support for (or opposition to) women's employment. Here, the reciprocal causation model (Model C) found non-significant effects in both directions, so the possibility that neither variables influences the other cannot be ruled out. As a result, the next step was to estimate the one-way causation models in order to estimate upper bounds on the effects, should they exist. The estimated regression coefficient of -0.014 in Model A suggests that each additional child that a woman prefers reduces her support by 0.015 out of 1 (equivalent to 1.5 points out of 100). The actual range of preferred family sizes in the Australian population is not large, so this is not a very large effect, even on the upper bound. The regression coefficient of -0.86 in Model B representing the effect of support for women's employment on preferred number of children can be interpreted as an upper bound on the true reciprocal causation effect. In substantive terms, according to the one-way causation model, all else equal a woman who is completely opposed to women's employment (i.e. had the lowest possible value on the attitudes towards women's careers index) would want 0.86 of a child more than a woman who was otherwise similar, but maximally in favour of women's employment (i.e. had the highest possible value on the women's career index). That would be a very consequential difference in terms of population growth, so it should be remembered in future work on this topic that the possibility exists that approval of women's employment may be quite consequential for fertility desires.

The next panel, Panel 3, explores the reciprocal causation between hours worked and actual fertility. In Model C which allows both influences to occur simultaneously, the estimated regression coefficients are not statistically significant. Accordingly the next step was to investigate the one-way causation models to establish upper bounds. The coefficient estimate of –2.0 in Model A can be interpreted as indicating that each additional child reduces the number of hours worked weekly by not more that 2, on average, all else equal. The coefficient estimate of -0.01 representing the effect of hours of weekly employment in Model B suggests that the difference in fertility between a woman working 60 hour weeks and a homemaker would amount to up to 0.6 of a child, on average and all else equal.

Finally, Panel 4 investigates the linkages between career attitudes and actual fertility. Model C which permitted the reciprocal paths did not detect a statistically significant influence either of support for female employment on actual fertility or of actual fertility on attitudes towards female employment.

Moving then towards the one-way estimates, Model A's coefficient estimate suggests that actual fertility has, at most, a tiny effect on career attitudes, with each additional child reducing support for female employment by 0.01 out of 1 (equivalent to 1%). Model B suggests that the upper bound on the effect in the opposite direction is more impressive, which moving from having the most strongly anti-female-employment attitudes on the index to having the most strongly pro-female-employment attitudes on the index would lead one to have 0.49 of a child less, on average and all else equal. So the effect of support for female employment is not likely to reduce the number of children by more than 0.49 on average (and could well be zero, as indicated by the non-significant paths in Model C).

Divorce

Table 7 gives the coefficient estimates and standard errors for the reciprocal causation models involving divorce, and for supplementary models to provide upper-bound estimates where the parameter estimates for the paths in the reciprocal causation models are non-significant.

Panel 1 explores the possibility that divorce may increase hours worked weekly and that increasing hours of weekly work may increase the probability of divorce. Both effects are found to be nonsignificant in the reciprocal causation model (Model C), so we turn to the one way causation estimates. Here, too, the effect of hours worked weekly on divorce is non-significant (Model A), and the effect of divorce on hours worked weekly is non-significant (Model B). These results suggest the working hypotheses that neither does divorce affect hours worked, nor does time devoted to employment affect the probability of divorce.

Panel 2 investigates the potential linkages between divorce and pro-career attitudes. In the reciprocal causation model (Model C), both of these effects are not statistically significant. Accordingly, the one-way causation models were estimated. They find that neither is the effect of divorce on pro-career attitudes statistically significant (Model A), nor is the effect of pro-employment attitudes on divorce statistically significant (Model B). In sum, it seems reasonable to adopt as a working hypothesis the view that divorce and attitudes towards female employment are not causally related, on average[16].

[16] This does not preclude the possibility that for some individual women their particular experience of divorce leads them to take a more positive view of female employment. The fact that the average effect is zero means that the experiences of these women, should they exist, are balanced by experiences that lead other individual women in the opposite direction (e.g. their divorce processes leading them to take a more negative attitudes towards women's employment). The analysis in this report does not really speak to this issue, but one could inquire into it in a future report if there were a hypothesis about why some women took one road and some the other.

Summary

All in all, the reciprocal causation models have produced strong results concerning the effects of education. The strong effect of education on hours worked weekly and non-significance of the reciprocal effect provides empirical justification for the traditional modelling strategy that allows only one-way causation from education to labour supply. Similarly, the reciprocal causation models find a very strong effect of education on career attitudes, but no statistically significant reciprocal effect. This result, too provides empirical justification for one-way causation models only allowing effects from education to career attitudes.

Table 7. Reciprocal effects of employment and divorce: Structural equation (LISREL) estimates. Australian women, married at least once and under age 40.

					Model fit			
	b	s.e.	beta	t	Chi-square	d.f.	RMSEA	cases
Panel 1. Hours worked & divorce								
Model A. Divorce --> hours worked, no reciprocal effect	ns	ns	ns	2.47	6.75	6	0.008	1,763
Model B. Hours worked --> divorce, no reciprocal effect	ns	ns	ns	2.62	5.99	6	0.000	1,763
Model C. Reciprocal effects					5.094	5	0.003	1,763
Preferred family size ---> hours worked	ns	ns	ns	1.39				
Hours worked ----> preferred family size	ns	ns	ns	-1.00				
Model C: [1]								
hrs_wkq = **evrdvrcq** + lnchgoq + cbeliefm +lnurbanm + yrbornq+ year80q + educm + ***mo_workm*** + ***fem#indm*** + z1								
evrdvrcq = **hrs_wkq** +lnchgoq + cbeliefm +lnurbanm + yrbornq+ year80q + educm + ***pntdv14x*** +***steppntx*** +***pcathq*** +***permis2*** + z2								
Panel 2. Career attitudes & divorce								
Model A. Divorce --> pro-career attitudes, no reciprocal effect	ns	ns	ns	-0.39	142.72	6	0.114	1,763
Model B. Pro-career attitudes --> divorce, no reciprocal effect	ns	ns	ns	0.05	142.83	6	0.114	1,763
Model C. Reciprocal effects					40.4	5	0.063	1,763
Preferred family size --->career attitudes	ns	ns	ns	1.99				
Career attitudes ---->preferred family size	ns	ns	ns	-2.04				
Model C: [1]								
career2 = **evrdvrcq** +lnchgoq + cbeliefm +lnurbanm + yrbornq+ year80q + educm + ***mo_workm*** +f ***em#indm*** + z1								
evrdvrcq = **career2** +lnchgoq + cbeliefm +lnurbanm + yrbornq+ year80q + educm + ***pntdv14x*** + ***steppntx*** + ***pcathq*** +***permis2*** + z2								

ns -- not statistically significant at p<.001 two-tailed.

[1] Variables involved in **reciprocal** relations are bold face and ***instrumental variables*** in bold italic**.** Models A and B, which are recursive, are identical to Model C except for omitting one of the (boldface) variables involved in reciprocal relations in one of the two equations**.**

In a way, some of the most important results may be the finding of non-significant effects between fertility and employment attitudes, and between fertility ideals and actual employment. A crude summary of this section would be that there is some connection between fertility and employment (although the detailed specification in Table 1 suggests that this is mostly temporary), but that actual experiences of employment probably do not shape fertility attitudes, and that actual family size probably does not shape employment attitudes. If these influences exist at all (about which there is genuine doubt), the upper bound estimates suggest that they are, at most tiny, at least in so far as these models correctly represent the world. However, there is a possible link between women's attitudes to careers and their preferred and actual fertility patterns. The evidence is equivocal, but pro-employment attitudes have sufficiently strong associations with preferred and actual fertility that their mutual influences warrant further exploration in future research.

Furthermore, divorce does not appear to be strongly connected with employment or employment attitudes, ceteris paribus. Both the reciprocal causation estimates and the one-way causation estimates linking divorce to both hours worked weekly and employment attitudes are not statistically significant.

DISCUSSION

The fact that none of the **family of origin** characteristics investigated in this report has a statistically significant impact on either labour force participation or hours worked suggests that disadvantageous characteristics of the family of origin do not necessarily impair capacity building for independence and self-reliance. These results also have the important implication for other studies that omission of family background characteristics in studies of women's labour force participation and hours worked will, on the evidence here, not lead to mis-specified models. Under these circumstances it seems reasonable to take as a working hypothesis the assertion that models without these variable will not, on that account, suffer from omitted variables biases. Nonetheless, it should be mentioned that this project has used a combined index of mother's and father's education, as is conventional in our field, and it remains possible that they might have different effects. Future research could investigate this by merging all the large existing datasets with the requisite information, although this would be a massive undertaking.

Education is, not surprisingly, a robust influence on women's hours worked and on their labour force participation, and is one that underlies a good deal of the rise in married women's labour force participation since 1984. Moreover, there is no significant decline in education's influence over time, in the models estimated by this project.

To the extent that they are correct, the reciprocal causation models show that it is because of their education that women increase their workforce engagement, rather than that being more deeply engaged in the workforce leads women to acquire more education.

Education also has a very large influence on **support for or opposition to women's employment**, in the models presented in this report. Moreover, the reciprocal effect in the opposite direction is non-significant, so it seems reasonable to take as a working hypothesis the claim that the effect is unidirectional, that education shapes career attitudes, but that career attitudes do not affect how much education one gets. In terms of capacity building for independence and self-reliance, FaCS programs to keep young people in education would seem to be a priority.

Our explorations of the **neighbourhood context** did not bear fruit. However, it is possible that other features of the local job market might prove more influential. We operationalised local female job opportunities in terms of postcode employment in traditionally female industries. Future research should also explore alternative possibilities such as the percentage female in the postcode's work force.

The results further suggest that **being married**, on its own, does not significantly affect women's degree of workforce engagement, but that particular

aspects of marriage do have such effects and/or associations. **Husband's income** has a negative association with women's workforce engagement, all else equal, whereas **husband's employment** has a positive association with women's workforce engagement, all else equal. Even in this large database, there are not enough cases to contrast the situation of women whose husbands or partners are unemployed with those who are out of the labour force. However, one could merge this dataset with HILDA to achieve a large enough number of cases for a suitable analysis.

To further investigate marital status influences, this report examined the potential reciprocal influences between **divorce**, hours worked weekly and employment attitudes, and found nonsignificant influence of divorce both on employment and employment attitudes and non-significant effects of hours worked and employment attitudes on divorce.

The evidence thus suggests that formal marital status, all else equal, is probably not causally linked to workforce engagement, to the extent that these models correctly represent genuine causal structures.

In this report, we have contrasted married women to non-married women, but it would be very interesting in future research to extend the analyses to comparisons across a more detailed breakdown of marital statuses and living arrangements: never formally married and living alone; never formally married but de facto; formally married; divorced and living alone; divorced and de facto; widowed and living alone; widowed and de facto. Such an investigation should now be feasible, because one could combine the IsssA pooled file with HILDA to get a large enough database with the requisite variables. We have conducted some exploratory analyses which suggest that never-formally-married de facto women appear to differ rather sharply from formally divorced women in de facto relationships. Nevertheless, it is possible that such an analysis will reveal that the crucial factor in labour force engagement and attitudes is not formal marriage, but rather partnering per se: One can only know by doing the analysis.

Another issue concerning marital status that should be born in mind is that formal marriage may not be an exogenous process if women and men select marriage partners in ways that are unmeasured by the survey but are relevant to the labour market. If so, then the apparent effects of husband's employment and income would really reflect the unmeasured pre-existing differences rather than having any intrinsic influence of their own. This issue could be addressed in future research via a two-pronged strategy: (1) using fixed effects models in panel data to attempt to control for unmeasured pre-existing difference; and (2) expanding the range of potentially relevant characteristics that are measured in new survey data.

The presence of **young children** is a large influence on women's labour force participation and work intensity, and there is no significant decline in its effect over time. Other influences – the gradual increase over the generations in workforce engagement, higher levels of education and the like – mean that the mothers of young children today are more deeply engaged in the workforce than

were the mothers of young children 18 years ago, but, insofar as the models in this project are correct, this is because the levels of the other influences have changed, not because the effect of having young children has changed. It is also noteworthy that today's mothers of young children are more likely to have only one child, so that also elevates their participation rates relative to mothers in the 1980s and early 1990s (without the employment rates of mothers of only children changing more than those of single childless women born in the same cohorts).

The lack of an interaction effect between time and family variables is one of the striking findings of these projects. There is an appearance of change in the impact of family, if one merely compares workforce engagement of mothers today with mothers of 15 or 20 years ago. But that is misleading, because the change is not limited to the mothers, but is common to the cohorts as a whole. The differential according to fertility within cohorts remains. Of course, this could change in the future, and is an issue that bears continued monitoring.

The reciprocal causation models involving both actual and desired fertility were rather inconclusive. Several different approaches to modelling suggest that there is no causal link between preferred family size and hours worked weekly. The evidence about support for (or opposition to) women's employment and preferred family size is somewhat more ambiguous. The hypothesis that there is no linkage cannot be dismissed, but, the models were able to discern upper bounds on that linkage if it exists. A change in preferred family size of an entire child reduces the support-for-female-employment index by not more that 1.5 points out of 100, on average, and all else equal, according to the upper bound estimate. Conversely, changing one's views from the most extreme opposition to women's employment to the most extreme endorsement would change the preferred number of children by not more than 0.86 of a child, on average and all else equal, according to the upper bound estimates.

In terms of hours worked and actual fertility, here again the reciprocal effects models to not allow one to reject the hypothesis that there are no such effects, that they are null. The upper bound estimates on the coefficients are that each additional child reduces hours worked weekly by not more that two, on average, and that each extra hour worked weekly leads to a reduction in fertility of not more than 0.01 of a child. With career attitudes and actual fertility, to, the hypothesis that there is no causal relationship linking them cannot be rejected. Upper bound estimates are that each additional child reduces support for female employment by not more than 1 point out of 100, on average and all else equal, and that a change of ideology from extreme opposition to female employment to extreme support for it would lead to an decrease of not more than 0.49 of a child, on average, and all else equal.

To the extent that the models are correct, the **time trends** discovered by the model, particularly the rather dynamic increases from generation to generation in both participation and hours worked weekly, will continue to generate rises in workforce engagement, to the extent that they continue into the future. There were no evident time effects associated with particular policy initiatives, but some of these are too strongly correlated with time to analyse separately.

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