1 Introduction

Background

Fertility has declined significantly in Australia since its peak in 1961, an outcome of the sweeping social and economic changes that have occurred since that time. Declining fertility rates have been accompanied generally by public anxiety, heightened in recent times by concerns about the growing fiscal burden an ageing population will place on the proportionately declining workforce. This has been accentuated by concerns that low fertility is an outcome of an economic or social environment that is hostile to childbearing, as well as the problems for the preservation of society and its culture posed by below replacement fertility.

However, since 2001, fertility rates have risen somewhat, at times being misleadingly characterised as a new 'baby boom'. The contemporary pre-occupation with declining fertility has meant that the recent upturn has been mainly perceived as positive, yet its permanence, causes and relevance are not well understood.

The aim of this working paper

This paper describes Australia's recent fertility experiences, while also synthesising the existing theory and evidence that explains these experiences. The paper provides a perspective on:

- the extent to which the increase in measured fertility is a result of changes in the timing of births or a shift in the likely fertility levels women achieve over their lifetimes
- the major factors that influence fertility generally and their role in the Australian context
- the significance of the increase in fertility and whether current and impending levels of fertility should be a cause for concern
- the usefulness and limitations of current ways of thinking about fertility behaviour, including a detailed explanation of misconceptions about Australia's recent fertility experiences and their implications.

Fertility is a complex issue. Understanding it draws on many disciplines, including demography, physiology, economics and sociology. This paper has relatively limited ambitions, with a focus on recent trends in aggregate fertility and their policy significance. It does not cover many important aspects of fertility, such as:

- the detailed fertility behaviour of specific sub-populations (regions, migrants, indigenous people, disadvantaged groups, women with different parities and ages), which are also of social and policy interest
- the precise roles of social norms in shaping fertility decisions, such as views about gender equity
- changing social patterns, such as later partnering, growing numbers of single-parent families and de-facto couples, as well as changing attitudes to childlessness
- the impacts of infertility and sub-fecundity.

So what is fertility?

Fertility is the natural capacity for creating new life. The term embraces many different aspects of this capacity, depending on the context. It sometimes refers to the likelihood of being able to conceive (fecundity). Alternatively, it is often used as a measure of the number of babies being born in total or per capita at a given time (period measures). This measure is most relevant to immediate provision of services, such as maternity services and child care. However, the number of children produced by a given generation of women once they have come to the end of their childbearing years (which are between 15 and 49 years) — the completed fertility rate (CFR) — matters most to the long-run analysis of the size and age structure of the population.[1] This cohort measure is, therefore, relevant to long-run planning and economic and social policy.[2]

The most problematic feature of the completed fertility rate is that, by definition, policymakers cannot observe it until a woman's reproductive life is over. For example, the most recent cohort for whom the CFR is available are women born in 1958. Accordingly, the CFR is of only limited value to the analysis of current

[1] Conceptually, the CFR is calculated by tracking age-specific fertility rates (ASFR) through time (that is, for a woman born in 1950 the CFR will be: $ASFR_{age=15}$ in 1965 + $ASFR_{age=16}$ in 1966 +…. + $ASFR_{age=49}$ in 1999). To be technically correct the CFR must take account of the fact that a women born in 1950 will turn 15 in 1965 but may experience births at age 15 in either 1965 or 1966. This is because, unless she was born on 1/1/1950, she will be 15 for some of 1966. CFR is then estimated by $0.5[ASFR_{age=15,1965} + ASFR_{age=15,1966} + ASFR_{age=16\ 1966} + ASFR_{age=16,1967}...]$

[2] A cohort is a group born in a given year.

fertility behaviour. Analysts therefore typically try to infer what might be happening to long-run fertility from other measures.

The most simple and timely measure of fertility is the Crude Birth Rate (CBR), which is the ratio of babies born to the population in a given year, or $CBR_t = 1000 \times n_t / p_t$, where n is the number of babies born and p is the population. However, changes in the timing of births over women's lifetimes and the age structure of the female population mean that the CBR will often provide a distorted picture of the underlying lifetime fertility behaviour of women. For example, as the population ages, a greater proportion of women will have completed their reproductive lives and the CBR will fall. Even if p is restricted to the population of women of reproductive age (aged 15–49 years), changes in their age composition will still conceal underlying fertility trends. At best, the CBR is an indicator of fertility behaviour over the short-run.

The Total Fertility Rate (TFR) is a more useful measure of fertility than the CBR as it is both timely and controls for the age structure of the population. The TFR is the usual 'headline' measure cited in public discussions about fertility. It is constructed by summing all age-specific fertility rates (ASFRs) in a given year:[3]

$$TFR_t = \frac{\sum_{a=15}^{49} ASFR_{t,a}}{1000}$$

The TFR is the average number of children that would be produced by a woman over her lifetime, if for every year of her life she experienced the currently prevailing age-specific fertility rates.

Many debates about fertility stem from confusion about the interpretation of the TFR. The TFR is a synthetic measure of fertility that will often not correspond to the actual lifetime fertility experiences of women. This is because the age-specific fertility rates in a given year (which are added together to form the TFR) relate to different cohorts of women, who will often experience different lifetime fertility rates. For instance, the age-specific fertility rate of 15 year old women in 2006 relate to women born in 1991, while the age-specific fertility rate of 49 year old women in the same year relate to women born in 1957. These different generations of women have faced different social and economic environments over their lifetimes. As a result, the assumption — implicit in the construction of the TFR — that 15 year olds in 2006 would, by 2040, have the same age-specific fertility rate as 49 years olds in 2006 is unrealistic.

[3] This expression is divided by 1000 as ASFRs are typically expressed as births per 1000 women, and TFR is expressed as babies per woman.

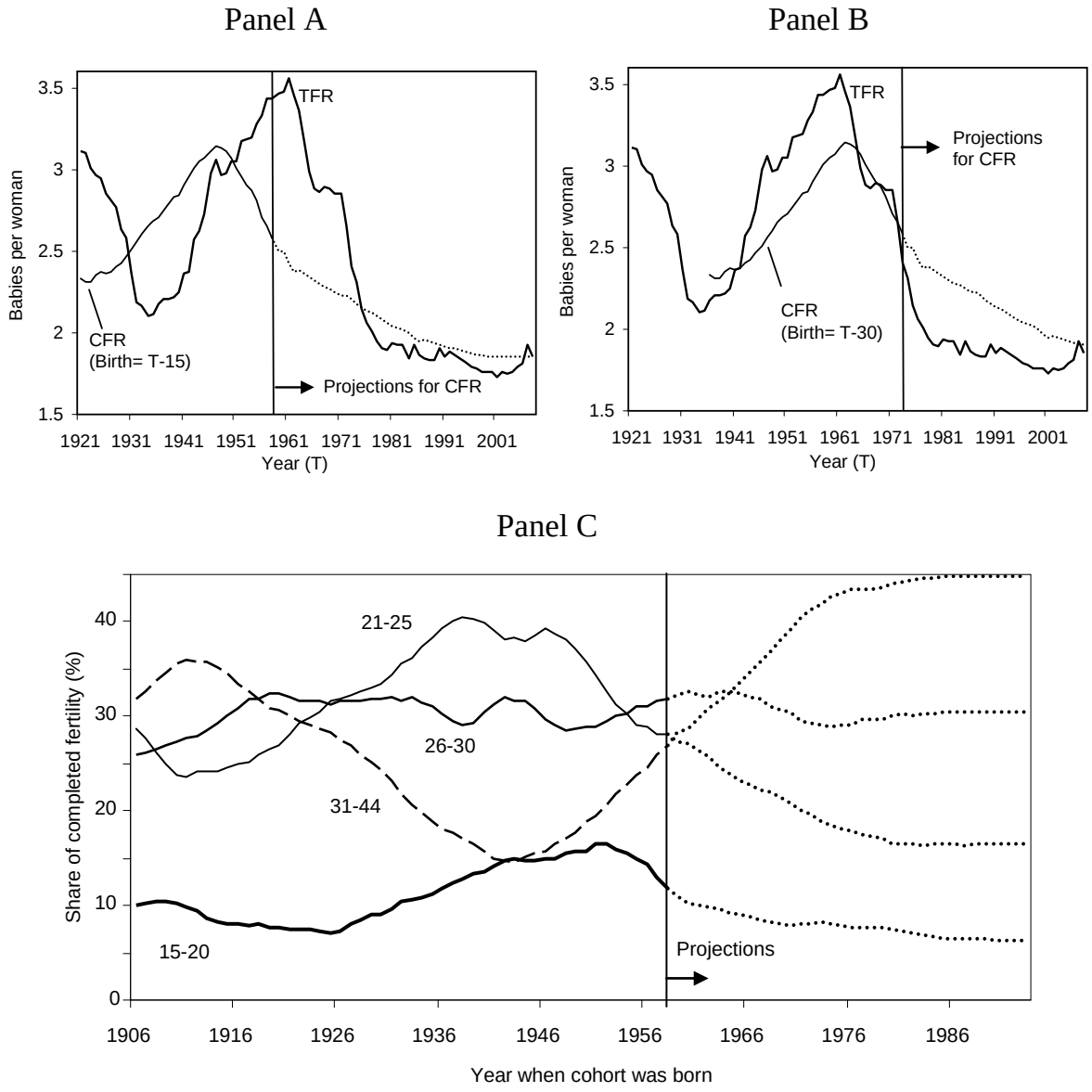
Changes in the TFR are less susceptible to this 'generational' problem, but are still as sensitive to changes in people's decisions about *when* to have babies ('tempo' effects) as to changes in the desired number over a lifetime ('quantum' effects). For example, if a group of women brought forward their childbearing for some reason, the TFR would increase, regardless of whether or not they intended to have more children over their lifetimes. Postponement and eventual recuperation has the opposite effect. Accordingly, changes to period measures of fertility may not presage low or high ultimate completed fertility. Due to tempo effects, the TFR exhibits a greater volatility than the CFR (panel A, figure 1.1). In any given year, quantum effects are often hard to distinguish from so-called 'tempo' effects.

The presence of tempo effects is illustrated by Australia's experiences during the baby boom (an issue taken up further in appendix H). The group of women born in the 1930s — the baby-boom mothers — had higher completed fertility than the generations around them. This was the major reason why the TFR was higher at that time. However, some of the increase in the TFR reflected women bringing forward their childbearing (a tempo effect). This is why the TFR at the peak of the baby-boom years was significantly higher than the completed fertility rate of women giving birth at that time (evident as the gap shown in panel B, figure 1.1 between the TFR and the CFR of birth cohorts when aged 30 years). In this period, women had babies earlier in their lives than those either after or before the boom. So, for instance, by the time they turned 26 years old, the cohorts of women born in the mid 1930s had given birth to around half of the children they were ever going to have. In contrast, the 1914 cohort of women had only around 30 per cent of their lifetime children by that age (panel C, figure 1.1). (For the generation of women born in 1985, the comparable figure is likely to be around 20 per cent.)

The baby-boom period indicates how tempo effects can exaggerate the apparent lifetime fertility of women. However, tempo effects can also lead to underestimation of the underlying lifetime fertility of women, which is relevant to more contemporary periods.

While possible tempo distortions mean that short-term movements should be interpreted with caution, a change in TFR, sustained over a long enough period, will necessarily be embodied in the CFR (and therefore will represent a quantum effect). Additionally, in the absence of further shocks (tempo or quantum), the TFR will converge to the CFR over time, making it a more reliable indicator as fertility behaviour becomes more stable over time.

Figure 1.1 **A comparison of the total and completed fertility rates**



a The shares of the CFR are derived by first estimating the age-specific cohort fertility rates of each birth cohort of women. Then it is possible to calculate the extent to which the CFR of that cohort is accounted for by particular childbearing ages. Since the reproductive years of women born after 1958 has not yet finished, the CFR for these cohorts was estimated by supplementing the available ABS data on age-specific fertility rates with projections from the PC FERTMOD model. **b** In Panel B, the CFR is shifted forwards by 30 years after the birth of each cohort of women for better comparison with the TFR. This reflects the fact that the total fertility rate is an unweighted average of women's fertility, with the mean age of the relevant group of women being around 30 years old. Hotz, Klerman, and Willis (1997) describe a more sophisticated method of ascertaining the 'mean age of fertility' but this only marginally changes the appearance of panel B.

Data source: ABS, *Births*, Cat. no. 3301.0.

'Parity' statistics help to interpret whether changes in the TFR represent quantum effects. A women's parity is the number of children born up to that point in her

life — such as none, one or two. A useful parity indicator is the likelihood of a woman having a further baby given the number of babies so far born. Parity data that also account for age (age and parity-specific fertility rates — APSFR) unpack changes to fertility in a way that can illuminate the implications for the CFR. However, these data are often gathered infrequently, constraining its availability and timeliness.

Despite its limitations, the TFR provides a reasonable basis for approximating trends in fertility behaviour. It is timely, controls for age structure, has (over longer periods) some correspondence with the CFR, and is widely used and understood. It is the upturn in this indicator, along with the increase in the number of babies born, that has generated much of the recent interest in fertility trends in Australia. Chapter 2 focuses on the extent to which the increase in the TFR reflects changes in women's likely completed fertility.

A guide to the paper

This paper proceeds as follows:

Chapter 2 examines the demographic data for Australia. This involves the presentation and interpretation of the various measures of fertility and their implications. A new measure is used to estimate the contribution of population and fertility to the changes in births. The chapter also explores the possible contribution to the measured increase in fertility of:

- measurement error (implying no behavioural phenomena)
- tempo effects (bringing births forward and the slowing of postponement)
- quantum effects (signifying an increase in women's lifetime fertility levels).

Chapter 3 considers the underlying determinants of the recent rise in fertility, including an assessment of the role of policy.

Finally, chapter 4 assesses whether present or impending Australian fertility patterns are problematic, and dispels some common myths about the economic and demographic implications of changes in fertility.