

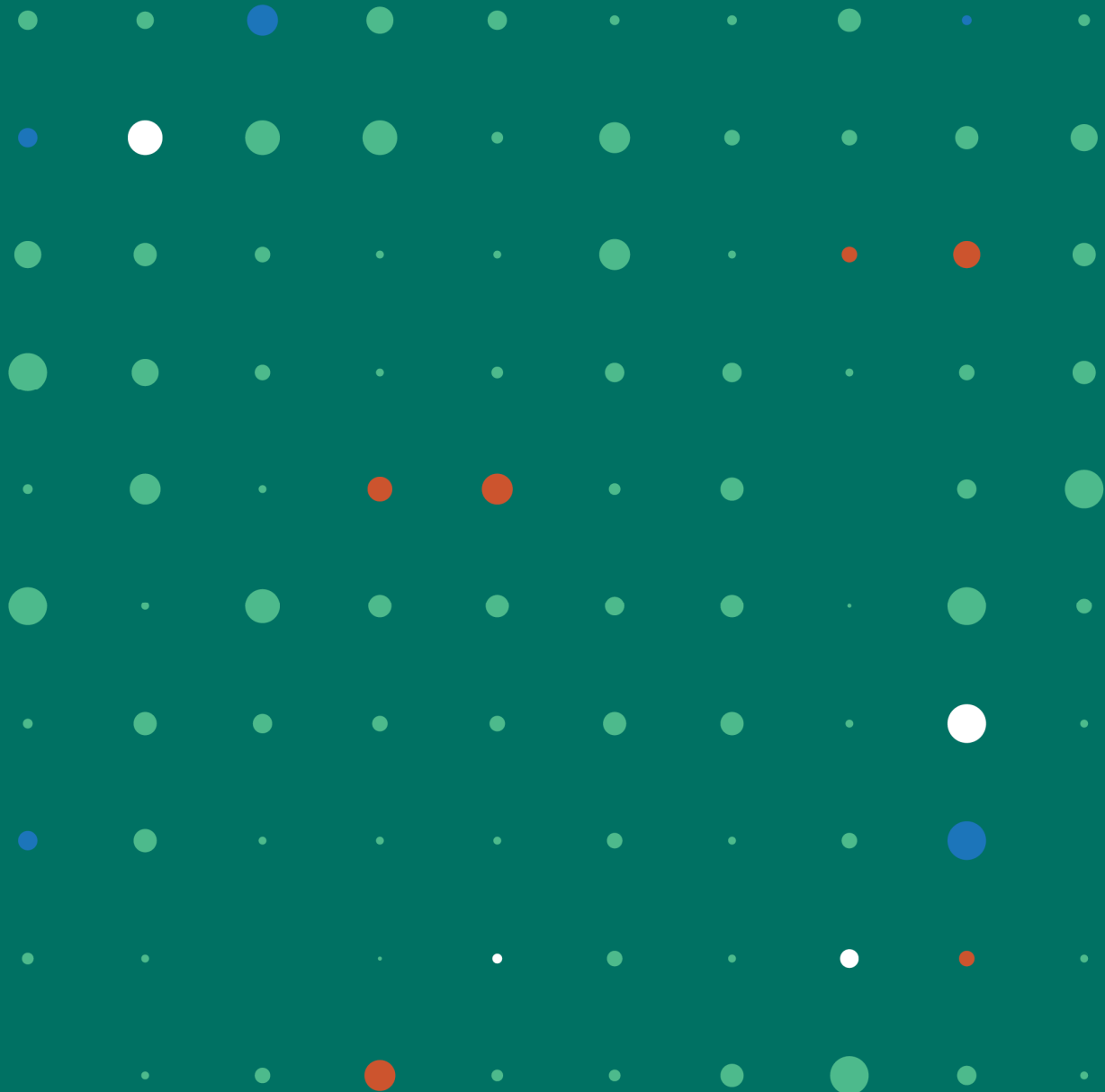


Australian Government
Centre for Population

A PROJECTION OF AUSTRALIA'S FUTURE FERTILITY RATES

ANALYSIS BY PETER MCDONALD FOR THE CENTRE FOR POPULATION

September 2020



Strong evidence. Deep insights. Collaborative approach.

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FOREWORD

One of the key roles of the Centre for Population (the Centre) is to develop projections of the size and distribution of Australia's future population to inform governments' planning and decision-making. Future population dynamics are informed by assumptions about future fertility, mortality and migration. Given there will always be uncertainty, and a variety of possible approaches, it is important to be transparent in explaining how these projections are put together, and to clearly explain why the underlying assumptions are made.

This paper concerns trends in Australia's fertility rates, and is being used to inform the Centre's population projections. It aims to draw inferences from past social and economic trends with a view to making assumptions for use in projecting fertility. Changes in fertility rates are ultimately determined by cultural factors and access to reproductive technology and birth control. Better understanding drivers of fertility is an important area for the Centre's ongoing work.

This paper has been prepared for the Centre by Professor Peter McDonald, who is a leading demographer and a pre-eminent expert in fertility, with a deep and sophisticated understanding of population issues in Australia. Professor McDonald is Professor of Demography in the University of Melbourne's Melbourne School of Population and Global Health, and is a Chief Investigator of the Australian Research Council's Centre of Excellence in Population Ageing Research. He was President of the International Union for the Scientific Study of Population from 2010 to 2013.

Professor McDonald's analysis was finalised by March 2020, based on population and births data from the Australian Bureau of Statistics as at December 2019. Following the outbreak of COVID-19 around the world, Professor McDonald prepared an update that takes account of the impact of COVID-19 on Australia's future fertility – both at a national level, and for each of the states and territories – in the short-term. This update relies on unpublished births data from the Australian Bureau of Statistics that the Centre for Population received in a custom data request and converted into fertility rates by single year of age, state and territory and financial year by occurrence. These fertility rates and the projections by Professor McDonald are available from population.gov.au alongside this report.

I thank Professor McDonald for his analysis and his contribution to the work of the Centre.

Victoria Anderson
Executive Director
Centre for Population

SUMMARY

Population projections depend on assumptions about the future fertility rate. The fertility rate itself is heavily influenced by changes in the timing and number of births within a woman's lifetime. In the short term, families make decisions about when they have children. In the long term, families make decisions about how many children to have.¹

Fertility rates in Australia have generally been in decline for 60 years since the last years of the Baby Boom. From 3.55 babies per woman on average in 1961, rates fell to around 1.74 babies per woman on average in 2018 (ABS 2019a, ABS 2019b). This trend has been driven by a combination of short and long term factors: the age at which women have children has been increasing over time, and the total number of children per family has been falling over time.

The interaction of these two factors makes projecting future fertility rates difficult. If future families delay having children, but end up having the same number of children on average as current families, then any children a woman defers having when she is young are fully 'recuperated' when she is older.

When the timing of births changes there are consequences for the total number of children per family. There is a strong likelihood when births are delayed that the number of births per woman will fall. The opposite applies if births occur at younger maternal ages – as was the case with the Baby Boom.

Ultimately, fertility rates are affected by a family's preference for the number of children it wants to have, which is culturally determined, as well as by the incidence of unintended births and ability to give birth, which is determined by biological factors, ease of access to birth control and reproductive technology.

In the short term, projections of future fertility depend on demographic developments and predicted behavioural responses to economic factors. The projected long-term fertility rate is assumed to continue to reflect the observed behaviour and trends of women of all ages at around 2030, and to remain constant from just after 2030 onward.

PAST TRENDS IN FERTILITY RATES

The total fertility rate (TFR) is a common summary measure of fertility that facilitates comparisons across time and between countries. It does not measure the fertility behaviour of a real group of women, but instead comprises the sum of the age-specific fertility rates for all women in a given year and country. It therefore provides an indication of the number of children a woman would have over the course of her life if she experienced the age-specific fertility rates for that year over her lifetime.

Chart 1 shows Australia's total fertility rate, broken down births per woman within five year age brackets, and demonstrates that fertility patterns in the Australian population have changed significantly over time. Fertility fell to a low level during the Great Depression of the 1930s as marriages and births were delayed in a time of great uncertainty.

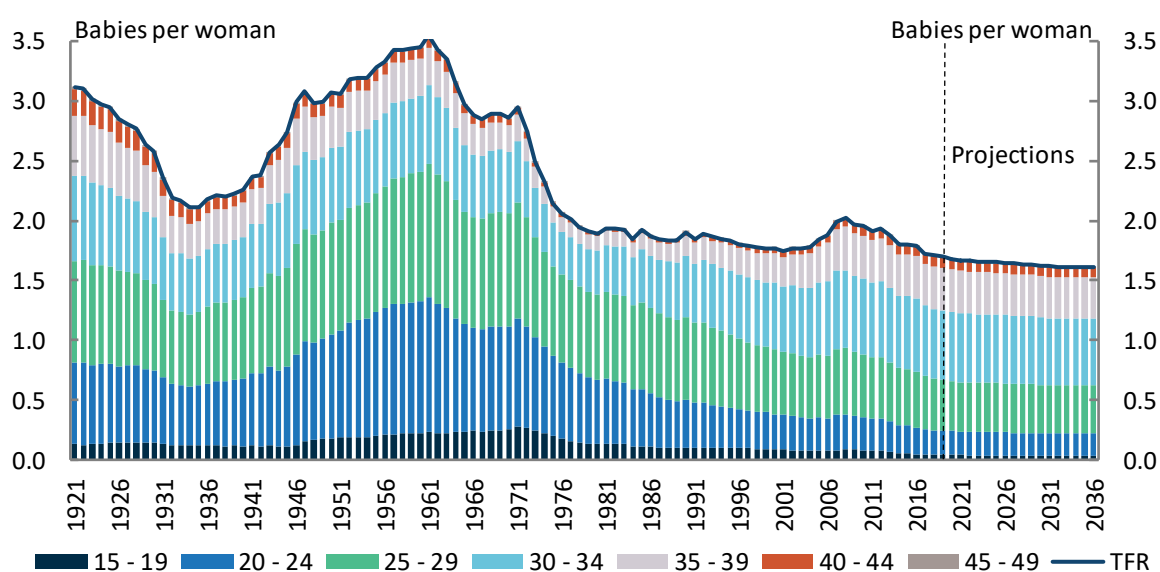
Australia then experienced one of the largest and longest baby booms of any industrialised country, driven largely by women having children at younger ages. Fertility rates rose from 2.63 births per woman in 1944 to a peak of 3.55 births per woman in 1961, before falling again to reach 1.95 in 1978.

¹ This paper refers to families throughout as the unit for decision making about the number of children that are born. 'Families' endeavours to encapsulate the varied forms of parenthood, including a single person with no children.

Fertility fell continuously from 1921 to 2003, primarily due to educated women increasingly delaying their first child. The rise in fertility from 2005 confirmed that the preceding decline in fertility was actually a result of some women delaying when they had children. Some of these delayed births were recuperated, with higher age-specific fertility rates for educated women in their 30s. As a result, women in their 30s overtook women in their 20s as having the highest rates of fertility and the total fertility rate increased and peaked at just over 2.00 babies per woman in 2007.

From that peak in 2007, the fertility rate has fallen over the last decade and by 2018 it was back to approximately the historical low recorded in 2001 (Chart 1). There has been a decline in the fertility rates of older teenagers and of women in their late 20s associated with less-well educated young women having fewer children. In addition, recuperation has slowed as the fertility rates of women in their 30s have flattened out.

Chart 1. TOTAL FERTILITY RATE DECOMPOSED INTO BIRTHS PER WOMAN WITHIN FIVE-YEAR AGE BRACKETS, 1921 TO 2036



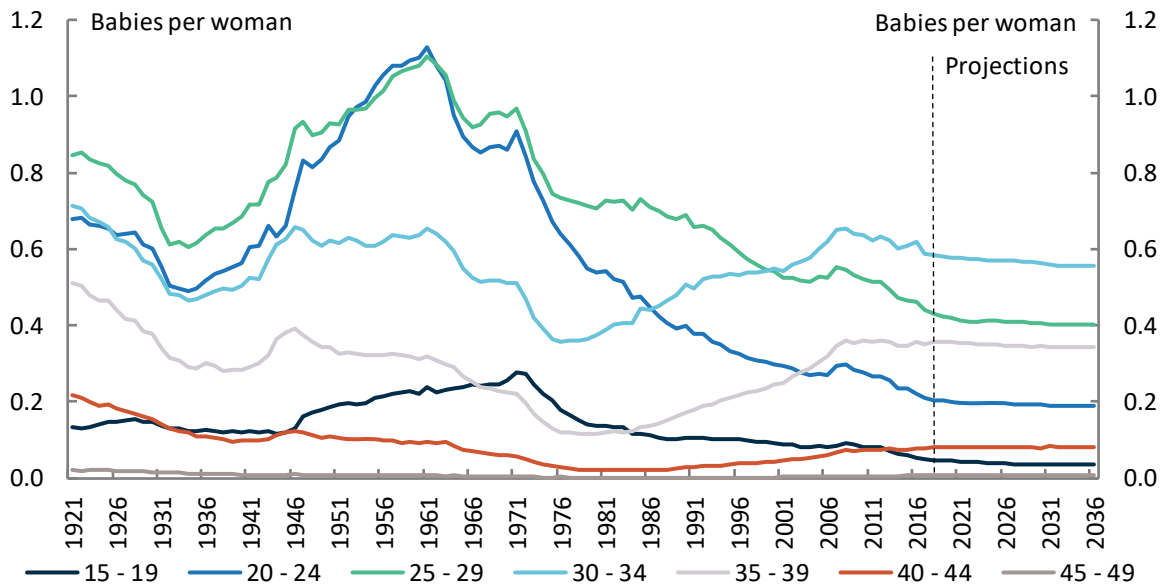
Source: ABS 2019a, ABS 2019b, ABS 2019c, and author's projections.

PROJECTED FUTURE FERTILITY RATES

The main challenge for projecting the future fertility rate is whether and to what extent the observed trends in the age-specific fertility rates will continue. Chart 2 shows that:

- future teenage fertility is expected to continue to fall as women remain in education longer, as attitudes towards early childbearing become even less positive and as access to family planning and birth control increases;
- future fertility rates for women in their 20s will continue to fall initially, because the long-term shift in the educational composition of women in their 20s is likely to continue, meaning that the share of less-well educated women continues to fall before stabilising;
- fertility rates for women in their late 30s appear to have stabilised, and are not expected to change in future; and
- there will be small increases in the fertility rates of women in their 40s as improvements to technology and healthy living help to extend the age at which delayed births can be recuperated.

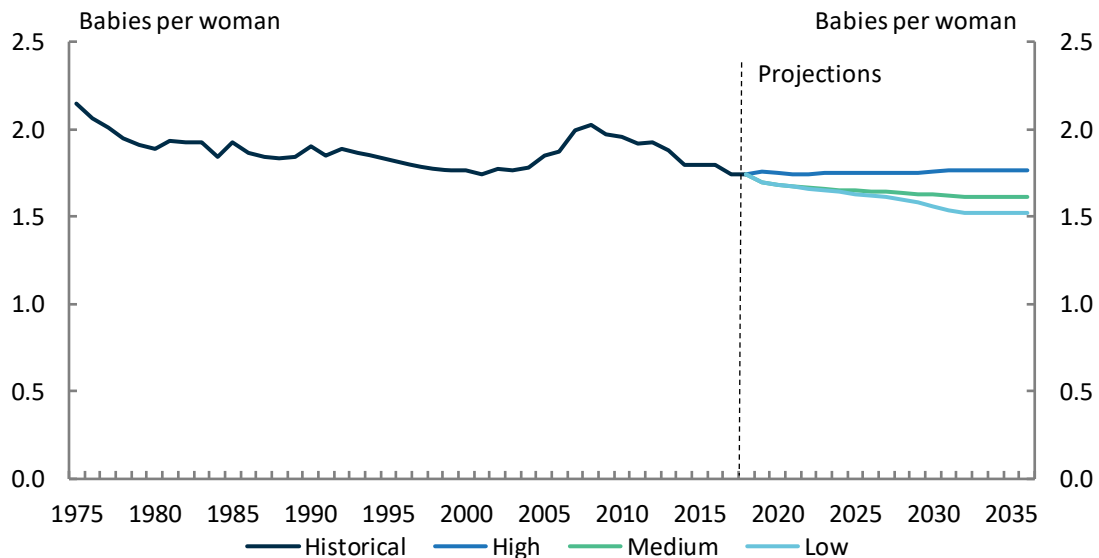
Chart 2. NUMBER OF BIRTHS PER WOMAN WITHIN FIVE-YEAR AGE BRACKETS, AUSTRALIA 1921 TO 2036



Source: ABS 2019a, ABS 2019b, ABS 2019c, and author's projections.

This means that Australia's fertility rates are not expected to return to formerly high levels, but instead are expected to fall to and then stabilise at 1.62 babies per woman just after 2030. Alternatively, if there is a relatively strong rebound in rates of recuperation sustained by women in their 30s and 40s, then a higher bound for the total fertility rate may stabilise at 1.70 babies per woman just after 2030. By contrast, if rates of recuperation are lower than the medium, then the total fertility rate may fall as low as 1.50 babies per woman before it stabilises (as shown in Chart 3).

Chart 3. TOTAL FERTILITY RATE, THREE PROJECTIONS, 2018 TO 2035

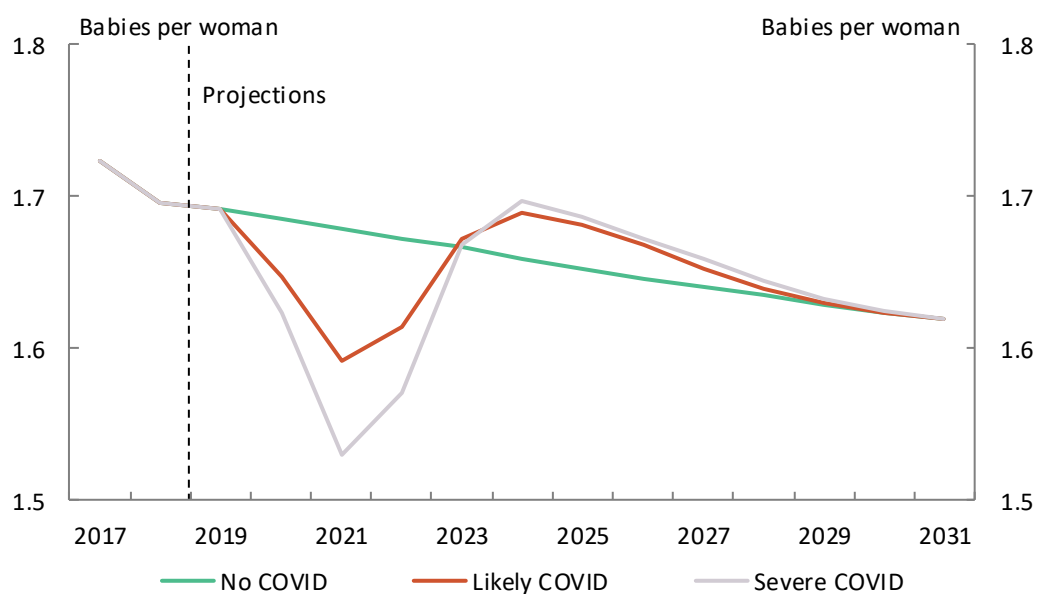


Source: ABS 2019b and author's projections.

THE LIKELY IMPACT OF COVID-19

Following the outbreak of COVID-19, two additional future fertility scenarios are projected focussing on the pattern of fertility in the short-term, as shown in Chart 4. Both scenarios are based on the medium scenario from Chart 3, and converge on 1.62 babies per woman just after 2030. The *'no COVID' scenario* matches the medium scenario, showing a gradual decline over time. In the two additional scenarios, the full impact of COVID-19 on fertility is assumed to be felt in 2021. In the *'likely COVID' scenario*, the total fertility rate is assumed to be 0.15 babies per woman lower in 2021, and around 80 per cent of the babies that are deferred are assumed to be recuperated within about ten years. In the *'severe COVID' scenario*, the total fertility rate is assumed to be 0.25 babies per woman lower in 2021, and around 70 per cent of the babies that are deferred are assumed to be recuperated within about ten years.

Chart 4. TOTAL FERTILITY RATES, SHORT-TERM PROJECTIONS, 2017 TO 2031



Source: ABS 2020, Centre for Population 2020, and author's projections.

PROJECTING BIRTHS

INTRODUCTION

Statistical agencies around the world have a very poor record of projecting fertility, even in the short term. Errors in the short term arise primarily because the annual fertility rate is heavily affected by changes in the timing of births within a woman's lifetime. Across their lives, women may experience both short-term shocks and long-term changes that affect the timing of their births as well as families' preferences for how many children they want to have. Projections of long-term fertility are based on observed behaviour and trends that are assumed to remain constant in the future.

To project future fertility, it is important to take account of the short and long term effects that have already influenced families' decisions. The legacy of past changes in the timing of births is carried into the future through the breakdown of the population of women in the childbearing ages by their age, number of births (parity) and time since the previous birth. Where the timing of births during women's lives changes, the number of children they have across their lifetime can also change. Conventionally, there is a strong likelihood if births are delayed that the total number of births per woman will fall. The opposite applies if births occur at younger ages, as demonstrated in the past.

Ultimately, fertility is affected by the number of children that families want to have and the incidence of unintended births. Both of these factors are partly culturally determined but also heavily influenced by ease of access to the means to control fertility.

UNDERSTANDING DIFFERENT MEASURES OF FERTILITY

The most commonly used, summary measure of fertility is the **Total Fertility Rate**. It is derived as the sum across all ages of the Age-Specific Fertility Rates of women in a period, usually a calendar year. The **Age-Specific Fertility Rate** is the rate at which women of a given age give birth in a year, calculated as the number of births to women of the given age in that year divided by the mid-year population of women of that age.

Importantly, the Total Fertility Rate does not measure fertility behaviour across the lifetime of an actual group of women. Normally, in making assumptions about future fertility levels, we would like to think about the number of children that an actual group of women will have, on average, across their lifetimes. Because the Total Fertility Rate does not measure this, it can be a misleading measure of lifetime fertility. However, because the Total Fertility Rate sums up the experience of different women in the same year, it is a good summary measure of the rate or intensity of childbearing in a particular calendar year. If the task is to calculate the number of births that occur in a particular year, as is the case in population projections, it is the rate or intensity of childbearing at different ages in a given year that is required, so forecasters must project Total Fertility Rates.

Fertility can also be measured as the average number of children born across several calendar years to a group of women who are all born in the same year. This measure, which does measure fertility behaviour for a real group of women across their lifetimes, is called **Completed Cohort Fertility**. Completed Cohort Fertility is obtained by adding the Age-Specific Fertility Rates for women born in a particular year at each age, in the calendar year at which they are that age.

The Total Fertility Rate and the Completed Cohort Fertility would be equal if the Age-Specific Fertility Rates at every age remained constant for 35 years as the cohort aged from 15 through to 49. This is extremely unlikely because of annual changes in the intensity of childbearing and changes in the timing of births as described above.

Tempo effects

When successive cohorts of women have their first child earlier in life, the Total Fertility Rate will tend to rise because births are brought forward in calendar time. Women at younger ages will be giving birth at a higher rate while women at older ages are still giving birth according to the earlier pattern of later age at first birth. This is known as a **tempo effect**.

When a society experiences a tempo effect, the Total Fertility Rate becomes an unreliable measure of the average number of children that real cohorts of women in the society are having across their lifetimes. When age at first birth falls, the Total Fertility Rate will rise above the Cohort Completed Fertility Rates of women going through the childbearing years at the time. When age at first birth increases, the opposite effect occurs with the Total Fertility Rate falling to lower levels than Completed Cohort Fertility. It can be difficult to determine when the shift to earlier or later births will end and what the subsequent effects will be. This is the central issue in the projection of fertility rates.

Recuperation

The extent to which cumulated cohort fertility rebounds from a low level after an increase in age at first birth is termed **recuperation**. It has generally been considered that the extent of recuperation in a society depends upon the extent to which that society supports the combination of work and family.

The number of children ever born (parity)

When families are able to make decisions about the number of children that they have, these decisions are best understood by examining the distribution of the number of children that women have across their lifetimes. Decisions about the number of children a woman has are heavily influenced by the number of children she already has, known as her **parity**.

To estimate future levels of fertility, it is easier to think about the distribution of the number of children born to cohorts of women rather than in terms of Age-Specific Fertility Rates or Total Fertility Rates. Projections of fertility in the long term must take into account the likely 'ultimate' distribution of the births that women will have across their lifetimes.

AUSTRALIAN BIRTH STATISTICS

Information on the total number of births and the Total Fertility Rate applying in Australia is provided in two publications from the Australian Bureau of Statistics (ABS):

- The annual *Births, Australia* publication (Cat. No. 3301.0) published each year in early December and referring to the previous calendar year. For example, *Births, Australia 2018* was published on 11 December 2019.
- The quarterly publication, *Australian Demographic Statistics* (Cat. No. 3101.0) is published approximately five months and three weeks after the most recent statistics published in the report. For example, *Australian Demographic Statistics, June 2019* was published on 19 December 2019.

BIRTHS, AUSTRALIA

This publication provides detailed tabulations of births on a calendar year basis. It is the only published source of single-year of age, age-specific fertility rates provided by the ABS.

The purpose of fertility estimates for population projections is to project the number of births that occur in a given year which, after allowing for mortality and migration, becomes the population aged 0 at the end of the given year. To project births, ideally, we would make use of single-year of age, age-specific fertility rates that

A projection of Australia's future fertility rates

are based upon the year of occurrence of births. However, the *Births Australia* publication provides rates based on year of registration, not year of occurrence.

Births data for 2018 in *Births, Australia 2018* refer to:

- births that were registered in 2018 and received by the ABS between 1 January 2018 and 31 March 2019; and
- births registered in any year prior to 2018 but not received by the ABS until the period 1 January 2018 to 31 March 2019.

This means, for example, if there was a substantial delay in registration affecting births towards the end of 2017 that led to 2017 registered births being sent to the ABS at some time from 1 April 2018 to 31 March 2019, these births would be included in the total 2018 births that are analysed in the publication. The year of occurrence of births for each year of registration included in the past five issues of *Births Australia* is as follows (Table 1).

Table 1. YEAR OF OCCURRENCE OF BIRTHS BY YEAR OF REGISTRATION, AUSTRALIA, 2014 TO 2018

YEAR OF OCCURRENCE	YEAR OF REGISTRATION* (%)				
	2014	2015	2016	2017	2018
2018					84.0
2017				82.7	12.2
2016			83.4	13.7	0.9
2015		83.4	13.4	0.8	0.6
2014	86.9	13.4	0.7	0.4	0.4
2013	10.5	0.6	0.4	0.4	0.4
2012	0.4	0.4	0.3	0.4	0.2
2011**	0.3	0.3	0.3	0.2	1.4
2010**	0.3	0.3	0.2	1.4	
2009**	0.2	0.2	1.4		
2008**	0.1	1.5			
2007**	1.3				
TOTAL	100	100	100	100	100

* Year of registration as defined for each issue of *Births Australia* (see text for definition)

** For the final figure in each column, the percentage shown is the percentage for the given year plus all previous years.

Source: ABS 2019b.

As indicated in Table 1, the percentages of births that occur in the same year as registration fluctuates from year to year.

In *Births Australia* issues, the age of mother is the age at the time of occurrence of the birth, not the time of registration. This means that, if registration processing delays are not related to the age of the mother (which seems very likely), the percentage distribution of births by age based on year of registration will be a reliable measure of the age distribution of births occurring in the same year.

AUSTRALIAN DEMOGRAPHIC STATISTICS

Australian Demographic Statistics is published on a quarterly basis. It provides information on the number of births in each quarter up to the quarter ending about six months before the publication of the report. For example, *Australian Demographic Statistics, June 2019*, published 19 December 2019, provides the number of births up to and including the June quarter of 2019. Thus, it provides more up-to-date statistics than does the issue of *Births Australia*.

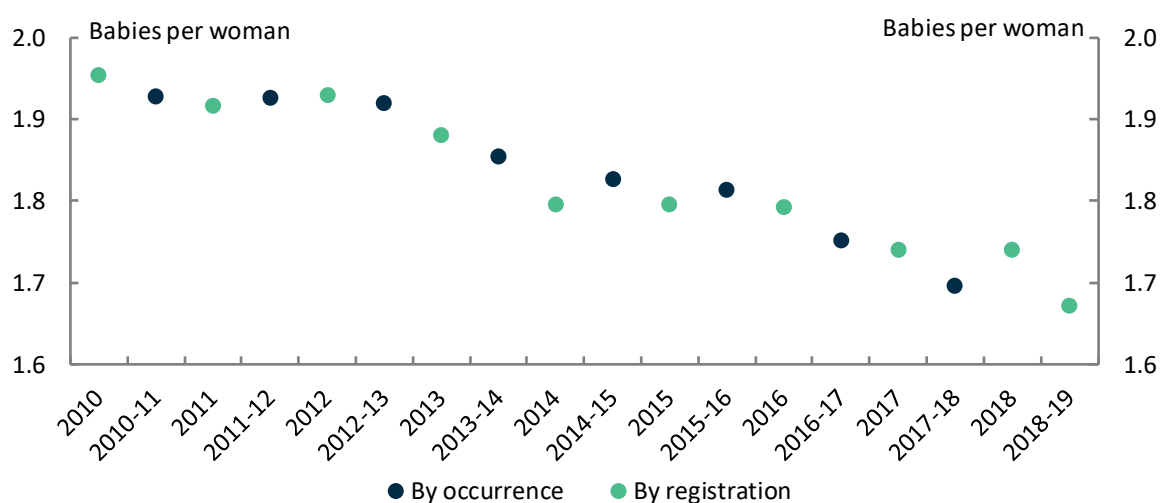
Importantly, however, because *Australian Demographic Statistics* is chiefly concerned with the publication of the Estimated Resident Population, it needs, as far as possible, to make use of births by **year of occurrence**.

Australian Demographic Statistics provides Total Fertility Rates for financial years where the input data are births by year of occurrence. For example, the March 2019 issue shows Total Fertility Rates based on year of occurrence up to the financial year 2017-18. The underlying age-specific fertility rates are not published by the ABS.

IMPLICATIONS FOR PROJECTING FUTURE FERTILITY

Chart 5 shows that the different measures of fertility – across calendar and financial years, and by registration and occurrence – have generally followed a similar pattern up until the most recent data releases of *Births Australia, 2018* and *Australian Demographic Statistics* for 2018-19. Projections of future fertility take account of the most recent data on births both by registration and occurrence. Historical total fertility rates and age-specific fertility rates are taken from the ABS's *Births Australia* until 2016.

Chart 5. TOTAL FERTILITY RATES BY REGISTRATION AND OCCURRENCE



Source: ABS 2019b, and ABS 2019c.

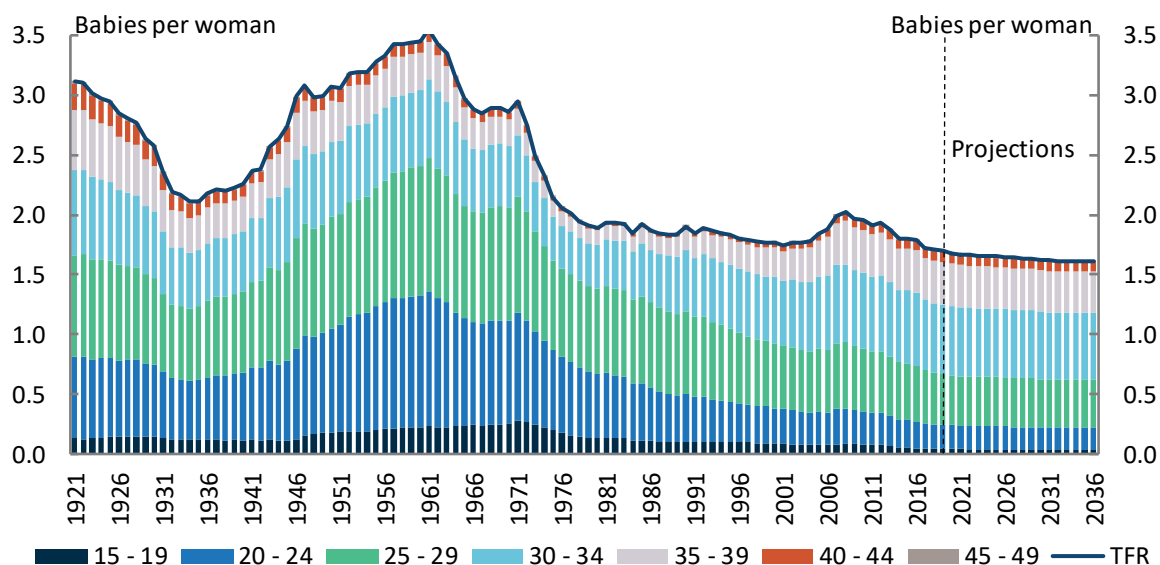
Where the measures diverge, projections of future fertility are guided by fertility measures based on the occurrence, rather than on the registration, of births. The Total Fertility Rate for 2017 is estimated as the average (1.72) of the Total Fertility Rates by year of occurrence for the years 2016-17 (1.75) and 2017-18 (1.70) from *Australian Demographic Statistics*. Age-Specific Rates for 2017 are then obtained by applying the age pattern of rates from the 2017 registration data (*Births Australia*) to this estimated Total Fertility Rate.

AUSTRALIAN FERTILITY TRENDS

CHANGES IN AGE-SPECIFIC FERTILITY RATES

Chart 6 shows historical Age Specific Fertility Rates for five-year age groups in Australia from 1921 to 2016. So that the effect of each age group on the total is evident, the rates are stacked so that their total is the Total Fertility Rate for these years. The chart clearly shows how age specific rates at younger ages have fallen continuously since 1961 except for small rises around 1971 and 2008.

Chart 6. TOTAL FERTILITY RATE DECOMPOSED INTO BIRTHS PER WOMAN WITHIN FIVE-YEAR AGE BRACKETS, 1921 TO 2036



Source: ABS 2019a, ABS 2019b, ABS 2019c, and author's projections.

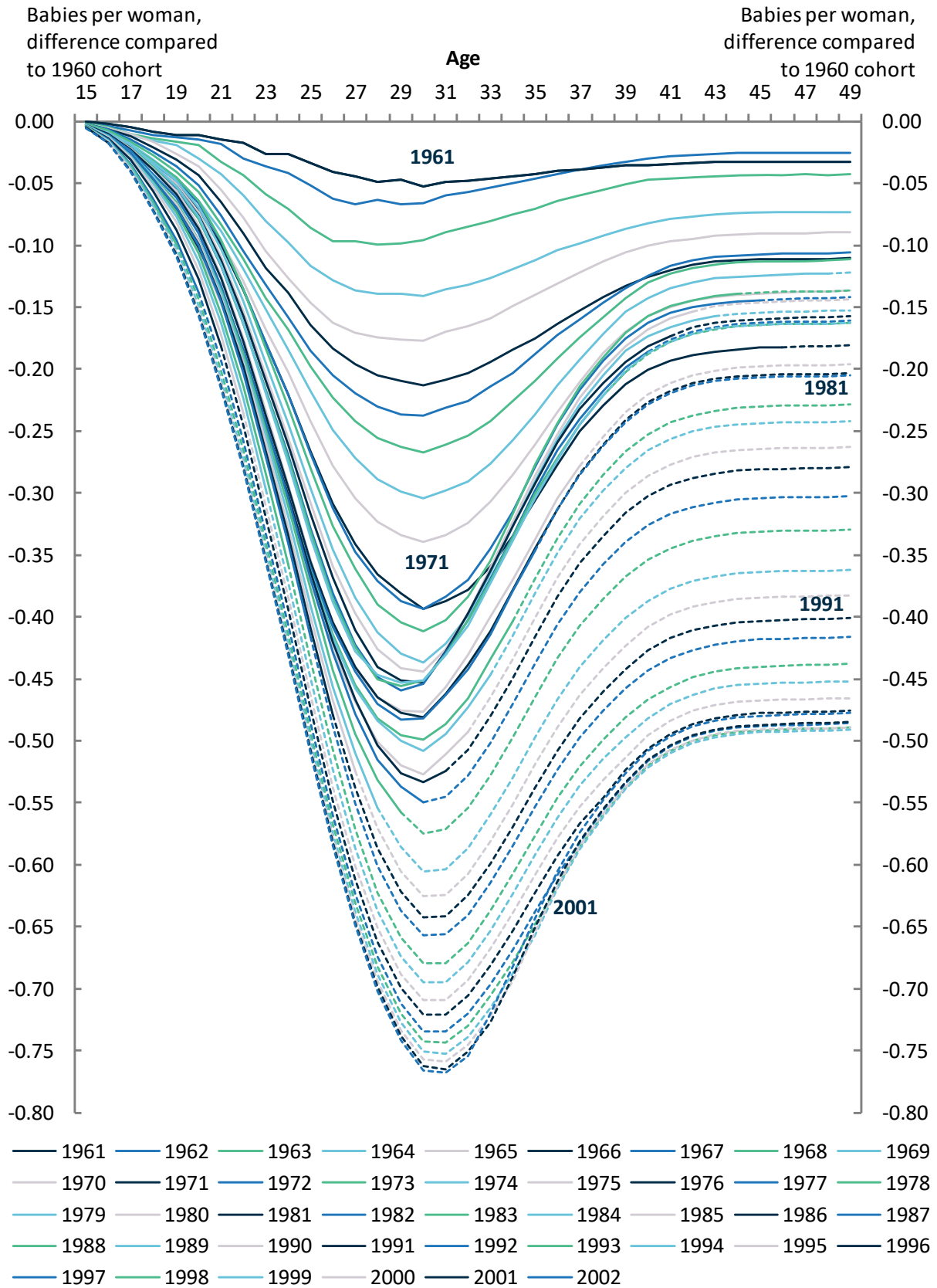
Fertility fell to a historically low level during the economic recession of the 1930s. This was mainly a tempo effect as marriages and births were delayed. Nevertheless, women in the peak child-bearing ages (20-34 years) at this time ended up with a lower Cumulated Cohort Fertility level than cohorts younger or older than them suggesting that the recession had long-lasting effects on fertility of these cohorts.

The most striking feature of Chart 6 is the high levels of fertility that prevailed from 1946 to 1971. Australia had one of the largest and longest baby booms of any industrialised country. The baby boom was largely the result of a tempo effect as births occurred at earlier and earlier ages but, as described below, women in the peak childbearing years during the baby boom ended their fertility with higher Completed Cohort Fertility. A baby boom of this magnitude is not likely to be repeated, although there was an increase in fertility between 2005 and 2013.

The chart also shows that fertility has fallen continually from 1992 to 2003 and McDonald and Kippen (2011) show that this fall was primarily due to educated women increasingly delaying their first birth during these years. The rise in fertility from 2005 was due primarily to recuperation leading to higher age-specific rates for educated women in their 30s. The births delayed by educated women in the 1990s have likely now all taken place so that there will be little further momentum in the population at risk for further decline among this group.

From a peak in 2008, the Total Fertility Rate tended to fall through the decade to 2017, when it was back close to its lowest level ever recorded.

Chart 7. COMPLETED COHORT FERTILITY – DEVIATIONS COMPARED TO WOMEN BORN IN 1960, FOR 1961 TO 2002 BIRTH COHORTS



Source: ABS 2019a, ABS 2019b, ABS 2019c, and author's projections.

A projection of Australia's future fertility rates

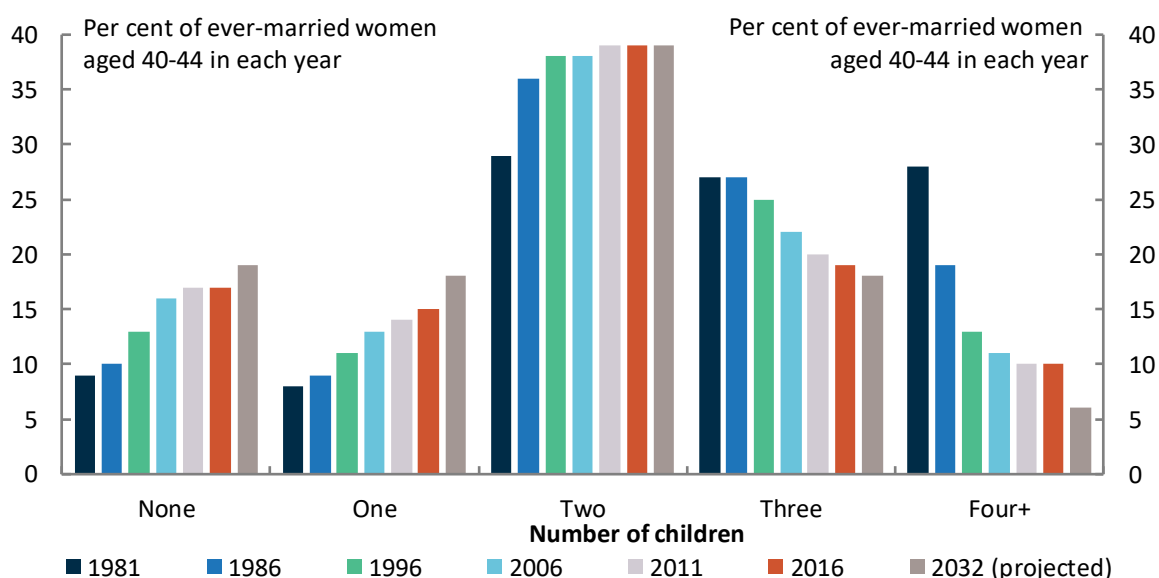
Most, if not all, Organisation for Economic Co-operation and Development (OECD) countries have gone through a long period of time in which the ages of mothers at birth have been rising. Accordingly, all have experienced falls in cumulative cohort fertility roughly through to age 30 before the delayed births are made up to some extent (Sobotka 2017).

Recuperation in Australia has been relatively strong, as shown in Chart 7. Successive cohorts nearing the end of their childbearing years have Cumulative Cohort Fertility that is less than 0.15 births per woman below the 1960 cohort (which ended with a Cumulative Cohort Fertility of 2.17). The extent of recuperation seemed to be reaching an equilibrium level of around a Completed Cohort Fertility of 2.00 births per woman for cohorts born around the latter part of the 1970s, with even some crossover effects that might have been the result of the 2004 supportive family policy changes. However, cohorts born from 1980 onwards appear to have commenced a new downward trend, perhaps because of the uncertain global economy and the impact of housing prices. Studies in European countries have shown relatively large downward impacts of the global economic crisis on fertility.

CHANGES IN PARITY: CHILDREN EVER BORN TO WOMEN BY AGE

Chart 8 shows the changing distribution of children ever born to women aged 40-44, near the end of their childbearing period. From 1981 to 1996, there was a substantial shift from high to lower parities. However, between 2006 and 2016, the changes in the parity distribution were small, with almost no change between 2011 and 2016. The chart shows the long-term trend away from three or more children towards a single child or no children. There is little difference between the 2011 and 2016 Census in the proportion of women ever married with no children and with four or more children. The proportions for 2016 vary from the longer term trend due to the temporary lift in the fertility of women at all ages in the years, 2005-2012. The projection for 2032 is based on a return to the long term downward trend.

Chart 8. CHILDREN EVER-BORN TO EVER-MARRIED WOMEN AGED 40-44, (AUSTRALIAN CENSUSES AND 2032 PROJECTED)



Source: Heard, G. and Arunachalam, D. (eds) 2015, ABS 2017, and author's projections.

CHANGES IN THE CHARACTERISTICS OF WOMEN OF CHILDBEARING AGE

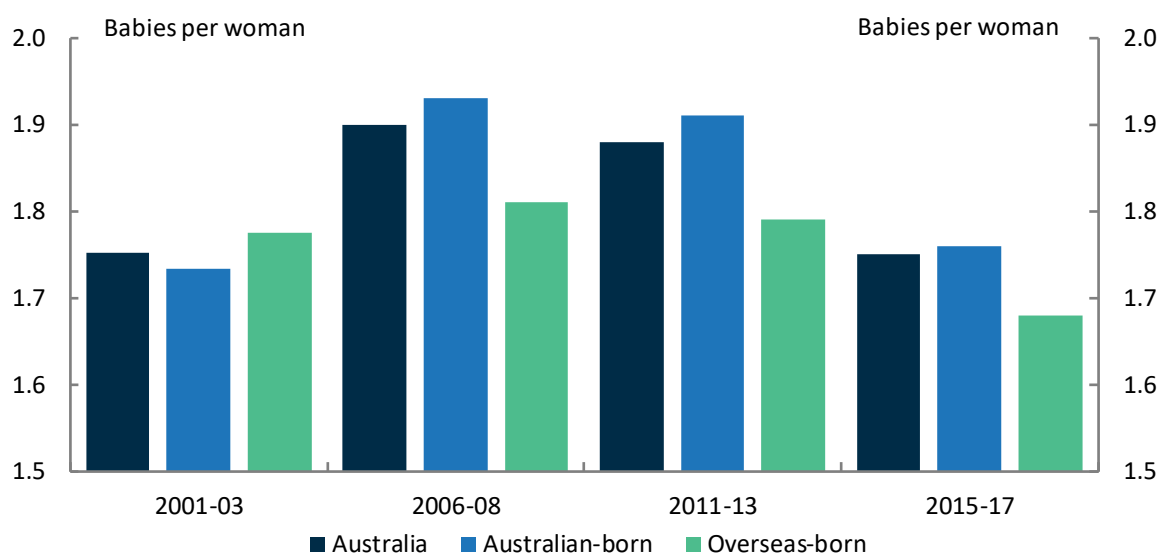
Changes in the characteristics of the women making up the Australian population can influence the annual number of births if the fertility rates of the various sub-groups are significantly different from each other. Four

characteristics that are relevant in Australia are country of birth and visa category, location, education and partnership status.

COUNTRY OF BIRTH AND VISA CATEGORY

In 2017, 36 per cent of all births were to women born outside of Australia (ABS 2019b). Chart 9 shows that from 2001 through to 2017, the Australian Total Fertility Rate was no more than 0.03 births per woman above or below the rate for women born in Australia even though the Australian Total Fertility Rate fluctuated widely over these years. This is because the difference in fertility between Australian-born women and overseas-born women is relatively small.

Chart 9. TOTAL FERTILITY RATES, AUSTRALIAN-BORN, OVERSEAS-BORN AND AUSTRALIA, 2001-03 TO 2015-17

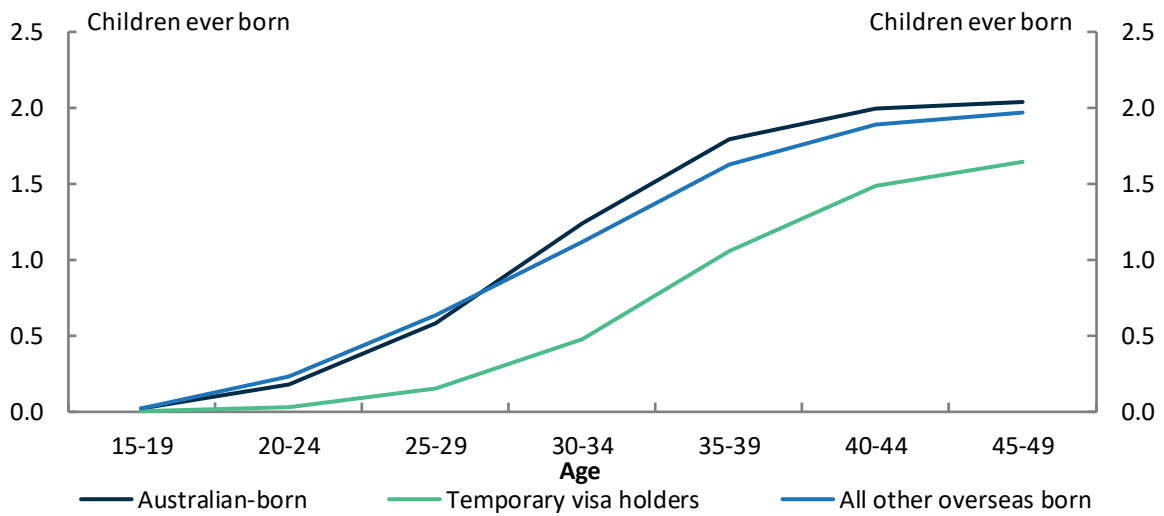


Source: Derived from ABS, *Births Australia*, Cat. No. 3301.0, various issues, 2001-2017.

In 2001-03, the fertility rate of overseas-born women was a little higher than that for Australian women but, in the past decade, fertility for the Australian-born has been about 0.1 births per woman higher than for overseas-born women. The shift to lower fertility among the overseas-born is due to the growing incidence of temporary residents among overseas-born women. Temporary residents (not including New-Zealand-born women) represented around 14 per cent of the Australian female population aged 20-29 at the 2016 Census.

Temporary residents are very unlikely to give birth while in Australia. For example, in 2015-17, the cumulative fertility to age 25 of China-born women was 0.04 births per woman compared with 0.30 for Australian-born women (ABS 2017). China-born women under the age of 25 are almost all international students (ABS 2017). Chart 10 shows the mean number of children ever born by age group in 2016 by birthplace and visa type. The number of children ever born to temporary visa holders at all ages is lower compared to both Australian-born and other overseas-born women, which are fairly similar to one another. In projecting fertility, the incidence of women on temporary resident visas is an increasingly important consideration.

Chart 10. MEAN NUMBER OF CHILDREN EVER-BORN BY COUNTRY OF BIRTH AND VISA TYPE OF MOTHER, AUSTRALIA, WOMEN AGED 15-49, 2016 CENSUS

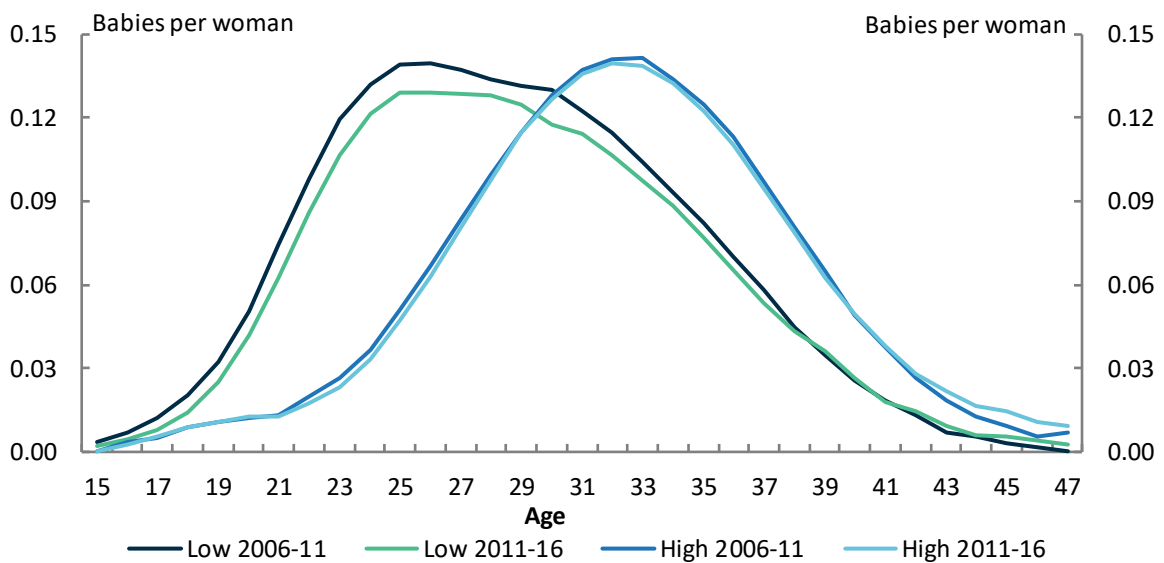


Source: ABS 2017.

EDUCATION

Level of education is not collected as part of the registration of births in Australia. However, using changes in parity between successive censuses, McDonald and Moyle (2019) have obtained estimates of fertility for two periods of time (2006-11 and 2011-16) for women of high and low education. High education is defined as having completed Year 12 and having a post-school qualification. For those aged 30-34 in 2016, around 70 per cent of Australian women had high education. The remaining 30 per cent of women were defined as having low education. The single-year-of-age Age-Specific Fertility Rates of these two education groups for the two periods are shown in Chart 11.

Chart 11. AGE-SPECIFIC FERTILITY RATES BY EDUCATION STATUS, 2006-11 TO 2011-16



Source: ABS 2017.

The chart shows that the timing of fertility is starkly different for the two groups and has not changed much between the last three censuses. The Total Fertility Rate for the high educated group remained almost constant across the two periods (1.88 for 2006-11 and 1.86 for 2011-16) but the rate fell significantly for the low educated group (2.16 for 2006-11 and 2.00 for 2011-16).

McDonald and Moyle (2019) show that, in Australia, across the two, five-year periods, 2006-11 and 2011-16, fertility was near-constant for women with a post Year 12 tertiary qualification (referred to as High Education in the paper and constituting 68 per cent of women aged 30-34, the peak age group of fertility) but fell significantly for those with lower levels of education (referred to as Low Education) This result mirrors the situation observed recently in the Nordic countries and in the United States (US).

Recent very low parity progression rates shown for low educated women suggest a significant tempo effect for this group. This may have been partly induced by the uncertainty arising from the global financial crisis but could also be due to changes in family support policy. For projections of fertility in the relative short-term, we need to estimate how much recuperation will take place for low educated women in the future. For the longer term, we need to make assessments of the relative size of the low educated population as education levels continue to rise.

The socio-economic circumstances of women with high and low education are very different. For example, in 2016, among mothers aged 35-39 years, 25 per cent of those with high education were not employed compared with 42 per cent for the women with low education. Further, 12 per cent of the mothers aged 35-39 with high education were not partnered compared with 26 per cent for the mothers with low education (McDonald and Moyle 2019).

PARTNERSHIP STATUS, LIVING ARRANGEMENTS AND HOUSING

Until the end of the 1960s, most births occurred within marriage and so the timing and rate of marriage had an important impact on fertility. From the 1970s, however, marriage has become less of an indicator for births and, in 2017, 41.2 per cent of births to Australian-born women were ex-nuptial births. For overseas-born women, the percentage ex-nuptial births was only 17.4 per cent, producing an overall percentage for Australia of 32.4 per cent which is low by the standards of OECD countries.

Relationships in which the parents live together are still an important consideration in fertility estimation but there is no longer a tight association between the time at which the living-together relationship is formed and when births occur as was the case prior to the 1970s. For cohorts born from 1980 onwards, there was a sharp increase in the age at which the first living-together relationship commenced (McDonald and Reimondos 2013). There was a large shift away from couple relationships in the age group 25-29 between the 2011 and 2016 Censuses for both men and women.

The future incidence of non-heterosexual relationships upon fertility may need to be considered. For women reporting themselves as being in a same-sex relationship at the 2016 Census, Completed Cohort Fertility for women in their 40s was 0.6 births per woman compared with 2.0 for all women. More than two-thirds of women in non-heterosexual relationships had had no births at the end of their childbearing period. Same-sex male couples are likely to have very small numbers of children per couple on average. These effects are already built into current fertility levels. The considerations for fertility projection are the unknown extent to which same-sex relationships could become more numerous in the future and how prominent childbearing will be in those relationships.

CHANGES IN EMPLOYMENT PATTERNS OF AUSTRALIAN WOMEN BY PARITY

The ability to combine work with childbearing is an important theoretical consideration in future trends in fertility (McDonald, 2000a, McDonald, 2000b, McDonald 2013). Australia has implemented a range of policy

approaches in this context. Child care is generally considered to be the most important policy initiative in supporting women's careers but other factors such as child-related payments and maternity leave are relevant (McDonald and Moyle 2010; Thevenon 2011; Rindfuss and Choe 2015).

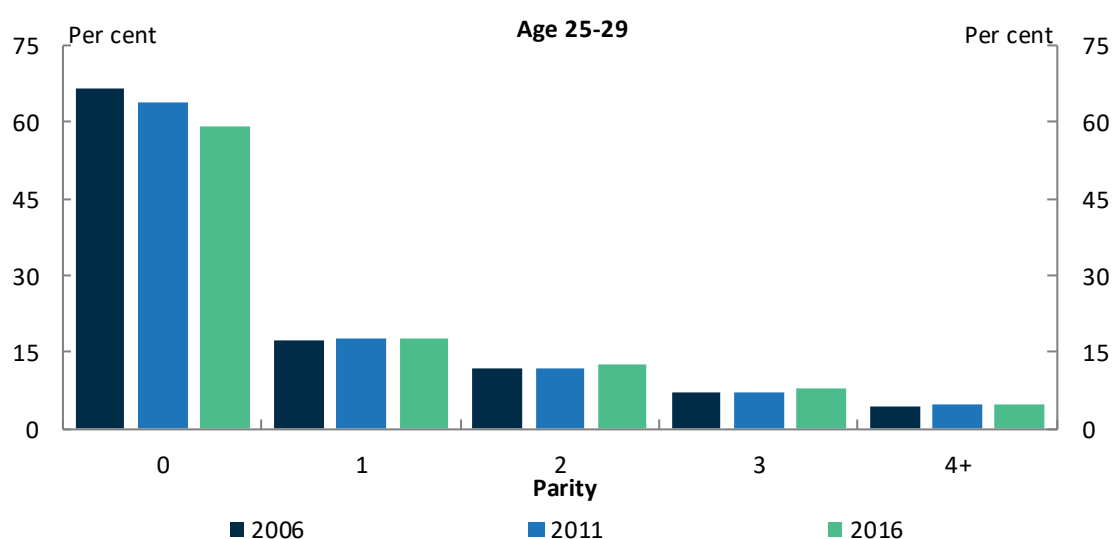
Employment conditions are also important and are considered to be the most important reason for very low fertility in East Asian societies. In Australia, in the 1970s and 1980s, a pattern developed where mothers were able to negotiate their hours of work with their employers on an individual basis (Gray and McDonald 2002). It became commonplace for women to work part-time with their hours adjusted to school hours of primary school children. Other countries like the United Kingdom have a similar pattern but, in many other developed country contexts, full-time work is the norm for mothers (US, Canada, France and Sweden). Unlike in these countries, women in Australia are frequently able to work part-time.

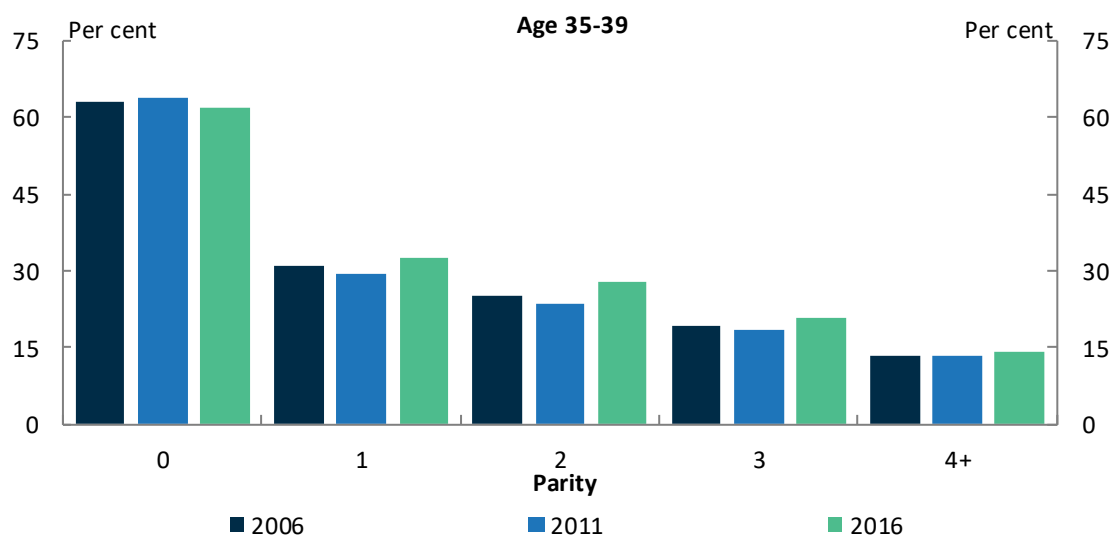
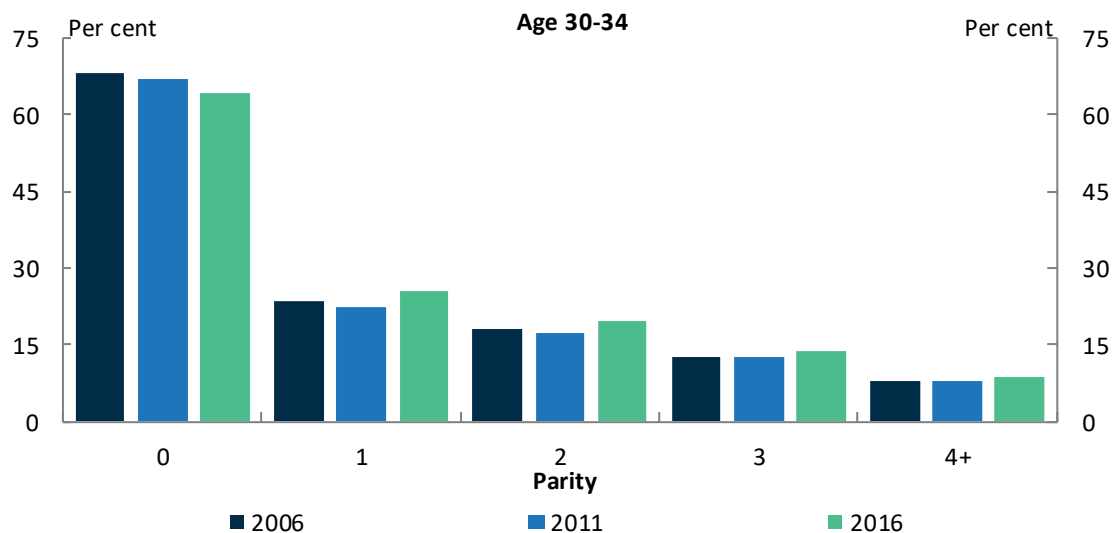
If Australian women considered themselves disadvantaged by having children and working part time (compared with men and childless women), there may be a shift towards the full-time work patterns of other countries. Such a trend would tend to lower fertility especially the proportion of women having three or more children. It is less common in France and Sweden, for example, for women to have three or more children than in Australia, but in both these countries, women are less likely to be childless (McDonald and Moyle 2010).

A government-funded, paid maternity leave scheme was introduced in Australia in 2011 to supplement a pre-existing unpaid scheme which enabled women to take up to two years out of work but with the right to return to the same job. The paid maternity scheme may encourage women with one child to return to work full-time earlier in order to qualify for paid maternity leave for a second child. Potentially, this may reduce the interval between the first and second births producing a tempo effect.

Chart 12 indicates that, across the censuses from 2006 to 2016, there has been remarkably little change in the incidence of full-time work for women in the main childbearing ages, ages 25-34, when parity is taken into account. As expected, full-time work is much more likely if the woman has no children; it is the first child that makes the difference. As parity increases, full-time work becomes less likely, especially between parities two and three. There is a slight indication of increased involvement in full-time work for women with one or two children between 2011 and 2016, but it is too early to say whether this is part of a new trend. Overall, it is likely the proportion of women having three or more children will continue its long historical decline but at a relatively slow rate.

Chart 12. PERCENTAGE OF WOMEN WORKING FULL-TIME BY PARITY AND AGE GROUP, AUSTRALIA, 2006, 2011 AND 2016, AUSTRALIAN CENSUSES





Source: ABS 2017.

AUSTRALIAN FERTILITY IN AN INTERNATIONAL PERSPECTIVE

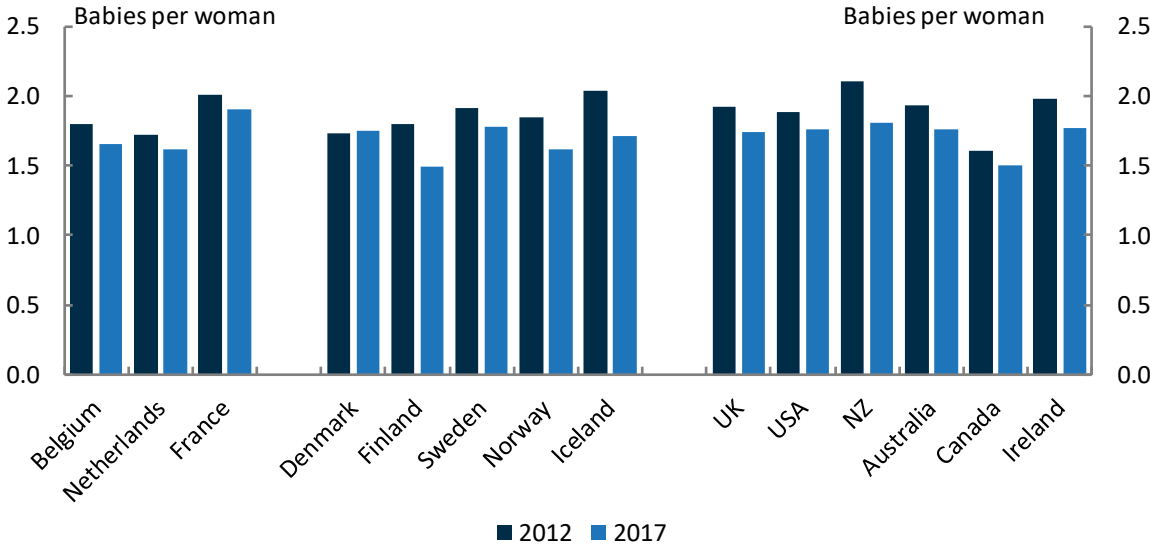
A well-known observation on fertility rates in OECD countries is that there has been a persistent bifurcation between countries with ‘very’ low fertility (under 1.5 births per woman) and those with ‘moderately’ low fertility (between 1.5 and 2.1 births per woman). A feature of this division was that countries were grouped along cultural lines. The very low fertility grouping included all the Southern European countries, all the German-speaking countries and all the wealthy East Asian countries. The moderately low grouping included all the Nordic countries, all the English-speaking countries and all the French-Dutch speaking countries (McDonald 2006). The conventional interpretation of this bifurcation is that the moderately low fertility countries provide higher levels of support to enable women to combine work and family than is the case in the very low fertility countries (McDonald 2006, Greulich et al. 2018).

In recent years, however, fertility has fallen in all the moderately low fertility countries except Denmark and some of the falls have been substantial (Chart 13). For example, between 2012 and 2017, the Total Fertility Rate fell from 1.80 to 1.49 in Finland, from 1.85 to 1.62 in Norway, from 2.04 to 1.71 in Iceland, from 1.92 to 1.74 in the United Kingdom and, in New Zealand, from 2.04 in 2012 to 1.71 in 2018. By 2018, fertility in the US had fallen to 1.73 (US Department of Health and Human Services 2019). At the same time, among the very low

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fertility countries, fertility has remained very low in most but the rate for Germany rose from 1.41 in 2012 to 1.57 in 2017. The stability in this period for Denmark may be because fertility in Denmark fell sharply prior to 2012.

Chart 13. TOTAL FERTILITY RATES, SELECTED COUNTRIES, 2012 AND 2017



Sources: McDonald, P. and Moyle, H. 2019.

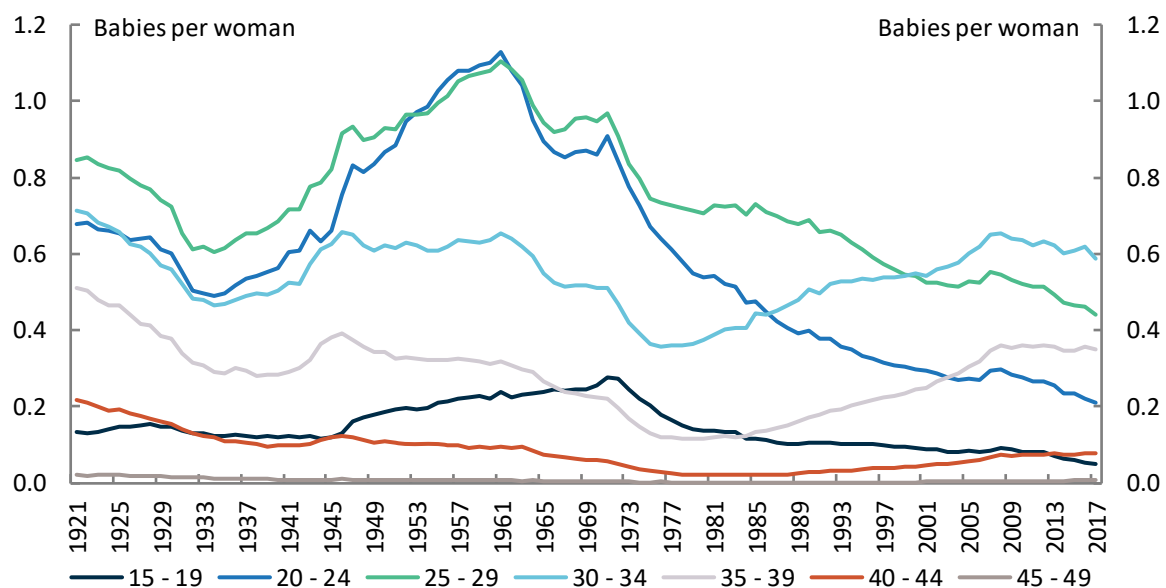
Recent research in Europe and the US concludes that the global financial crisis had a depressing effect upon fertility across many countries (Comolli 2017, Schneider 2017, Matysiak et al. 2018, Seltzer 2019). These studies show that the impacts were greater at younger ages and hence upon those who were most likely to have directly experienced the negative effects of the financial crisis through unemployment and increases in employment uncertainty.

BEHAVIOURAL AND COMPOSITIONAL SUMMARY

FERTILITY FROM 1991 TO 2008

As Chart 7 shows, for every cohort since those born in 1960 cumulated cohort fertility fell relative to the 1960 birth cohort until age 30. From age 31 onwards, recuperation (making up for the delayed births) occurred. This effectively divides fertility into two segments that have different determinants. Up to age 30, fertility is heavily influenced by the timing of the first birth which in turn is affected by cross-sectional shocks such as an economic downturn. From age 31 onwards, fertility is more influenced by the preference for the total number of children by the end of the childbearing ages.

It is useful to consider future fertility up to age 30 in terms of cross-sectional trends while future fertility after age 30 is best considered in terms of the final outcomes for each birth cohort of women. This is the broad approach that has been taken for the projections made in this report, along with compositional changes in the population. Of course, towards the middle of this distribution, around age 30, some women will be delaying while others are recuperating making the projection process more complex.

Chart 14. NUMBER OF BIRTHS PER WOMAN WITHIN FIVE-YEAR AGE BRACKETS, AUSTRALIA 1921 TO 2017

Source: ABS 2019a, ABS 2019b, and ABS 2019c.

Chart 14 displays long-term trends in Age-Specific Fertility Rates. In more recent years, there was a consistent trend throughout the 1990s with fertility falling significantly at ages under 30 and rising, but to a lesser extent than the fall in the twenties, for ages above 30. The net result was a continuous decline in the Total Fertility Rate from 1991 to 2001. Fertility projections made in the early 2000s were based upon the assumption that these trends would continue for all age groups without giving due consideration to the potential for recuperation. The base case in the first Intergenerational Report (Commonwealth of Australia 2002), for example, had fertility falling from 1.75 in 2000 to reach 1.60 births per woman by 2042.

However, as shown in Chart 14, between 2003 and 2008, fertility rates increased strongly for women aged 30 and above, but, counter to the long-term trend since the 1970s, the rates also increased for women in their twenties. Three factors are likely to be involved to produce the results for this period. First, the strong increases at older ages were the result of recuperation following the falls in fertility at younger ages in the 1990s. Second, increases at all ages were probably stimulated by the positive economic outlook during these years increasing confidence among younger people about their job and income prospects. Finally, the family support policies introduced in 2004 potentially added to people's confidence to have children.

Projections made towards the end of this period assumed a continuation of relatively high fertility. The base case in the third Intergenerational Report (Commonwealth of Australia 2010), for example, had fertility remaining constant at 1.90 births per woman.

FERTILITY AFTER 2008

Chart 14 shows that the situation changed again after 2008 with a return of strong falls in fertility at younger ages. Formally establishing causality is beyond the scope of this paper, but a number of factors are likely to be involved here. First, the global financial crisis may have lowered the confidence of younger people in having children early. This would apply in particular to those with low employment and wage prospects as evidenced in the falls in fertility among low educated women. This new pattern of behaviour would have been aided by improved access to the means of fertility control. Reduced government family support for mothers who were not working is likely to have contributed to this lack of confidence in having children. The formation of

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relationships was also delayed in this period and more young people remained at home with their parents. At young ages, there is evidence of a high degree of caution being exercised.

Another factor, by rough estimation, is that as much as 50 per cent of the decline in fertility rates for women in their twenties was due to two compositional changes: the large increase in the component of the population consisting of temporary migrants who have fertility rates close to zero (up to 45 per cent of the 50 per cent) and, in smaller measure because of the long-term nature of the change, the continued shift of women from the low education category to the high education category which involves a massive shift in the age at childbearing.

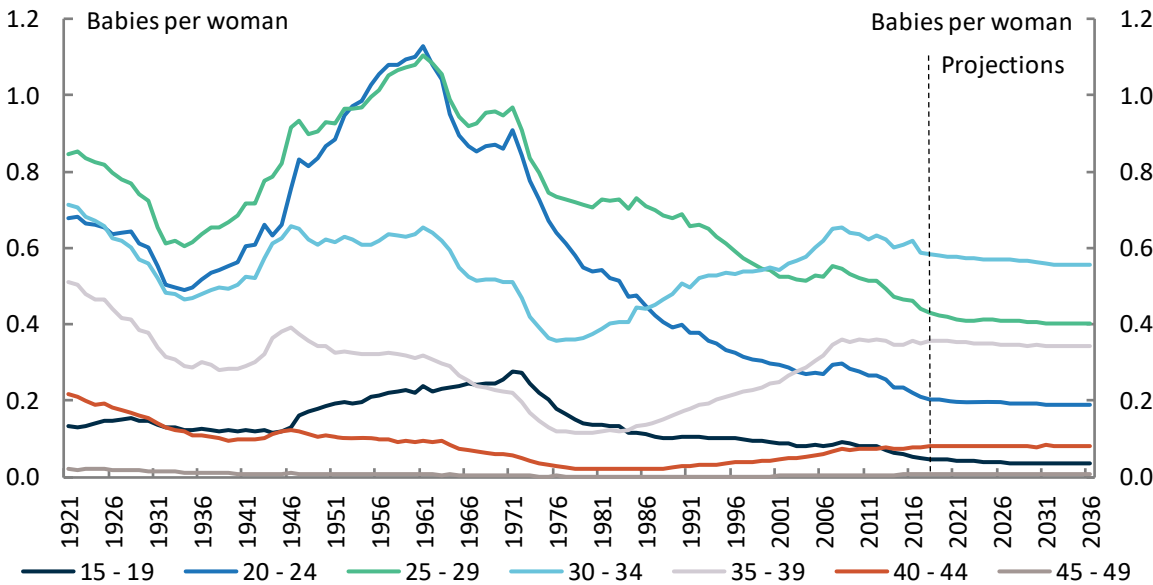
PROJECTIONS OF FUTURE FERTILITY

Projections of future fertility are informed by the analysis and trends discussed in the earlier sections. The main challenge for projecting the future fertility rate is in judging whether and to what extent the observed trends in the age-specific fertility rates will continue. Overall, the future total fertility rate is comprised of the following assumptions applied to age-specific fertility (see Chart 15).

- Teenage fertility is expected to continue to fall as women remain in education longer, as attitudes towards early childbearing become even less positive and as access to family planning and birth control increases.
- Fertility rates for women in their 20s will continue to fall, because the long-term shift in the educational composition of women in their 20s is likely to continue, meaning that the share of less-well educated women continues to fall and then stabilise.
- Fertility rates for women in their late 30s appear to have stabilised, and are not expected to change in future.
- There will be ongoing small increases in the fertility rates of women in their 40s as improvements to technology and healthy living help to extend the age at which delayed births can be recuperated.

Taken together, this means that Australia’s fertility rates are not expected to return to formerly high levels, but instead are expected to fall to and then stabilise at 1.62 babies per woman by 2032.

Chart 15. NUMBER OF BIRTHS PER WOMAN WITHIN FIVE-YEAR AGE BRACKETS, AUSTRALIA 1921 TO 2035



Source: ABS 2019a, ABS 2019b, ABS 2019c, and author’s projections.

THREE LONG-TERM SCENARIOS FOR FUTURE FERTILITY

Given the uncertainty around future fertility, this report provides three projections of future fertility rates, with the medium projection set out in detail above considered the most likely. In all three scenarios, fertility rates are assumed to be the same from 2018 to 2022 inclusive before diverging. It is assumed that fertility will fall to an 'ultimate' level just after 2030 in all three scenarios. The logic here is that if fertility is changing noticeably, the change will move towards a new longer-term stable pattern relatively quickly.

The three pathways for the Total Fertility Rate are shown in Chart 16. The High projection has the fertility rate recovering after a fall but remaining a little below its 2017 level by 2032. The rise is initially relatively fast. The logic is that this is a relatively strong recuperation at later ages for births that have been delayed recently by women aged less than 30. From 2026, however, the rise is more moderate.

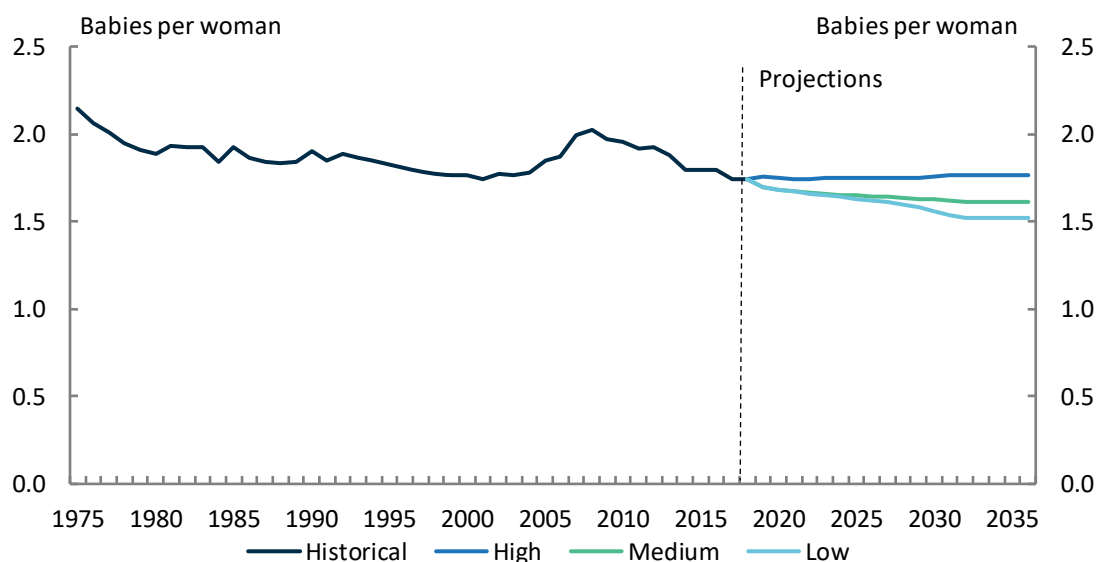
The Medium projection is based on the notion that the fall in fertility is long-lasting and recuperation is modified downwards as argued above, but relatively modestly. The decline from 2023 is regular with fertility reaching a low point of 1.62 by 2032.

The Low projection has fertility trending downwards more strongly than the Medium projection to 2028 and then even more strongly after 2028. This is an assumption that has fertility falling to 1.50 by 2033.

In all projections, the age pattern shifts to older ages with the strength of the shift increasing from the High projection to the Low projection as shown in Chart 16. It should be noted, however, that the age pattern of fertility makes little difference to the number of predicted births because the differences between the various patterns are relatively small and because the numbers of women at each age do not vary very much. It is the assumed Total Fertility Rate that matters.

For all three projections, fertility is assumed to remain constant in the years following the end points of 2032 (High and Medium) and 2033 (Low).

Chart 16. TOTAL FERTILITY RATE, THREE PROJECTIONS, 2018 TO 2035



Source: ABS 2019b and author's projections.

THE NEAR-TERM IMPACT OF COVID-19 — TWO FURTHER SCENARIOS

The analysis in the preceding sections of this report was finalised prior to the outbreak of the Coronavirus (COVID-19) in Australia. This section has been prepared subsequently to explore the near-term impact of COVID-19 on future fertility. All scenarios are based on the medium scenario in the previous section (Chart 16), and the 'likely COVID-19' scenario is expanded to provide future fertility projections at the state and territory level.

The effects of COVID-19 on the projections for Australia are implemented using assumed plausible, cross-sectional scenarios. The COVID-19 experience is totally unique and so it is not possible to estimate likely impacts using a model — we can only make plausible suppositions. The impact of COVID-19 is expected to dissipate over time, with total fertility rates converging back to 1.62 babies per woman from 2032 onward as in the medium scenario above.

The data source used for the analysis and projections in this section are the single year of age, age-specific fertility rates by year of occurrence for financial years from 1981-82 to 2017-18 for Australia and its states and territories supplied by the Centre for Population (2020). These fertility rates are calculated using a custom data request from the Australian Bureau of Statistics from *Australian Demographic Statistics* (ABS 2020). The analysis below refers to calendar years. In the final calculation, these results are split into financial years.

COVID-19 AND FERTILITY

The outbreak of COVID-19, as well as the measures taken to limit its spread, is expected to affect fertility by producing uncertainty among young people that leads to them deferring when they have children. Some households are also likely to defer children where one or both parents lose their eligibility for parental leave payments through COVID-related unemployment.

The effects of past episodes of economic downturn or weakness on the Australian Total Fertility Rate are shown in Table 2 below. The impact of COVID-19 is likely to be closer to the 1930s in its effects upon employment and is therefore likely to generate more insecurity than in 1991 and 2009. The effect on fertility of the economic downturn in the early 1980s was even smaller. However, the sizeable falls in fertility in the 1930s, 1960s and 1970s were from higher absolute levels of the Total Fertility Rate than have been observed in recent years, so the overall fall as a result of COVID-19 may be somewhat smaller. Cohort trends can complicate the interpretation.

Table 2. ABSOLUTE FALLS IN THE TOTAL FERTILITY RATE (BIRTHS PER WOMAN) IN THE GIVEN YEAR COMPARED WITH THE PREVIOUS YEAR, AUSTRALIA, YEARS OF ECONOMIC DOWNTURNS

YEAR	ABSOLUTE FALL IN TOTAL FERTILITY RATE FROM THE PREVIOUS YEAR
1929	0.13 births per woman
1930	0.05
1931	0.23
1932	0.17
1962	0.10
1963	0.10
1964	0.18
1965	0.19
1966	0.10
1972	0.20
1973	0.24
1974	0.10
1975	0.17
1976	0.09
1983	0.03
1991	0.05
2009	0.07

Source: ABS2019a.

DELAY AND RECUPERATION

Fertility behaviour is best examined using the fertility rates of women in the same birth cohort, both because cohorts change their behaviour historically (eg. through variations in education and employment across cohorts) and because members of the same cohort experience any cross-sectional shock at the same age.

Shocks to fertility due primarily to economic or pandemic shocks are cross-sectional in nature but have a lasting impact on cohort fertility. For population projections, however, it is cross-sectional fertility rates that are required.

For Australian birth cohorts over 40 years or more, two aspects of fertility behaviour are most relevant — delay and recuperation. Delay means that each successive birth cohort delays its births to ages later than the earlier cohorts. The principal mechanism is delay of the first birth. McDonald and Kippen (2011) have shown that, beyond the first birth, Australian women tend to maintain the same rates of birth in a three-parameter model that is by age, parity and years since the previous birth. Compared with parity and years since the previous birth, age is a very poor predictor of whether or not a woman gives birth.

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Recuperation is the extent to which delayed births are subsequently made up. Examination of cohort trends for Australia shows that, relative to a fixed, standard earlier birth cohort, cumulated cohort fertility falls to around exact age 31 (the sum of single year of age cohort fertility rates for ages 15-30) and then turns upwards (recuperation), as shown in Chart 7.

As further delay occurs, the rate of recuperation increases but not to 100 per cent (or the level where all of the births that were delayed are made up). The effect is that cohort completed fertility by age 50 falls across time. These processes can be observed using two indices:

- Delay: Cohort Completed Fertility to Exact Age 31 Relative to Cohort Completed Fertility for a Standard Earlier Birth Cohort, in this case, the 1966-67 birth cohort.
- Recuperation: The Ratio of Cohort Completed Fertility at Exact Age 41 to Cohort Completed Fertility at Exact Age 31 for the Same Birth Cohort.

It is convenient to use age 41 rather than age 50 for the recuperation index because the additional fertility at ages 41 to 49 is very small (1-2 per cent of the total), since almost all recuperation occurs at ages 31 to 40. Using the earlier age of 41 enables examination of past trends for more real cohorts.

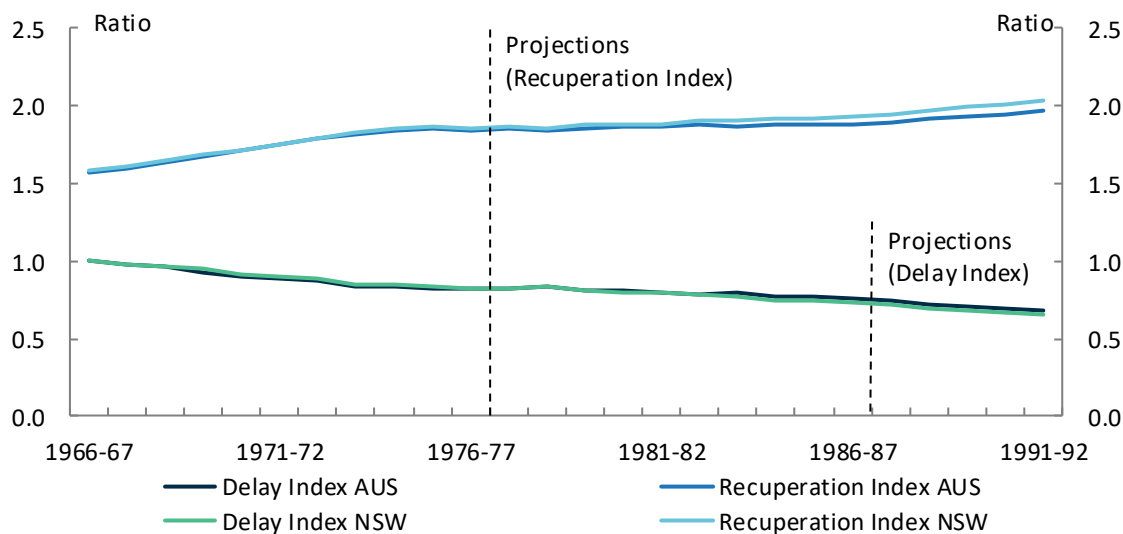
These indices are shown for Australia and New South Wales in Chart 17 — both historical and as projected in the no COVID scenario. The New South Wales indices are exceptionally close to the Australian indices despite fertility being at a different level. This suggests that cohorts in New South Wales were changing their behaviour simultaneously with cohorts across Australia. Based on recorded data, the Delay Index shows a steady decline for cohorts from 1966-67 to 1973-74. The index then flattens for about four years before starting to fall again. The cohorts where the levelling off occurred were in the peak child-bearing ages during Australia's mini baby-boom (about 2006-2011).

Again, based on recorded data, the Recuperation Index (Chart 17) rises across time before levelling off towards the end of the years shown. Again, the levelling off occurs for the cohorts that experienced the boom effect so they did not need to recuperate quite so much. But, once more, the New South Wales and Australian trends are very similar.

Chart 17 shows the trends of both indices as recorded and as projected in the absence of COVID. In the projections, the Delay Index continues to fall and the Recuperation Index continues to rise. The similarity in trend for New South Wales and Australia in the projections is achieved by modelling the NSW change across time on the Australian change.

The same comparisons with Australia are shown graphically at the end of this addendum for all of the other states and territories. While the levels may differ a little, especially for recuperation, the trends for each of the states and territories in recent years are the same as for Australia. This provides confidence for the use of the simple ratio approach to calculating the projections of state and territory age-specific fertility rates from the trend in the projected Australian rates.

Chart 17. DELAY AND RECUPERATION INDICES AS RECORDED AND PROJECTED, NEW SOUTH WALES AND AUSTRALIA, 1966-67 TO 1991-92 BIRTH COHORTS



NOTE: The delay index is the ratio of cohort completed fertility to exact age 31 relative to cohort completed fertility for the 1966-67 birth cohort. The recuperation index is the ratio of cohort completed fertility at exact age 41 to cohort completed fertility at exact age 31 for the same birth cohort.

Source: ABS 2019b, ABS 2020, Centre for Population 2020, and author's projections.

TWO COVID-19 IMPACT SCENARIOS

Following the outbreak of COVID-19, two additional future fertility scenarios are projected, as shown in Chart 18. The **'no COVID' scenario** is the previously prepared 'medium' scenario, modified slightly in its earlier years to comply more closely to the Delay-Recuperation model described above. This modification also takes into account the ABS preliminary total fertility rates by year of registration for 2018-19. These 2018-19 rates show, for every state and territory except Victoria, a slowing of the rate of decline that had applied in the previous three years. The near-final figures to be published in September 2020 are likely to show a strong correction to the Victorian total fertility rate and only a small decline between 2017-18 and 2018-19 for Australia.

It is assumed that COVID-19 has no effect on births in 2020, as almost all babies born in 2020 will be from pre-COVID-19 pregnancies. Instead, the full impact of COVID-19 on fertility is assumed to be felt in 2021 in two new scenarios. In the **'likely COVID' scenario**, the total fertility rate is assumed to be 0.15 babies per woman lower in 2021, and around 80 per cent of the babies that are deferred are assumed to be recuperated by 2032. In the **'severe COVID' scenario**, the total fertility rate is assumed to be 0.25 babies per woman lower in 2021, and around 70 per cent of the babies that are deferred are assumed to be recuperated by 2032.

The births deferred are assumed to be mainly first births but some deferral is applied also to second births partly because of parental leave effects on household decisions to have another child. It is assumed in the scenarios that second births are less likely to be made up than first births.

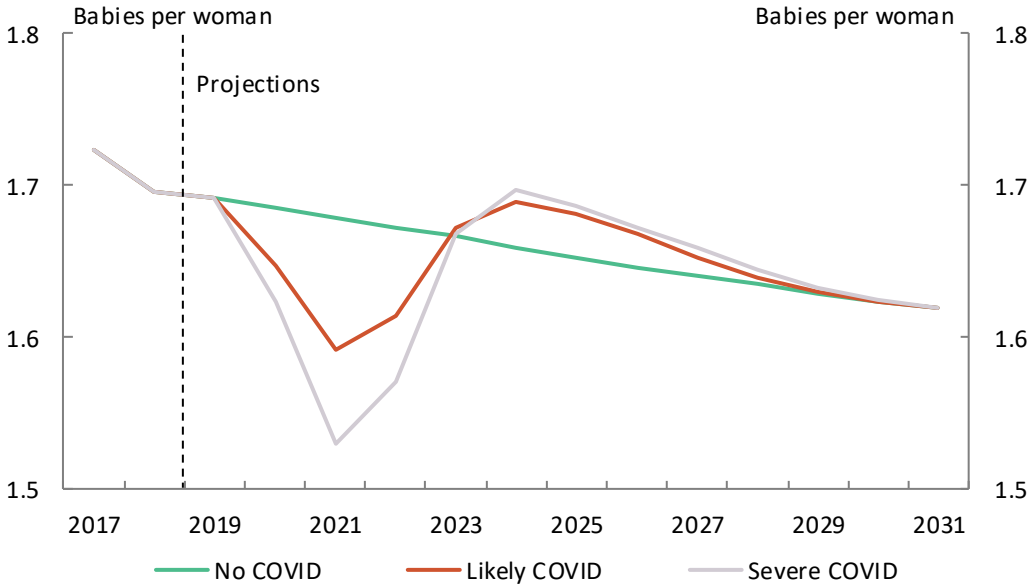
Deferrals of births are assumed to take place at ages 21 to 40 and that fertility rates at ages 15-20 and at ages 41 and over are not affected by COVID-19. The logic is that decision-making about births at young and old ages is 'non-standard'; however, this distinction is not important because fertility at ages 15-20 and at ages 41 and over is very low and any adjustment that was made would be trivial.

Based on the distributions by age of first and second births (in relative terms), two-thirds of the fall in total fertility rate in 2021 (the first full year of impact) is made at ages 21-30 and one third at ages 31-40.

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COVID-19 effects on deferral of births are assumed to continue at increasingly lower levels for the years 2022 to 2025 (Likely COVID) and 2022 to 2026 (Severe COVID). With each additional year, proportionally more of the deferral (compared with 2021) is applied to age group 31-40 than to age group 21-30. Births deferred are assumed to recuperate over the years, 2022 to 2028 (Likely COVID) and 2022 to 2030 (Severe COVID). The size of the recuperation is highest in the first year after the deferral and falls across the subsequent years.

Chart 18. TOTAL FERTILITY RATES, SHORT-TERM PROJECTIONS, 2017 TO 2031



Source: ABS 2020, Centre for Population 2020, and author’s projections.

PROJECTIONS OF FUTURE FERTILITY BY STATE AND TERRITORY

This section expands the central scenario — the ‘likely COVID’ scenario above — into projections for each of the states and territories. State and territory future fertility rates are assumed to be consistent with those for Australia, assuming that the relative changes over time for Australia also apply to each of the States and Territories.

For example, if in the Australian projections, fertility at age 25 in 2018-19 was 0.985 times fertility at age 25 in 2017-18, this same ratio (0.985) is applied to fertility at age 25 in 2017-18 in each state and territory, to estimate fertility in that same state or territory at age 25 in 2018-19. This assumption has been applied to each of the three new projections including those that include potential effects of COVID-19.

The implication, therefore, is that COVID-19 will have the same relative impact on fertility rates in every state and territory as it does for Australia as a whole. This constant relativity across states and territories is supported by the fact that COVID-19 effects are assumed to derive from the uncertainty and activity restrictions induced by COVID-19 rather than directly by the severity of the disease itself.

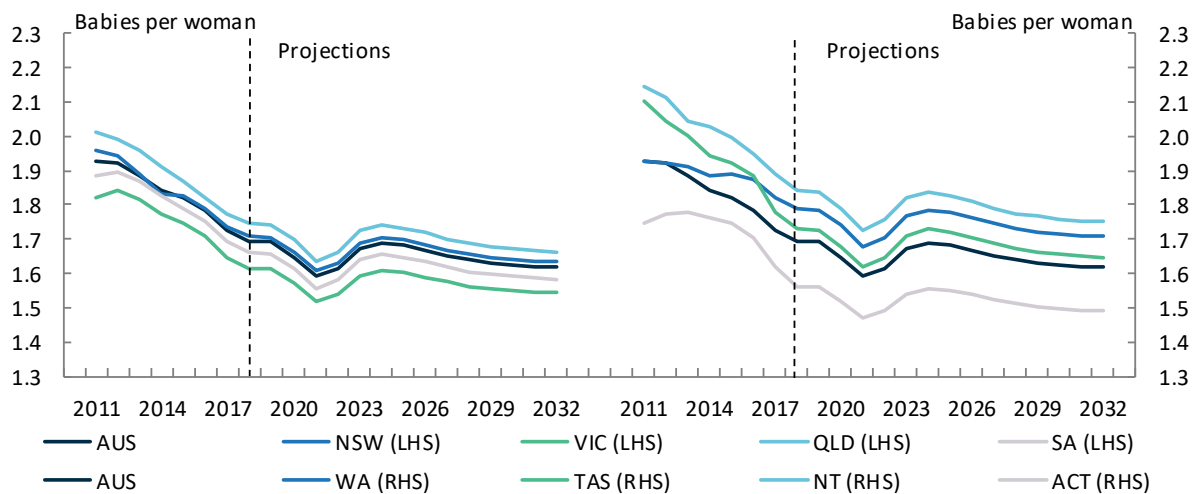
This ensures consistency between the projections for Australia and the projections for the states and territories. The discussion of the Delay-Recuperation model above suggests that this approach is reliable. The trends in Total Fertility Rates in recent years in the nine jurisdictions also tend to support this approach (Chart 20). While there are some small fluctuations from year to year, across time, each state and territory tends to retain its relative difference to the rates for Australia. The projected fertility rates for the states and territories are shown in Table 3 and in Chart 19 below.

Table 3. TOTAL FERTILITY RATES BY JURISDICTION, 'LIKELY COVID' SCENARIO, 2018 TO 2032

YEAR	AUS	NSW	VIC	QLD	SA	WA	TAS	NT	ACT
2018	1.70	1.71	1.62	1.75	1.66	1.79	1.73	1.84	1.56
2019	1.69	1.71	1.61	1.74	1.66	1.79	1.73	1.84	1.56
2020	1.65	1.66	1.57	1.70	1.61	1.74	1.68	1.79	1.52
2021	1.59	1.61	1.52	1.64	1.56	1.68	1.62	1.73	1.47
2022	1.61	1.63	1.54	1.66	1.58	1.71	1.65	1.76	1.49
2023	1.67	1.69	1.59	1.72	1.64	1.77	1.71	1.82	1.54
2024	1.69	1.70	1.61	1.74	1.66	1.79	1.73	1.84	1.55
2025	1.68	1.70	1.60	1.73	1.65	1.78	1.72	1.83	1.55
2026	1.67	1.68	1.59	1.72	1.63	1.76	1.70	1.81	1.54
2027	1.65	1.67	1.58	1.70	1.62	1.75	1.69	1.79	1.52
2028	1.64	1.65	1.56	1.69	1.61	1.73	1.67	1.78	1.51
2029	1.63	1.64	1.55	1.68	1.60	1.72	1.66	1.77	1.50
2030	1.62	1.64	1.55	1.67	1.59	1.72	1.66	1.76	1.50
2031	1.62	1.64	1.54	1.67	1.59	1.71	1.65	1.75	1.49
2032	1.62	1.63	1.54	1.66	1.58	1.71	1.65	1.75	1.49

Source: ABS 2020, Centre for Population 2020, and author's projections.

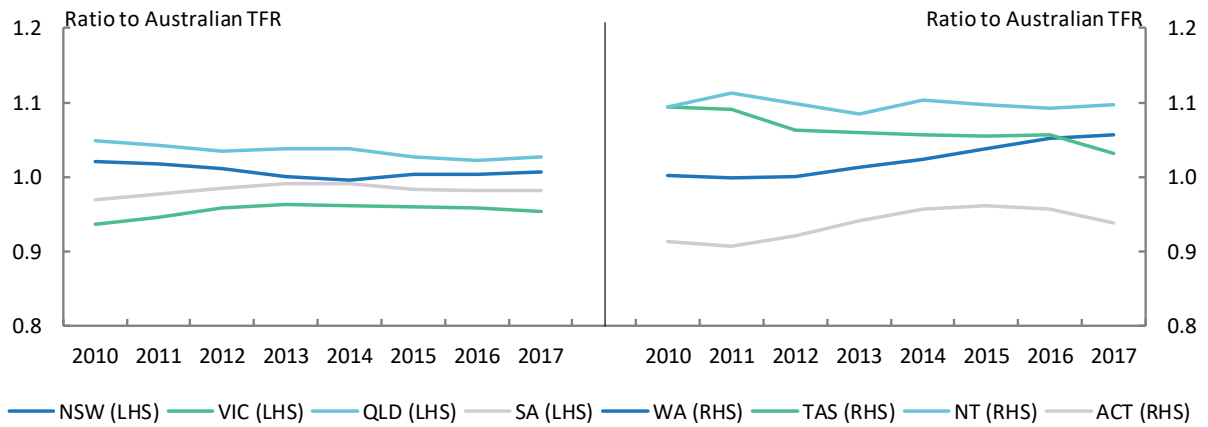
Chart 19. TOTAL FERTILITY RATES BY JURISDICTION, 'LIKELY COVID' SCENARIO, 2011 TO 2032



Source: ABS 2020, Centre for Population 2020, and author's projections.

The approach of using the ratio with Australia to make projections for the states and territories is potentially unreliable if the age-specific rates in the year before the projection, that is, 2017-18, are unstable due to small numbers. Because of this, preliminary to the projections, the 2017-18 recorded age specific rates for Tasmania (Chart 25), the Northern Territory (Chart 26) and the Australian Capital Territory (Chart 27) were smoothed while maintaining the same Total Fertility Rate.

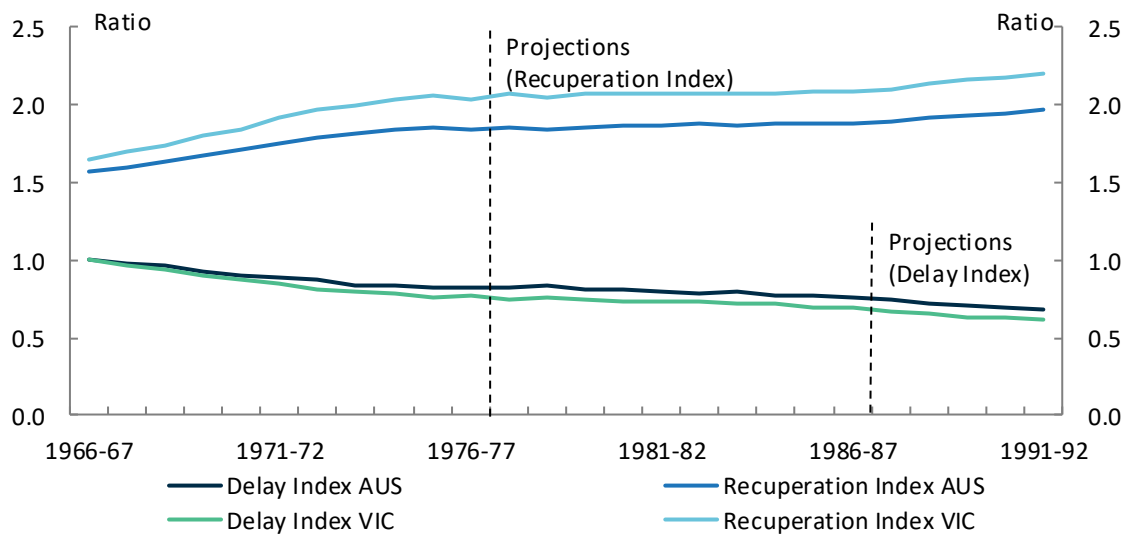
Chart 20. RATIO OF SUB-NATIONAL TOTAL FERTILITY RATES TO THE AUSTRALIAN TOTAL FERTILITY RATE



Source: ABS 2020 and Centre for Population 2020.

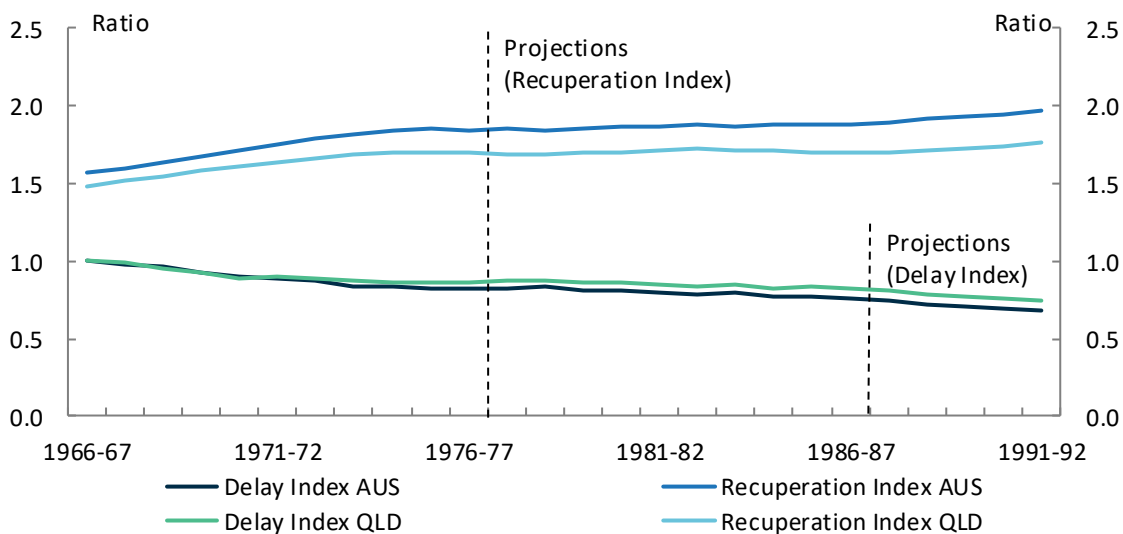
Chart 17 showed the delay and recuperation indices for New South Wales and for Australia. Chart 21 through to Chart 27 show the same thing for all of the other states and territories in comparison to Australia. For all of the charts, the delay index is the ratio of cohort completed fertility to exact age 31 relative to cohort completed fertility for the 1966-67 birth cohort. The recuperation index is the ratio of cohort completed fertility at exact age 41 to cohort completed fertility at exact age 31 for the same birth cohort.

Chart 21. DELAY AND RECUPERATION INDICES AS RECORDED AND PROJECTED, VICTORIA AND AUSTRALIA, 1966-67 TO 1991-92 BIRTH COHORTS



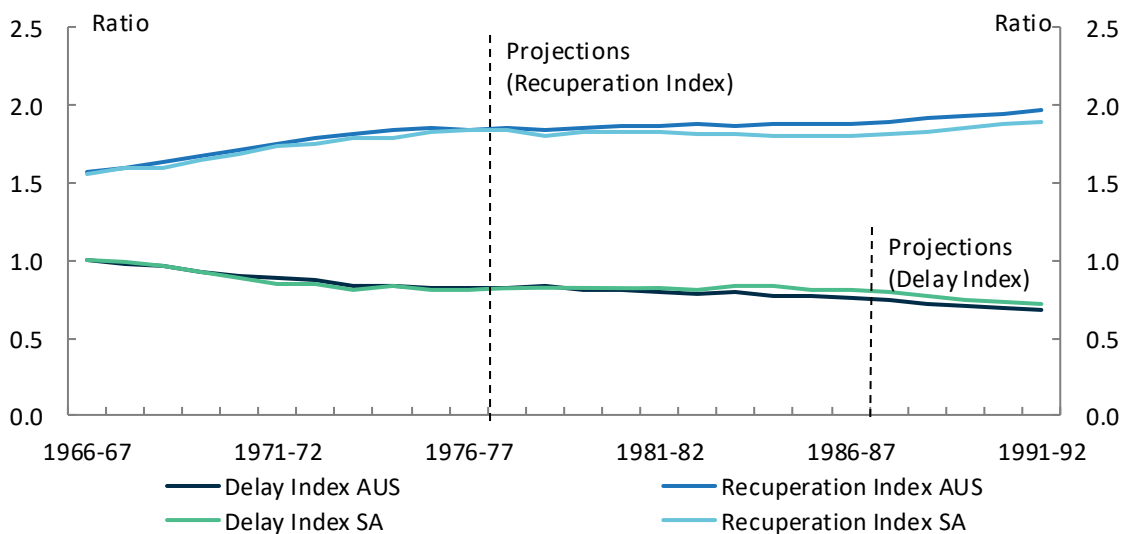
Source: ABS 2019b, ABS 2020, Centre for Population 2020, and author's projections.

Chart 22. DELAY AND RECUPERATION INDICES AS RECORDED AND PROJECTED, QUEENSLAND AND AUSTRALIA, 1966-67 TO 1991-92 BIRTH COHORTS



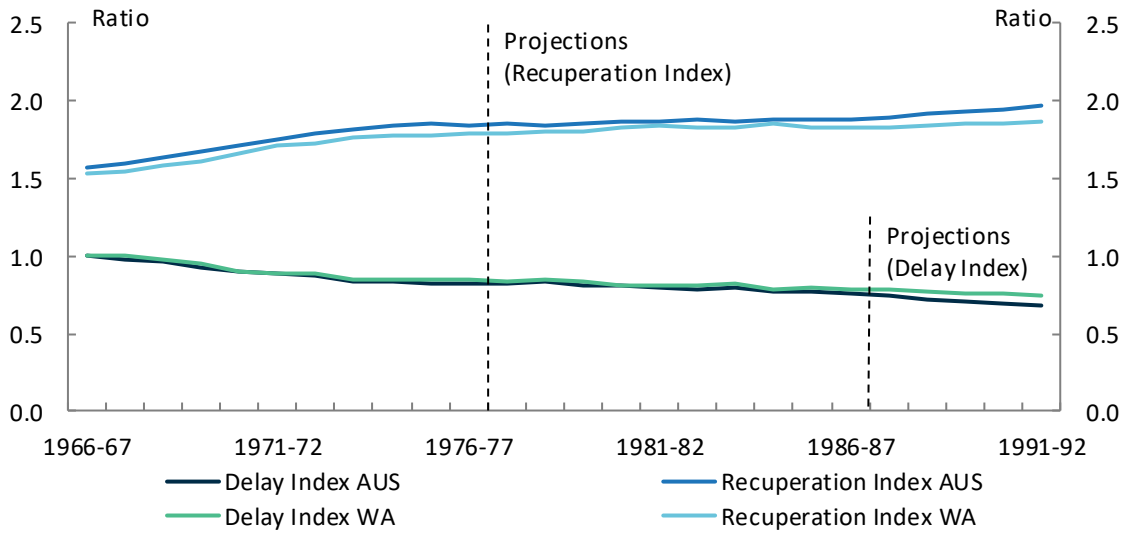
Source: ABS 2019b, ABS 2020, Centre for Population 2020, and author's projections.

Chart 23. DELAY AND RECUPERATION INDICES AS RECORDED AND PROJECTED, SOUTH AUSTRALIA AND AUSTRALIA, 1966-67 TO 1991-92 BIRTH COHORTS



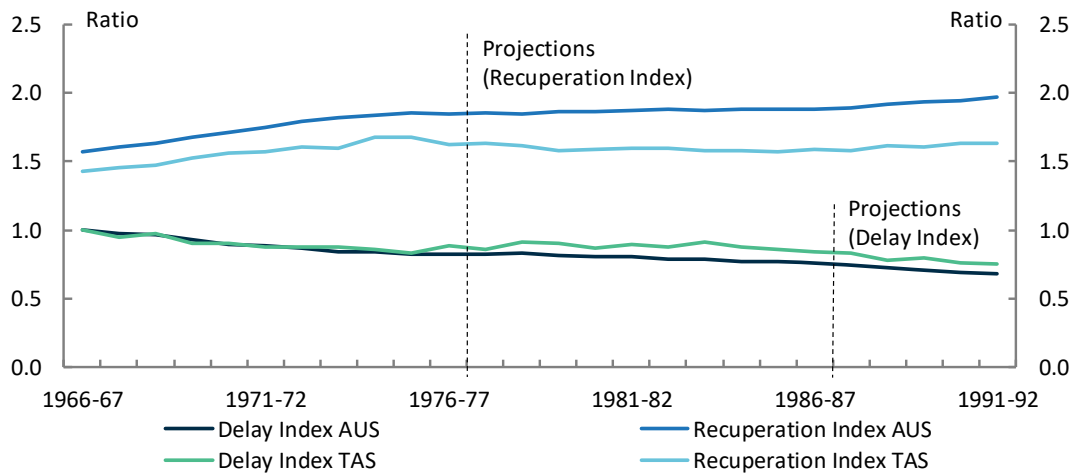
Source: ABS 2019b, ABS 2020, Centre for Population 2020, and author's projections.

Chart 24. DELAY AND RECUPERATION INDICES AS RECORDED AND PROJECTED, WESTERN AUSTRALIA AND AUSTRALIA, 1966-67 TO 1991-92 BIRTH COHORTS



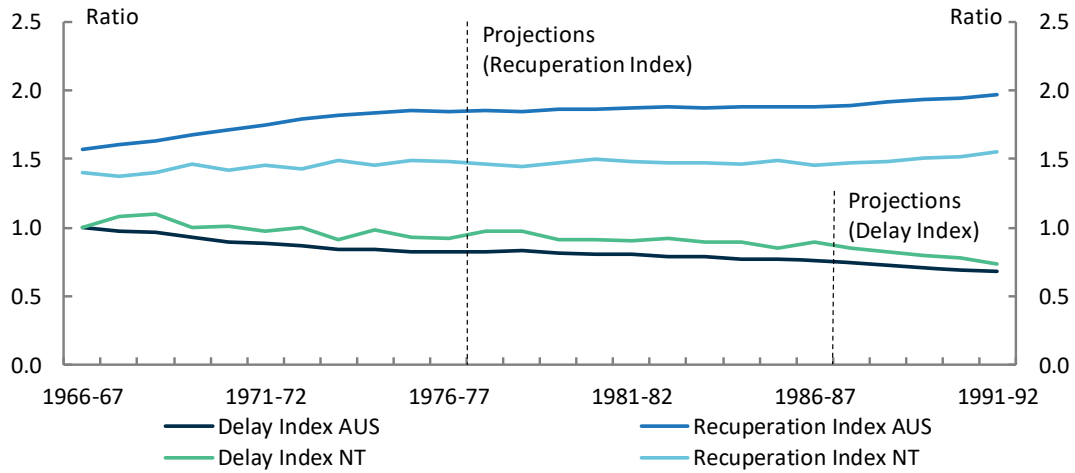
Source: ABS 2019b, ABS 2020, Centre for Population 2020, and author's projections.

Chart 25. DELAY AND RECUPERATION INDICES AS RECORDED AND PROJECTED, TASMANIA, 1966-67 TO 1991-92 BIRTH COHORTS



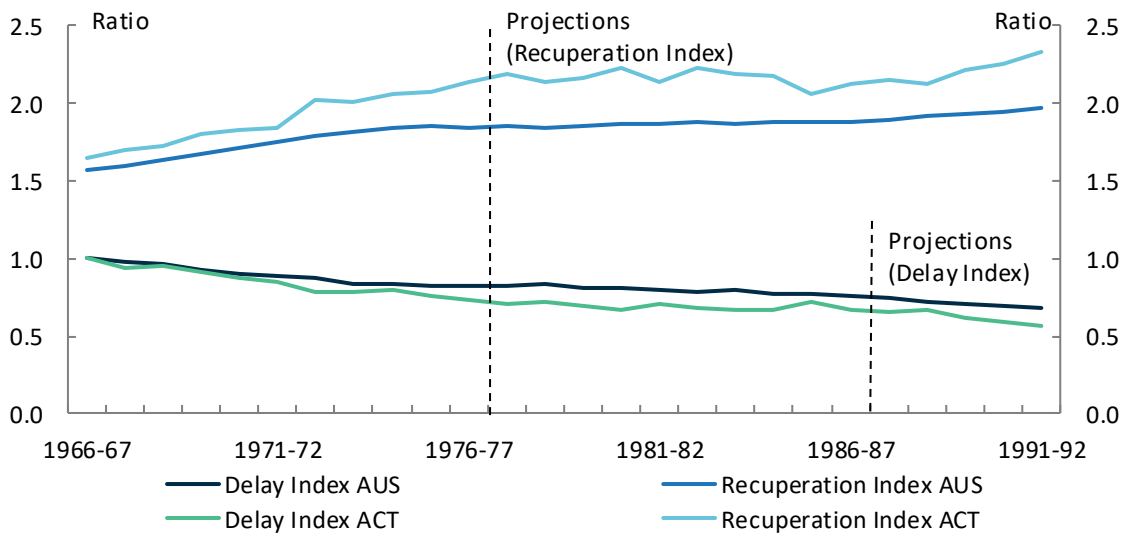
Source: ABS 2019b, ABS 2020, Centre for Population 2020, and author's projections.

Chart 26. DELAY AND RECUPERATION INDICES AS RECORDED AND PROJECTED, NORTHERN TERRITORY AND AUSTRALIA, 1966-67 TO 1991-92 BIRTH COHORTS



Source: ABS 2019b, ABS 2020, Centre for Population 2020, and author's projections.

Chart 27. DELAY AND RECUPERATION INDICES AS RECORDED AND PROJECTED, AUSTRALIAN CAPITAL TERRITORY AND AUSTRALIA, 1966-67 TO 1991-92 BIRTH COHORTS



Source: ABS 2019b, ABS 2020, Centre for Population 2020, and author's projections.

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