Delay of First Births in Australia, 1981-2001: Its Nature and Its Impact Upon the Timing and Incidence of Second Births

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Introduction

Since the work of Norman Ryder on demographic translation in the 1950s and 1960s (Ryder 1956, 1959, 1964), it has been well understood that trends in the Period Total Fertility Rate (PTFR) are affected not only by the level or quantum of fertility but also by the timing or tempo of births. When there is a shift to an earlier age at first birth, the PTFR will rise even when, across lifetimes, there is no change in the Completed Cohort Fertility Rate (CCFR). Studies have shown that the post-war baby boom was largely a result of a shift of childbearing to earlier ages (Ryder 1990; Bongaarts 1999). In recent times, the reverse phenomenon has applied: the age at first birth has risen substantially in many countries and the PTFR has fallen, often to exceptionally low levels.

A response to this situation has been to define new summary measures of fertility, various forms of what has been called the tempo-adjusted Total Fertility Rate (Bongaarts and Feeney 1998; Kohler and Ortega 2002; Zeng and Land 2002; Sobotka, Lutz and Philipov 2005; Rodríguez 2006). These measures use a range of parameterised approaches, but are mathematical in their concept as distinct from behavioural. Given the importance of the issue, there has been surprisingly little research into specific behavioural changes associated with changes in the tempo of fertility.

In this paper, we consider tempo effects that derive from postponement of births. There is little discussion in the literature about whether tempo effects derive from a postponement by cohorts of the first birth, of the second birth or of higher order births. However, most writings that claim that a tempo effect may be in operation are associated with a shift in the timing of the first birth, no doubt because increase in age at first birth has been the experience in advanced countries in recent decades.

Age specific rates of first birth

The first question to examine is what happens to cohort age-specific rates of first birth during a tempo effect initially assuming that there is no effect on the cohort's quantum of fertility.

The simplest form

The simplest form of tempo effect upon age at first birth would be that the age distribution of rates of first births for cohorts shifts to the right (rates are lower at younger ages but higher at older ages) and the ultimate quantum of first births does not change. In very simple terms, the rate of first birth for Cohort C at age A becomes the rate of first birth for Cohort C+t at age A+k where k is some constant. It may also be the case that successive cohorts beginning their fertility have increasingly larger and then slower delays (k is not a constant but a function of t) but the distribution of first births remains the same. Thus we would observe upward movements in the mean age at first birth that were potentially variable across cohorts but measures of the distribution (spread) of first births would remain the same. In this form, the tempo effect could be called a pure cohort effect.

The first complication

In the simplest form, behaviour in each cohort is mirrored fully in the next cohort but at a higher age. The first complication to this scenario is that the determinants of increase in age at first birth and their behavioural responses are cross-sectional, not cohort-based. This is very likely to be the case. A cohort just about to begin its fertility potentially will experience the impacts of the change across all of its fertility (or at least until there is some new cross-sectional change). However, a cohort that is five years older cannot delay the births that it already has had but the delay phenomenon may still apply to the cohort's subsequent fertility. The simplest form that can apply to this older cohort is that the distribution of first births shifts to the right as in the simplest example given above but only for ages above the cohort's age when the cross-sectional effect occurs. This could be described as a pure cross-sectional effect that affects different cohorts simultaneously and leads to delay of cohort fertility from the age of the cohort at the time of the onset of the cross-sectional effect.

The second complication

Responses to the cross-sectional delay-determining factors may be different for cohorts that have already commenced their childbearing. On one hand, the impact may be smaller because the older cohorts have already achieved the goals that are deterring the younger cohorts from having births (education, a good job, home ownership, money in the bank). In this case, the age distribution of first births for cohorts would narrow. On the other hand, the effect may be larger at older ages because those more inclined to have births early have already had their births (selectivity) leaving those who are more concerned about the timing of births yet to have their first birth. In this case, the age distribution of first births for cohorts would widen.

The third complication

Within each cohort, there may be differential responses to the factors influencing the timing of the first birth. Some members of the cohort may delay more than others. This would mean that the distribution of age at first birth would alter. In particular, the specific determinants of teenage births may be more powerful than the general determinants of delay of the first birth. In this case, teenage birth rates may remain much the same while first births at older ages are delayed. In this case, the distribution of age at first birth for a cohort would widen and a teenage 'hump' may appear in the cohort distribution of age at first birth.

The fourth complication

The fourth complication is that before we have time to observe the effects of a set of cross-sectional factors that influence the timing of births, those cross-sectional factors change again. This is the real world of high complexity. However, in the past three decades, most advanced countries have experienced a very long-run upward movement in the age at first birth and, as a result, this is an ideal period in which to examine the form of and the effects of changes in the timing of the first births.

The quantum of first births

Finally, the all-important question is whether postponement of first births for a cohort leads to a change in the quantum of first births for a cohort. The likely way that this would happen is that, at older ages, for physiological or behavioural reasons, rates of first birth may not rise as much as is required to maintain the quantum of fertility for the cohort. In this case, the distribution of age at first birth would narrow while the mean age rises.

The distribution of second births by interval from the first birth

Our preliminary investigations suggest that the essential demographic determinant of the second birth is not age but the length of the interval since the first birth (McDonald and Kippen 2007). So, the question becomes, what happens to the interval between the first and the second birth for a cohort when the first birth is delayed.

The simplest form

The simplest response to postponement of the first birth is that there is no change in the distribution of the interval between the first birth and the second birth. This would be the case if postponement is related entirely to the commencement of childbearing. By age, the distribution of second births would shift to the right mirroring the shift to the right in age at first birth.

The first complication

The distribution of the interval to the second birth may change but uniformly by age at first birth. The distribution may shorten because, irrespective of their age at first birth, women may want to ‘catch up’ or do not want their age at second birth to be as a late as it would otherwise be. Alternatively, the distribution of the timing of the second birth may widen because the postponement effects also serve to postpone second births.

The second complication

The distribution of the interval to the second birth may change differentially according to the age at first birth. Typically, after the postponement of the first birth, those who have their first birth at a relatively late age may have their second birth faster because of their concern that having the second birth at a relatively old age may involve difficulties in relation to physiology or life pathways. In this case, the distribution of intervals to the second birth would tend to narrow.

The quantum of second births

Of course, the overall quantum of second births is affected by a fall in the quantum of first births but, given that a first birth has occurred, is the quantum of second births affected by changes in the timing and/or quantum of the first birth? Most simply, the quantum of second births may fall because women run out of time to have the second birth relative to their physiology or planned life pathways. On the other hand, in relation to the quantum of first births, there may be selectivity in that those who do not have a first birth may be selective of those that would not previously have had a second birth. In this case, the quantum of second births among those that have had a first birth may rise.

Third and higher order births

The possibilities in relation to third and higher order births can be considered in the same terms as the second birth with the likelihood that, as parity progresses, the possibility for the complications to occur increases. Third and higher order births are not considered in this paper in its current version.

This study

This study makes use of a very detailed database that the authors are compiling for Australia on fertility classified simultaneously by single year of age of woman, single parity and single years of duration since the previous birth. The data available at present refer to the calendar year period from 1981 to 2001. For completeness, some assumed additions are added at young ages prior to 1981. More detail on the database and its logic is contained in McDonald and Kippen (2007). We had hoped to have data available to 2006 because we are eager to examine the determinants of the increase in Australian fertility since 2001. However, the required information was not able to be produced by the Australian Bureau of Statistics in time for the writing of this paper. These data will be included in a subsequent version.

First, we examine the nature of the increase in age at first birth for Australian cohorts born from 1950 onwards. Then, we examine the progression from the first to the second birth for the same cohorts. We hypothesise that the timing of first births for cohorts was stimulated by two cross-sectional economic shocks (recessions), the first in 1981 and the second in 1990 and that thye effects of each shock upon the timing of first births lasts for around five years before people become confident that the good times have returned. However, we also hypothesise that successive cohorts behave differently during these periods of calendar time according to their ages at the time of the recessions.

Increase in age at first birth

Figure 1 indicates that the peak age for first birth rates for Australian cohorts shifted from around 24 years for the 1957 birth cohort to 29 years for the 1972 birth cohort. This is a very substantial change in a relatively short period of time. Cumulated first birth rates for cohorts shown in Figure 2 indicate similarly that the age by which 50 per cent of women had had a first birth shifted from age 25 for the 1956 birth cohort to 28 for the 1972 birth cohort.

To examine the nature of the change in first birth according to the possibilities described above, we examine the movements in rates of first birth for successive blocks of cohorts as shown in Figure 1. Similar conclusions can be drawn from the cumulated rates shown in Figure 2. Movements, however, are probably most evident from Figure 3 which shows cumulated first birth rates by age for successive cohorts relative to a standard cohort, the 1960 cohort.

First births for the 1950-54 cohorts (aged 27-31 in 1981)

For these cohorts, rates are only available for older ages (from age 27 for the 1954 cohort). As described above and evidenced below, we argue that the early 1980s cross-sectional time period was a time in which delay of first births was very prominent triggered by the 1981 economic recession. However, the effects of delay do not appear to have had much effect upon these cohorts that were somewhat older at the time of the 1981 recession. Given (from Figure 2) that 70 per cent or more of the members of these cohorts had had a first birth by 1981, there was little scope for further births to be delayed.

Nevertheless, clearer from Figure 3, the proportion having a first birth by age 30 fell by about three percentage points from the 1950 cohort to the 1954 cohort. Most of this small gap, however, was made up by the time these cohorts had reached age 35 (in the second half of the 1980s). The cohort was not affected at all in its progression to first births by the onset of the second recession in 1990 because they had already largely completed their progression to the first birth by 1990. The quantum of first births (by age 45) fell by only about one percentage point from the 1950 to the 1954 cohort.

While the effects of delay on these cohorts are very small, because of the cross-sectional nature of the delay phenomenon, what we observe here is not a pure cohort effect where the rates of first birth of each successive cohort shift to the right at all ages. Instead, the rates shift to the right only at older ages. This is as described in the 'second complication' above; the change applies only at older ages and is small because the cohort is already well advanced in its progression to first birth. The 'selectivity' possibility described in the second complication does not appear to be operating.

First births for the 1955-59 cohorts (aged 22-26 in 1981)

These cohorts were aged 22-26 in 1981 and were in the peak of their childbearing at the onset of the 1981 recession. By age 25, the delaying factors had had a fairly substantial impact upon their progression to the first birth. The proportion having a first birth by age 25 fell by about nine percentage points from the 1954 cohort to the 1959 cohort (Figure 3). However, these cohorts experienced strong recuperation in their progression to the second birth in the second half of the 1980s. By age 35, the difference in progression to the first birth between the 1954 and 1959 birth cohorts was less than four percentage points. These cohorts appear to have accepted that better economic times had returned in the later 1980s. By the time of the second recession in 1990, these cohorts had almost completed their progression to the first birth and, essentially, recuperation for the delay in the early 1980s simply continued in the early 1990s. The quantum of first births (by age 45) fell again by only about one percentage point from the 1954 to the 1959 cohort.

Again, we observe a shift to the right in the distribution of rates of first birth by age but only from the ages of the cohorts at the time of onset of the recession. This time, because these cohorts were at the peak of their first birth rates when the recession occurred, the delaying impact was substantial dropping the proportion having a first birth by age 25 by nine percentage points in five years. This is once more in accordance with the 'second complication'.

First births for the 1960-64 cohorts (aged 17-21 in 1981)

For the 1960-64 group of cohorts, there is evidence of delay of first births as early as the late teens. The delay effect becomes much stronger, however, as these cohorts pass through their early 20s. By age 25, the proportion progressing to the first birth had fallen by about a further nine percentage points between the 1959 and 1964 cohorts. As the 1964 cohort was 25 in 1989, the delay effect continued throughout the 1980s. That is to say, while the previous group of cohorts (1955-59) was experiencing increased age-specific first birth rates in the late 1980s, this later group (1960-64) was continuing to reduce their first birth rates. This is somewhat counter to our hypothesis that the acceptance of the return of good times by the mid 1980s would have dampened any further delay. Indeed, this cohort was recuperating its delayed first births strongly during the early 1990s, following the onset of the second recession and their recuperation slowed in the later 1990s. Thus, an interpretation of the timing of first births purely in terms of the impacts of cross-sectional recessions is not sustained. This probably supports the argument that delay of first births is associated with more fundamental, institutional changes (see McDonald 2006). Nevertheless, the 1981 recession seems also to have been an important trigger.

By age 25, the progression to the first birth was some 18 percentage points lower for the 1964 cohort than for the 1954 cohort. However, by the end of their childbearing, the difference was only about four percentage points. Behaviour *within* this group of cohorts looks more like a pure cohort effect although, importantly, falls in age-specific first rates at young ages are larger and cover a smaller number of years than the rises at older ages. In other words, the cohort age distribution of first birth rates widens. Or, delay occurs more rapidly than recuperation.

First births for the 1965-69 cohorts (aged 17-21 in 1986)

This group of cohorts is notable for a significant downward shift in rates of first birth in the teenage years. By age 20, progression to the first birth was 4-5 percentage points lower for the 1969 cohort compared to the 1964 cohort. This corresponds fairly well with the onset of the 1981 recession even though we might consider that economic outlook does not drive teenage fertility. However, there may have been other factors involved that occurred at the same time (eg. increased access to abortion and contraception or longer durations of school education). These cohorts also continued the trend to lower first birth rates in the early 20s. By age 25, the proportion having had a first birth was some 26 percentage points lower than it had been for the 1954 birth cohort. They were in their early twenties in the first half of the 1990s, so, once more, the second economic recession seems to have had little impact on the timing of first births.

There is also evidence for these cohorts of a speeding up of recuperation of delayed first births. Each successive cohort catches up with the previous cohort at an earlier age. The suggestion across all cohorts is that the speed of recuperation is a function of the maximum extent of delay – the greater the delay, the faster is the recuperation.

Raw data from the 2000 census indicate that the 1965-69 group of cohorts will complete their fertility with a quantum of first births about two percentage points lower than the 1960-64 group of birth cohorts. Thus, compared to the 1950 cohort, the 1968 cohort will be less likely by about eight percentage points to have a first birth by age 45 compared to about 25 percentage points at age 25. Thus, solid recuperation still continues but the proportion never having a first birth gradually builds up.

First births for the 1970-74 cohorts (aged 17-21 in 1991)

As suggested under the 'third complication', there is strong evidence especially for cohorts from 1970 onwards that there are separate determinants of teenage fertility and these remain resistant to the delaying factors. This is leading to a double-peaked distribution with rates being a little lower in the early 20s than in the late teens. This teenage hump is evident in other English-speaking countries.

Another interesting feature emerges for the 1970-72 cohorts. For these cohorts, there is little further delay of first births below age 23 compared to previous cohorts but delay of first births is significant for a few years after age 23. Recuperation begins for these cohorts at a later age, more like age 27 than age 25. This shift occurs in the late 1990s but ends quickly within this group of cohorts. This seems to be some evidence for the 'fourth complication' that some new cross-sectional delaying factor emerged at the end of the 1990s that was not associated with the earlier longer-term delay triggered by the 1981 recession. This requires further investigation but may in some way be related to policies of the new conservative government at that time (child care became less affordable due to government cuts in 1996, labour markets were further deregulated).

Data for cohorts from 1972 onwards, as far as their short experience indicates, suggest that the continued delay of first births largely ceased with the 1972 birth cohort. This is where we miss the more recent data. Indeed, in the recent data, we shall be looking for a shift in the opposite direction, to earlier childbearing, associated with the fairly substantial rise in Australian fertility in recent years.

The impacts of cohort increases in age at first birth upon the timing and quantum of second births

In the remainder of the paper, rates of progression to the second birth are examined for Australian birth cohorts according to the age at which they had their first births. Progression is measured in terms of years from the time of the first birth.

First birth at ages 20-24

As observed above, the percentages progressing to a first birth by age 25 fell very substantially across the cohorts from 1950 to 1974. Interestingly, this large shift away from childbearing under the age of 25 seems to have had no effect upon the distribution of the timing of second births for those who had their first birth while aged 20-24 (Figures 4 and 5). What changes is the quantum of second births. As the proportion having a second birth before age 25 falls, the proportion who ultimately have a second birth also falls among those having their first birth before age 25. In other words, as first births become less common at young ages, the group that has a first birth at a young age becomes increasingly selective of those who will not continue to have a second birth.

First birth at ages 25-29

When the first birth is at ages 25-29, the pattern is different. Again, there is no change across cohorts in the distribution of timing to the second birth but there is also almost no change in the quantum of second births (Figures 6 and 7). Having a first birth at ages 25-29 and then a second birth in standard time after the first birth could be regarded as typical or normal behaviour for an Australian woman in these years. Thus, it is very interesting that this typical behaviour persisted strongly across 20 successive cohorts despite the huge shifts that occurred in the timing of first births.

First birth at ages 30-34

For those who had their first birth at ages 30-34, again there is little change across cohorts in the timing of the second birth. However, as having the first birth at age 30-34 becomes more common, the quantum of second births to women who have a first birth in these ages increases (Figures 8 and 9). The suggestion is that, for earlier cohorts, those having first births at ages 30-34 (relatively late for these cohorts) were selective of women who would not continue to a second birth. As a first birth at ages 30-34 became more typical behaviour, progression to the second birth also became more typical.

First birth at ages 35-39

A first birth at age 35-39 is abnormally late. We have data only for cohorts born in the 1950s at this point. For these cohorts, there was no change in either the timing or the quantum of second births (Figures 10-11). Not unexpectedly, the quantum of second births is much lower for those who had their first birth late than it is for those who had first births at earlier ages.

Summary of changes in second births

Changes in the timing of second births are summarized in Figure 12. This figure shows the progression to the second birth for different birth cohorts according to the age at which they had a first birth. Those born in 1960-64 and having their first birth at ages 20-24 are taken as the standard as they are close to 'typical'. Their outcomes are very similar to those born in 1955-59 and 1960-64 who had a first birth at ages 25-29, behaviour that can also be described as central or typical. Our concern is then in describing variation from this typical behaviour (the norm).

The most important point to be made about Figure 12 is that, unlike first births, second births do not show a pattern of recuperation to the norm. For first births, recuperation was very strong with usually at least two-thirds of early loss compared to the norm being made up by the completion of childbearing (Figure 3). For second births (given age at first birth), there is almost no recuperation once a cohort/age at first birth group has fallen below the norm. Thus, the story here is about quantum not about tempo.

For those exercising what might be described as typical first birth behaviour for their cohort, there is remarkable stability across time in the progression to the second birth, both tempo and quantum.

However, as we shift further away from typical first birth behaviour, either to younger or older first births, quantum falls and does not recover across the lifetime of the woman. Overtime, those having a first birth at ages 15-19 become increasingly less likely to have a second birth. For Those born in 1975-79 and having their first birth as a teenager were 25 percentage points less likely to progress to a second birth that those who had their first birth at typical ages. Most importantly for interpretation of trends in fertility, once the first birth shifts to ages above 30, the quantum of second births falls sharply and there is no recuperation. Those who have their first birth at ages 35-39 are 40 percentage points less likely to have a second birth than those who have their first birth at ages 25-29. Those who have their first birth at ages 30-34 are between 15 and 20 percentage points less likely to have a second birth than those who had their first birth at 25-29.

Conclusion

We show in this paper that, at least in the case of Australia, a long-term upward movement in age at first birth produced complicated patterns of change in the fertility behaviour of cohorts. The outcomes diverged considerably from the simple, pure cohort effect assumed in the calculation of so-called 'tempo-adjusted' measures of fertility. Changes in fertility were not merely a function of a lateral shift in the cross-sectional mean age at birth (note, a measure itself distorted by changes in the timing of births). For first births, the delay effects vary significantly according to the age of the cohort at the time of onset of a cross-sectional delay. There is evidence that teenage fertility is resilient to the delaying effects. However, at least in Australia, there is evidence of strong recuperation in relation to first births; most first births delayed later occur. On the hand, the opposite is the case for second births. When the first birth occurs at an atypical age, either early of late, the quantum of second births falls relative to the typical pattern and does not recuperate with time. In particular, a compositional movement of first births to ages above age 30 can be expected to lead to a fall in the quantum of second births.

Our hypothesis that changes in the timing of first births were driven by two cross-sectional economic shocks was not supported. While changes in the broader economic outlook of young people are undoubtedly involved, the second economic recession in 1990 seems to have had little or no impact upon the pattern of shift to later childbearing that had already been established.

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Figure 1. First-birth rates by age and cohort, Australian women born 1950–1984

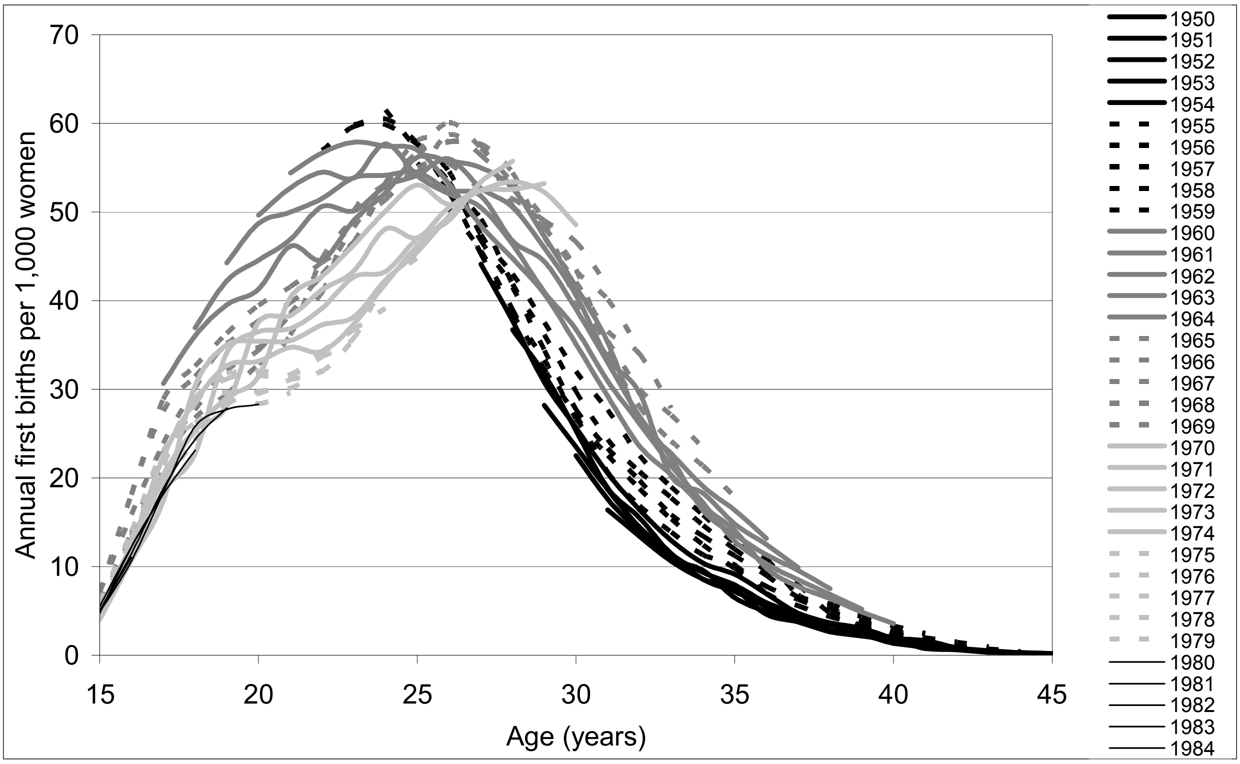

Figure 2. First-birth cumulative proportion by age and cohort, Australian women born 1950–1984

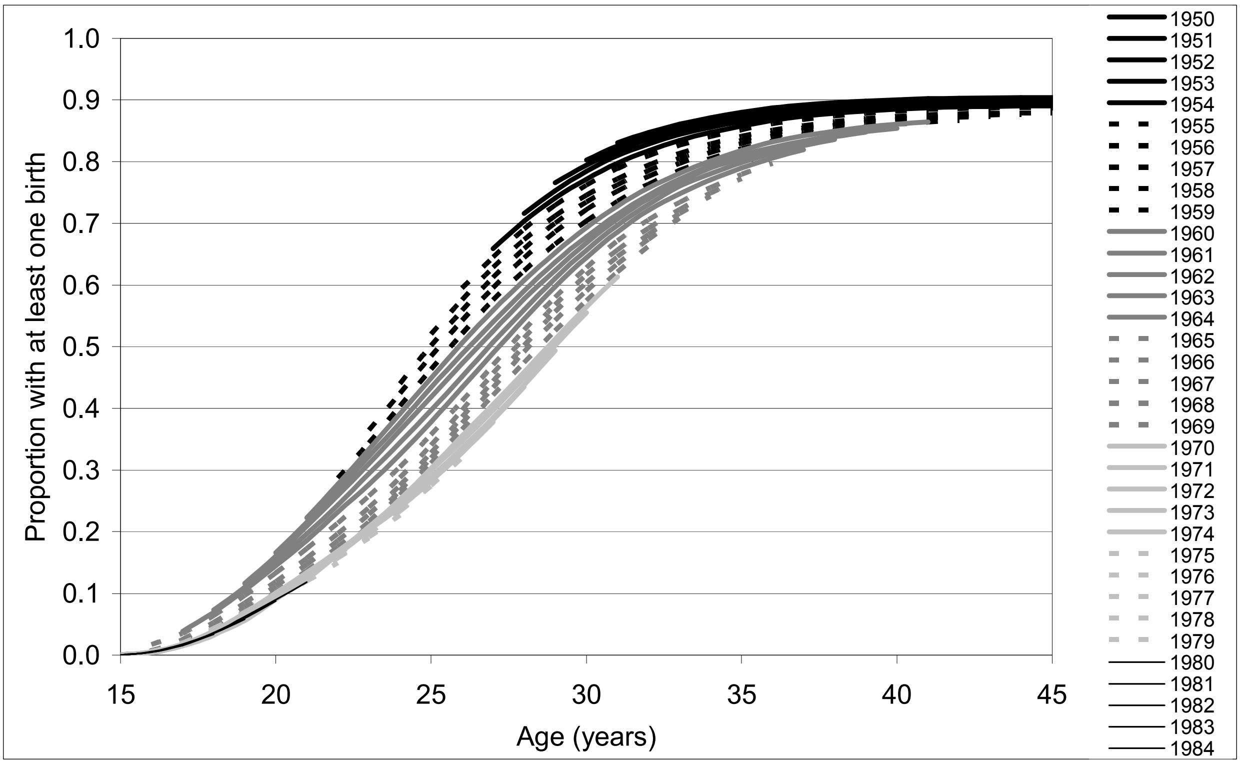

Figure 3. Cumulated first-birth rate by age and cohort, standardised against 1960 cohort (completed rate = 0.87), Australian women born 1950–1984

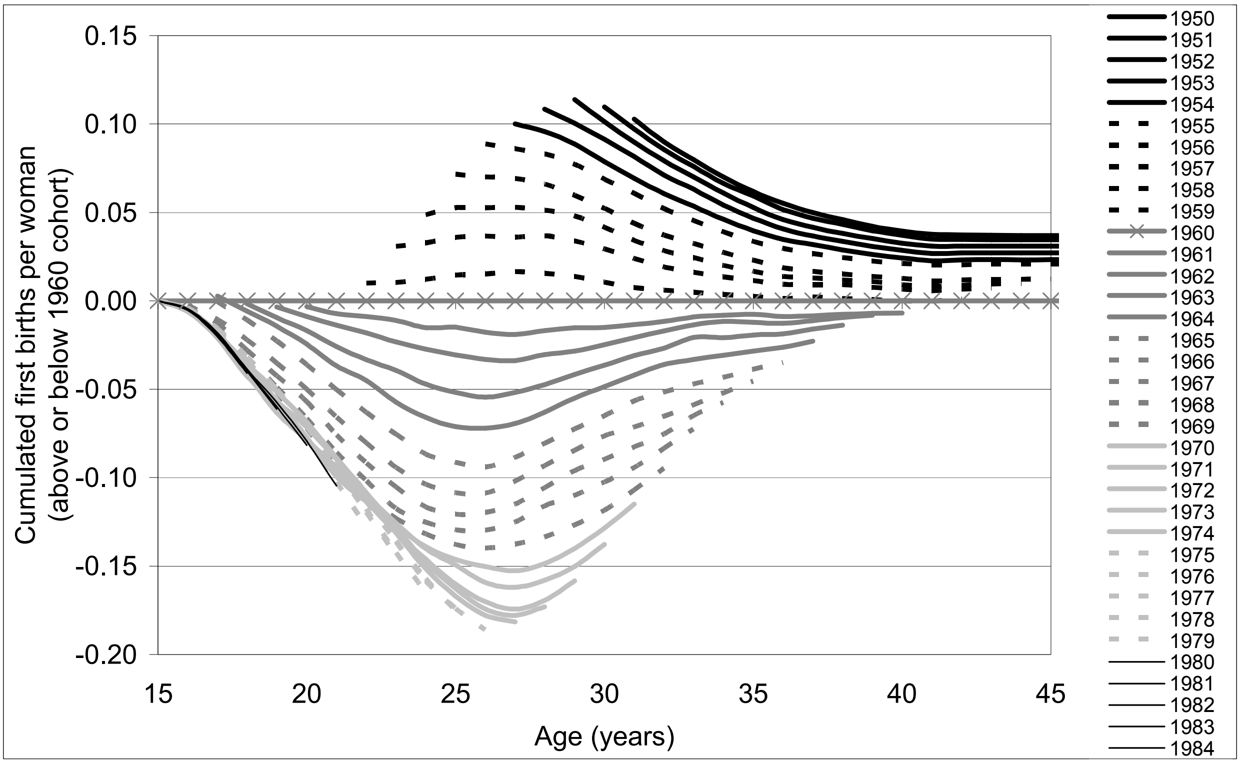

Figure 4. Second-birth rates by cohort and time to second birth, Australian women born 1955–74 and aged 20–24 at time of first birth

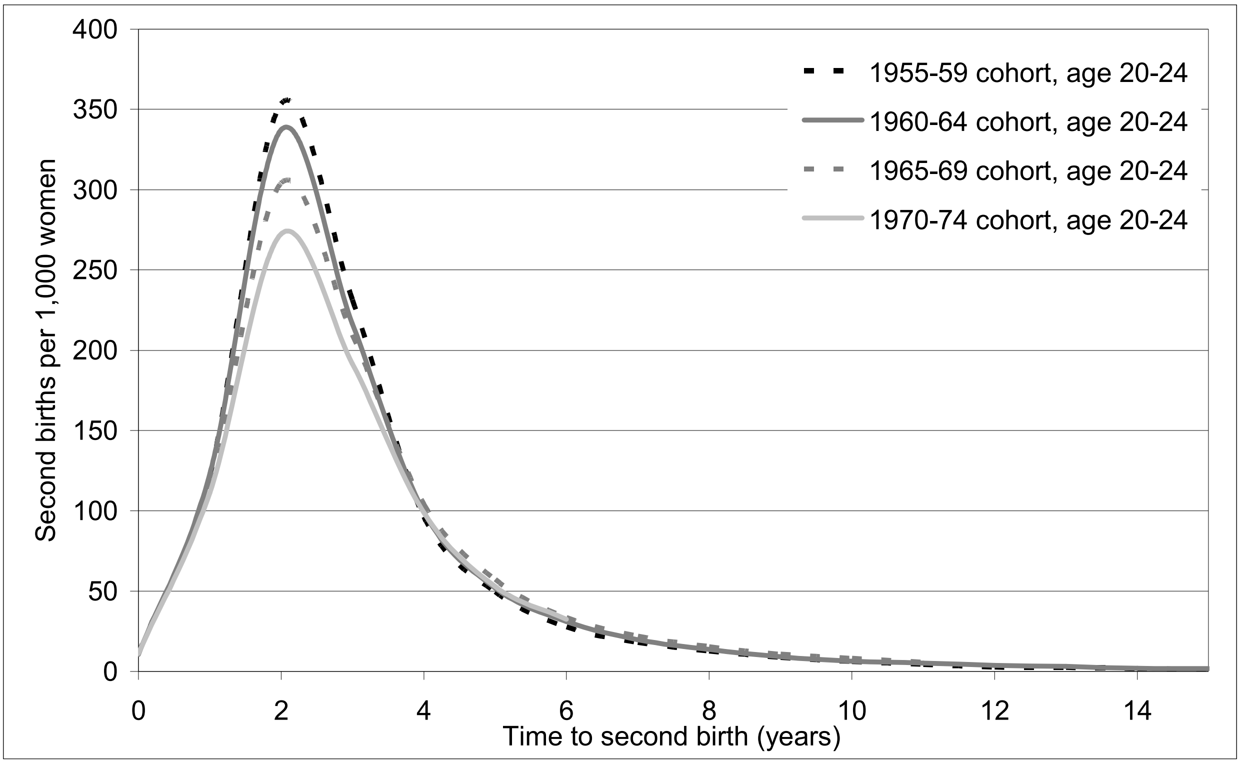

Figure 5. Cumulated second births by cohort and time to second birth, Australian women born 1955–74 and aged 20–24 at time of first birth

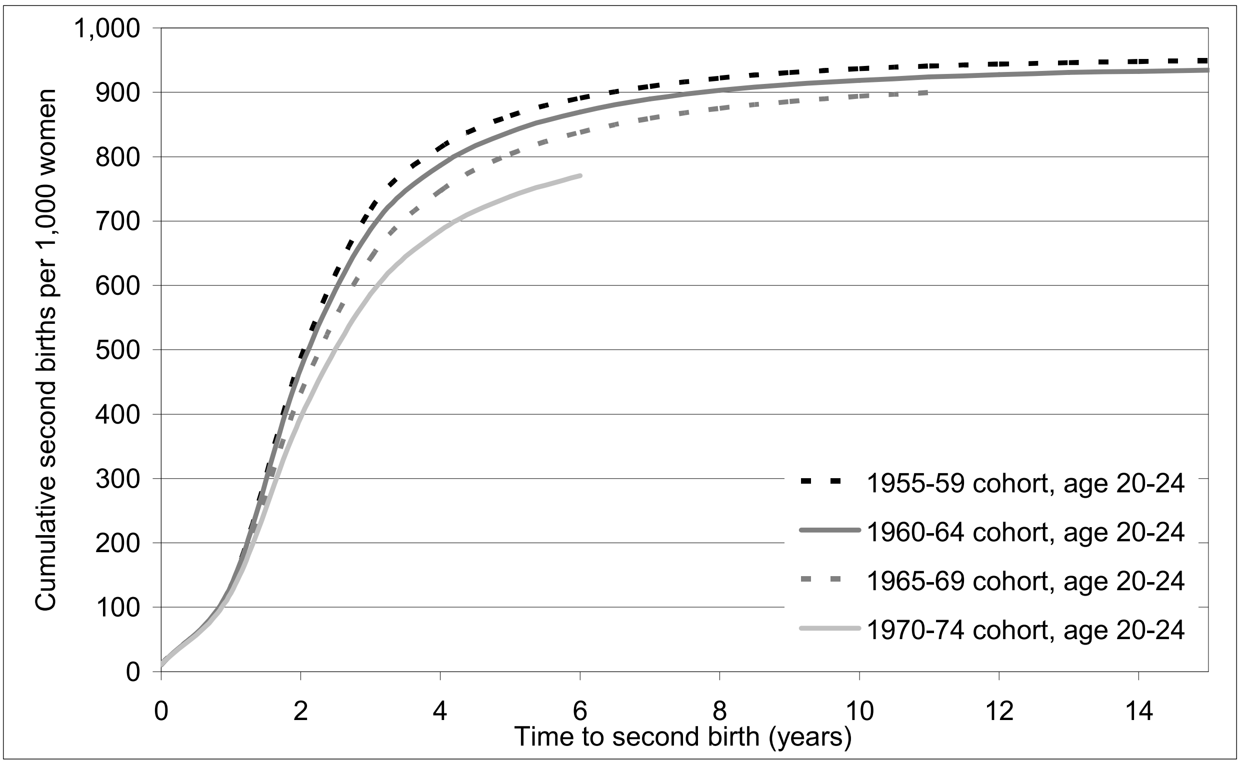

Figure 6. Second-birth rates by cohort and time to second birth, Australian women born 1950–69 and aged 25–29 at time of first birth

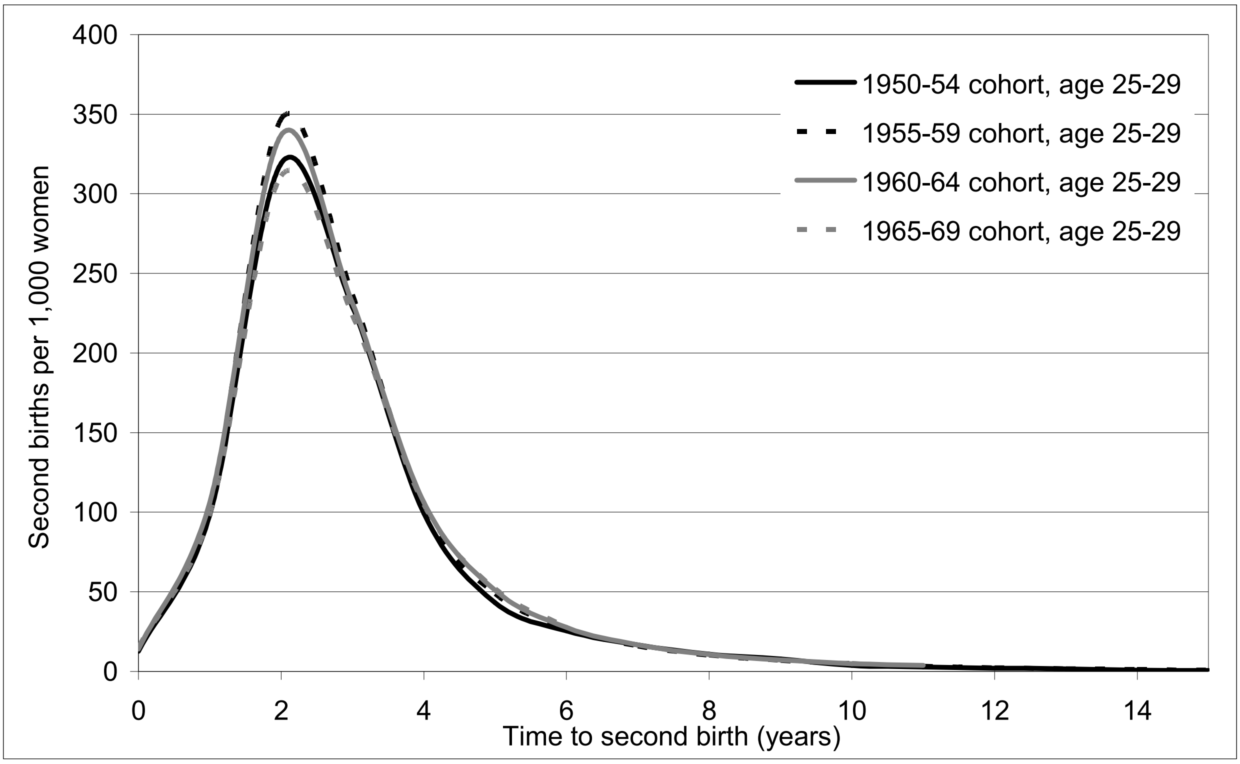

Figure 7. Cumulated second births by cohort and time to second birth, Australian women born 1950–69 and aged 25–29 at time of first birth

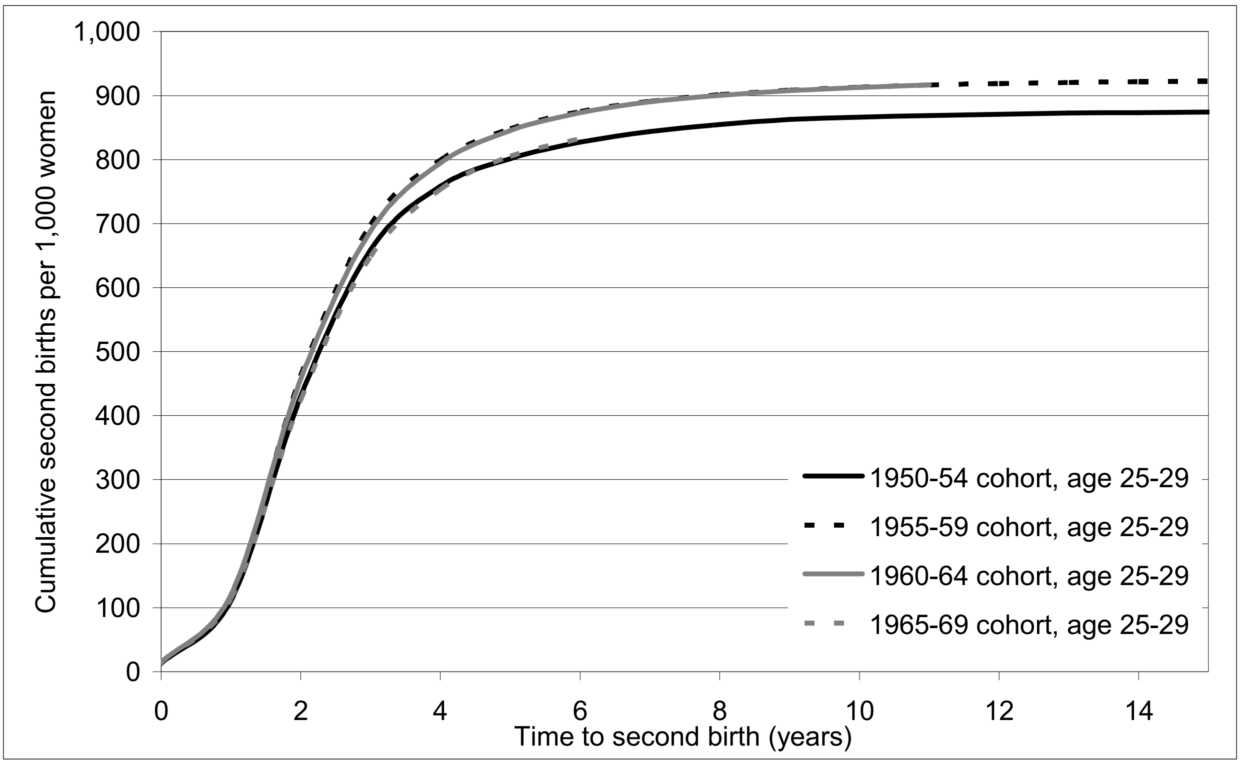

Figure 8. Second-birth rates by cohort and time to second birth, Australian women born 1950–64 and aged 30–34 at time of first birth

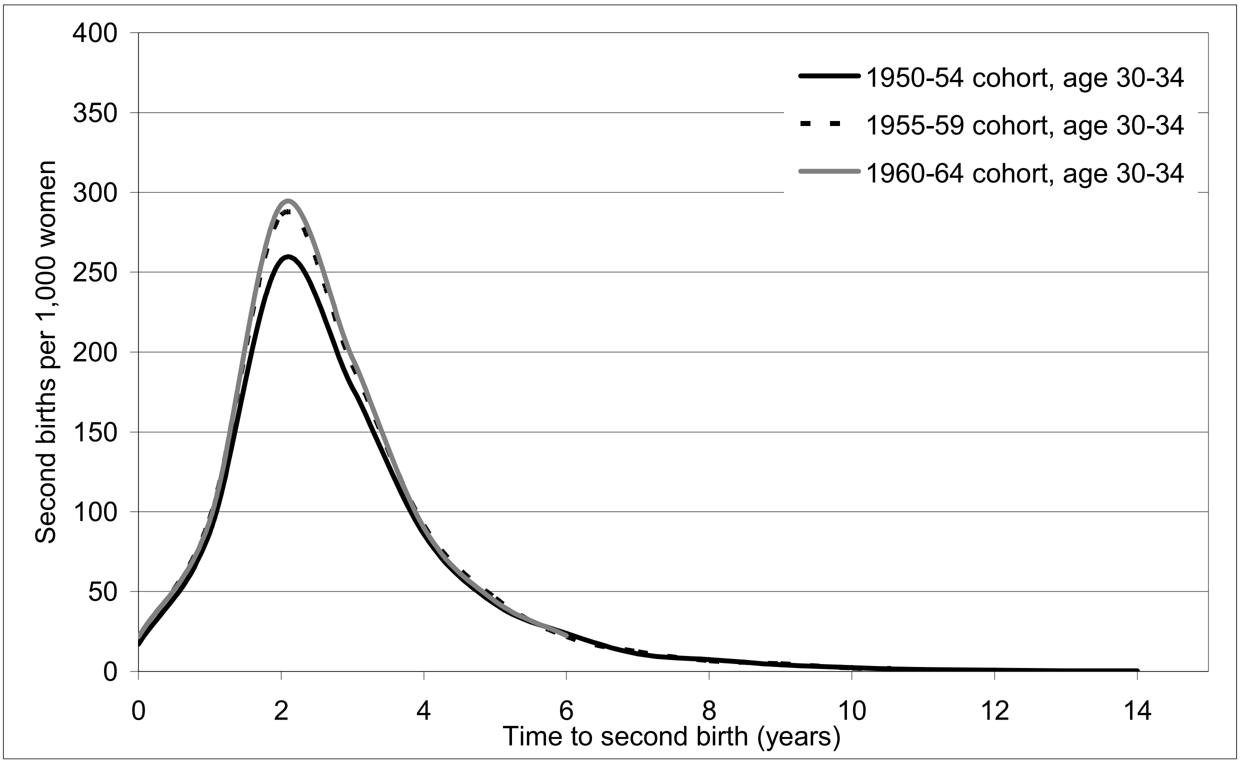

Figure 9. Cumulated second births by cohort and time to second birth, Australian women born 1950–64 and aged 30–34 at time of first birth

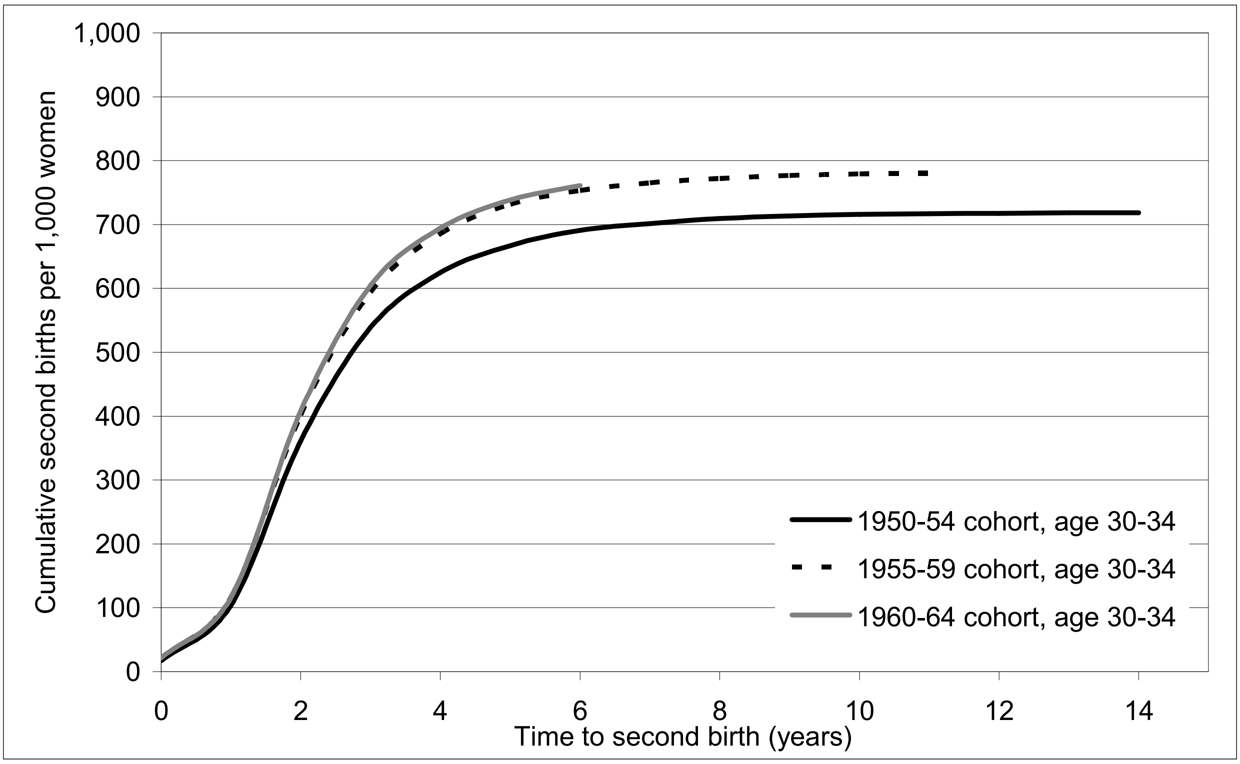

Figure 10. Second-birth rates by cohort and time to second birth, Australian women born 1950–59 and aged 35–39 at time of first birth

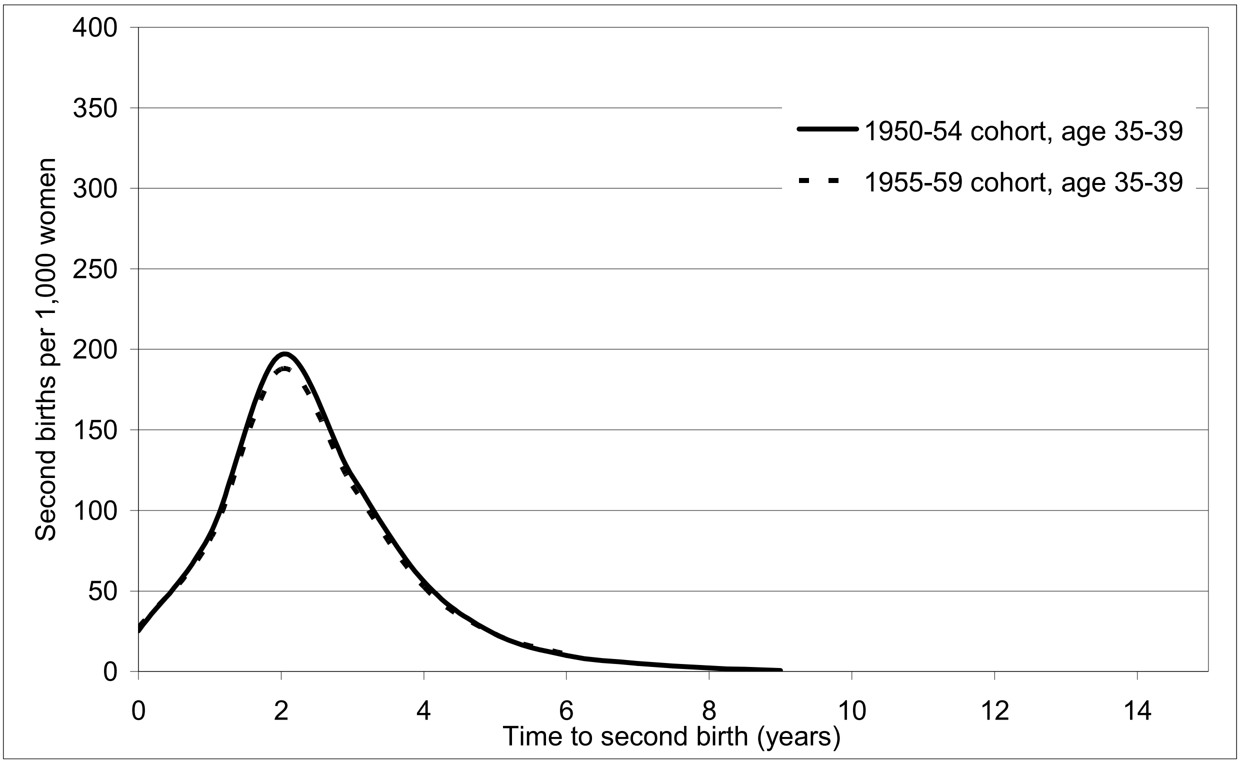

Figure 11. Cumulated second births by cohort and time to second birth, Australian women born 1950–59 and aged 35–39 at time of first birth

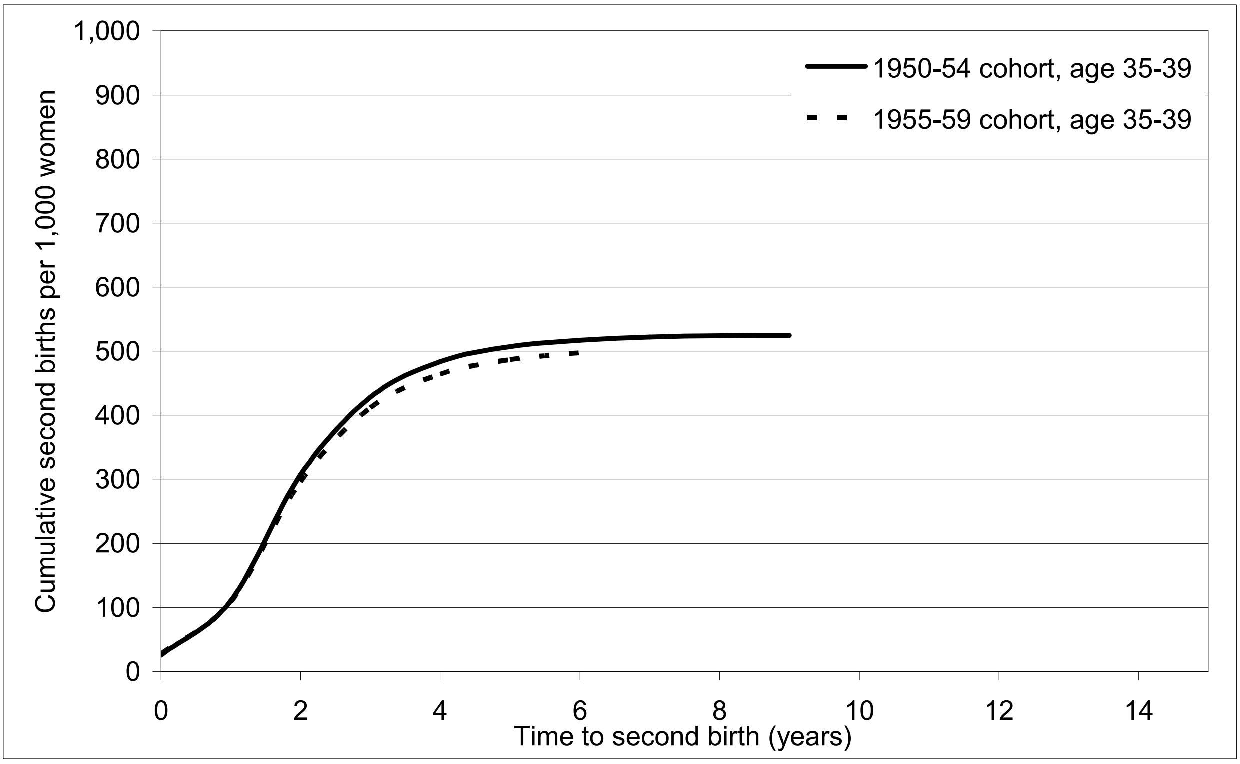

Figure 12. Cumulated second-birth rate by age at first birth, cohort and time to second birth, standardised against 1960–1964 cohort with first birth at age 20–24 years (completed rate = 0.93), Australian women born 1950–1979