ARC CENTRE OF EXCELLENCE IN POPULATION AGEING RESEARCH

THE BACK-TO-THE-FUTURE FACT SHEET

A VISUAL HISTORY OF DEMOGRAPHIC PROJECTIONS IN AUSTRALIA

ABOUT THIS FACT SHEET

How have official demographic projections changed over time and to what extent have these conformed with real-world outcomes?

This fact sheet compares historic demographic patterns and central projections from the Australian Bureau of Statistics (ABS, various years) and the Australian Treasury (various years).

Treasury figures are of particular interest since they form the basis for the Intergenerational Report (IGR), an analysis of fiscal sustainability of existing policy.

The fact sheet shows how outcomes can differ based on different assumptions and how it is not uncommon for projections and assumptions to stray from reality.

WHAT IS A PROJECTION?

A projection is different from a prediction or forecast. It is a hypothetical exercise that asks: what will be the outcome if given assumptions hold?

For example, how would the total population change if every woman had three children (all else equal)? So a projection is a mechanical calculation and cannot be incorrect unless there is a calculation error.

WHAT IS A FORECAST?

By contrast, a forecast is a speculative exercise that attempts to predict the future using the most realistic assumptions possible.

For example, a forecast would look at the most likely future population and number of children per woman.

ASSESSING PROJECTIONS

Both the ABS and Treasury emphasise that in describing Australia's future demography (as well as the related long term fiscal impacts) their figures should be seen as projections, not forecasts.

But the two are commonly conflated in public and political discourse and the projections have an impact on policy decisions. So the reasonableness of official projections should be subject to scrutiny, evaluated against actual experience and compared to each other. Any differences and inaccuracies can serve as a guide to users of the data.

Transparency is all the more necessary given that the Treasury sets its own demographic assumptions for long-term fiscal reporting rather than using those produced by an independent national statistics office – the usual approach among OECD countries.

The comparisons here are in chart form. For a detailed assessment of projection 'errors' see, for example, Abbas (1992), Wilson (2007) and Wilson (2012).

WHICH PROJECTIONS?

Of interest here are the central population and the implied ageing projections as well as the underlying demographic components: fertility, migration and life expectancy.*

The ABS publishes several projection variants and Treasury produces accompanying sensitivity analyses.

These are important but could be enhanced by applying stochastic methods to produce confidence intervals around projections, such as those published recently by the Productivity Commission (PC 2013) and regularly in countries such as New Zealand (Dunston 2011).

TOTAL POPULATION

As shown in the first chart, the Australian population has generally risen by different rates to those projected, but differences do not appear systematic: sometimes the central projection was below and sometimes above the historic population level.

Projections are most likely to go astray when there are turning points in the statistical series on which they are based. For instance, each decade between the 1950s and 2000s saw a deceleration in population growth. Since the mid-2000s, the number of Australians has been increasing at a faster rate (due to higher fertility and migration).

This change meant that the population was underestimated in ABS projections 1997 to 2004 and IGRs 2002 and 2007: IGR 2002 projected 1.4 million fewer Australians by 2012 than was the case.

The impacts are greater over long periods since errors in underlying assumptions can accumulate over time: IGR 2002 projected a total population of 26 million in 2050, which was revised to 38 million in IGR 2015.

POPULATION AGEING

The increase in size of older cohorts compared to overall (or working-age) population is one measure of population ageing.

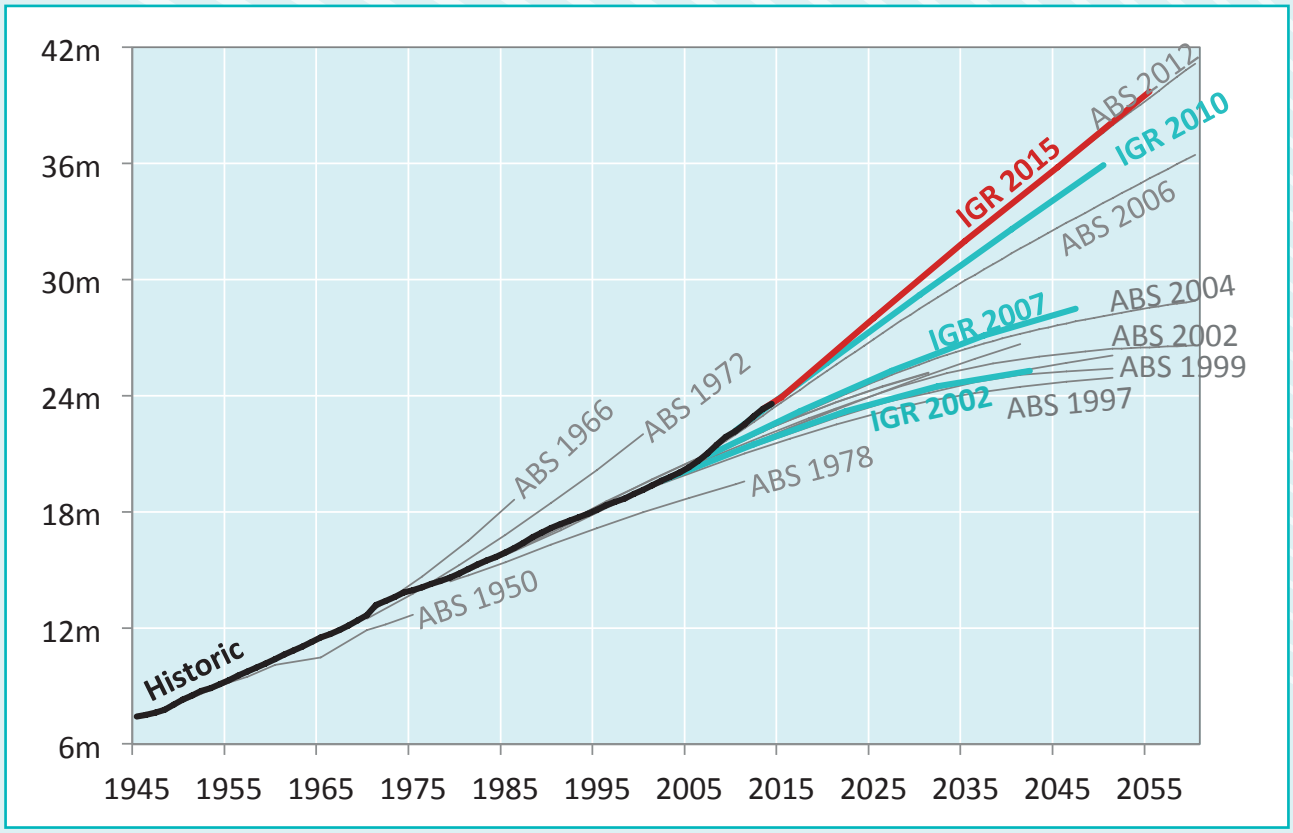
The degree of this increase was not fully captured in projections until the 1990s. The relative size of older cohorts increases with lower fertility, higher life expectancy and lower migration.

In years when fertility was particularly high (e.g., 1966 and 1972) the projected increase in younger cohorts and stable mortality meant that the proportion of older people was projected to drop, which it did not.

The assumptions of lower fertility and migration rates in earlier IGRs meant that these reports predicted a much older population than that seen in more recent IGRs and ABS projections (despite upward revisions in life expectancy).

ABS variants are poor at illustrating ageing scenarios. For example, the 'high' variant relates to a high population so it combines high life expectancy with high fertility and migration. In terms of demographic ageing, these factors offset each other.

TOTAL POPULATION



FERTILITY

The summary measure for fertility is the Total Fertility Rate. It represents the number of children a woman would have if the probability of childbirth observed at each age in a given year would apply over a woman's whole life (Alternative fertility predictors to TFR have been suggested by McDonald & Kippen, 2011).

Fertility can be difficult to predict, especially for generations yet to be born. As noted earlier, turning points are especially difficult to anticipate. This was the case for the end of the baby boom in the 1960s and rebound in fertility in the 2000s.

As the 2002 IGR was being published, fertility reached a low of 1.7 births per woman before recovering to 1.9 by 2010. As a result, the assumptions in the IGRs have been successively more optimistic about fertility forty years hence, changing from 1.6 to 1.7 and then to 1.9 births per woman.

MIGRATION

The ABS has historically taken pains to emphasise the 'illustrative' nature of migration assumptions, the impact of which was often modelled separate to the natural population increase. In the past, this practice co-existed with the public's historic sensitivity to migration (Goot 1991).

Migration assumptions have been based on observed net inflows in a single year, over a given period, or inferred from stated policy.

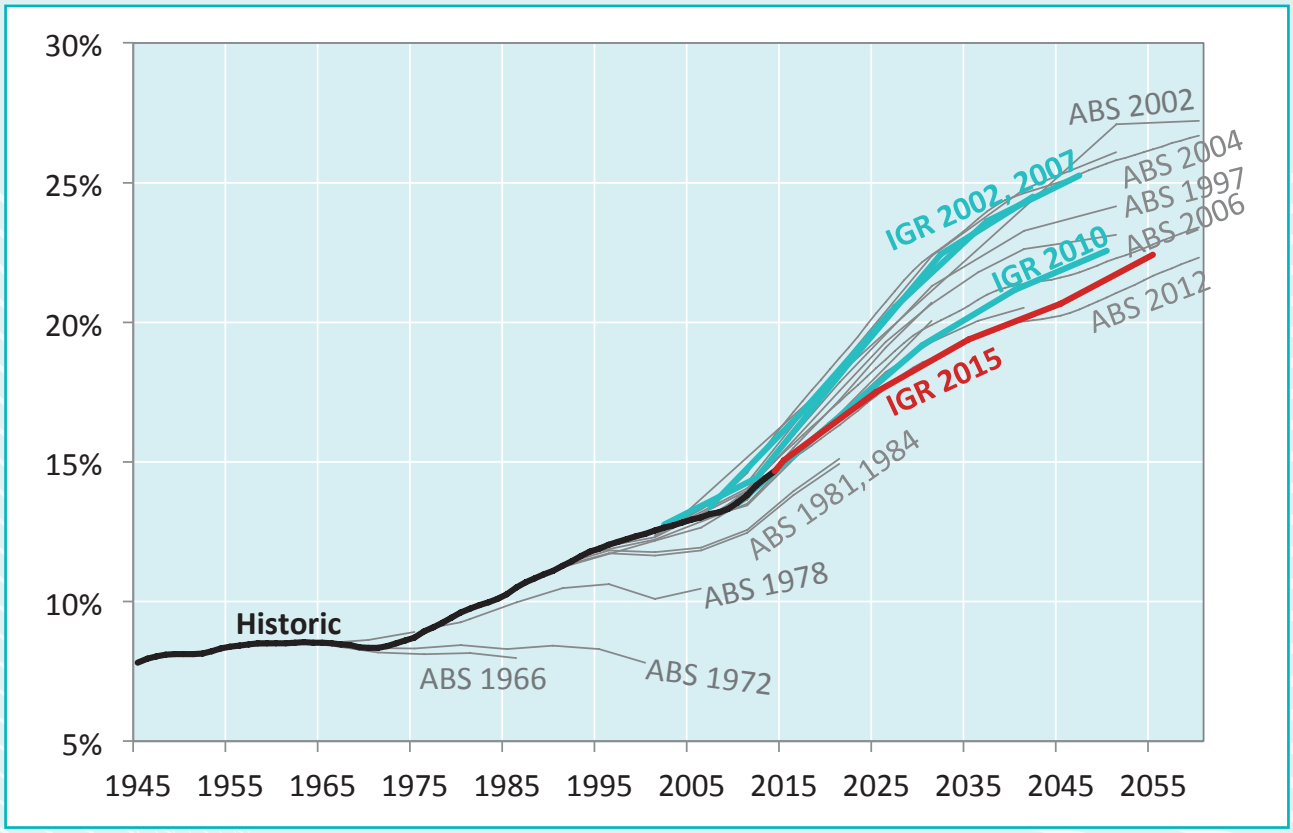
Wilson (2012) found that net overseas migration is the demographic component that contributed most to 'forecast error'. Perhaps this is unsurprising since net overseas migration has fluctuated widely despite government controls on total inward migration.

In recent years net migration numbers have typically been under-estimated (partly because a 2006 to 2007 methodological change revised upward the actual figures).

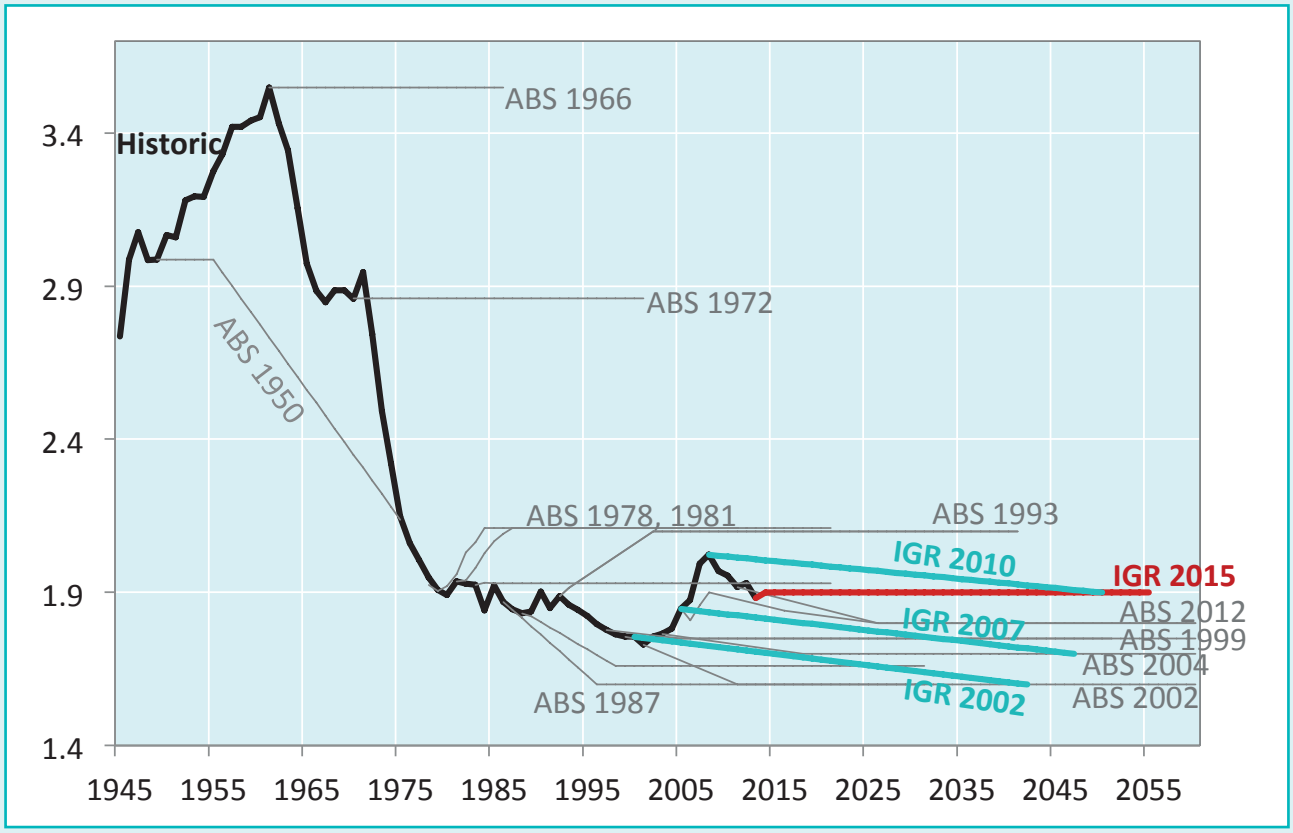
ABS 1999 and IGR 2002 expected 90,000 net migrants per year, which increased to 110,000 in ABS 2004 and IGR 2007 and 180,000 in ABS 2006 and IGR 2007. Current IGR 2015 projections suggest an average of 215,000 per year over the next 40 years.

These too could be underestimates since the number is assumed constant rather than as a proportion of the total or working-age population. For example, it implies that annual net migration as a proportion of the population will decline.

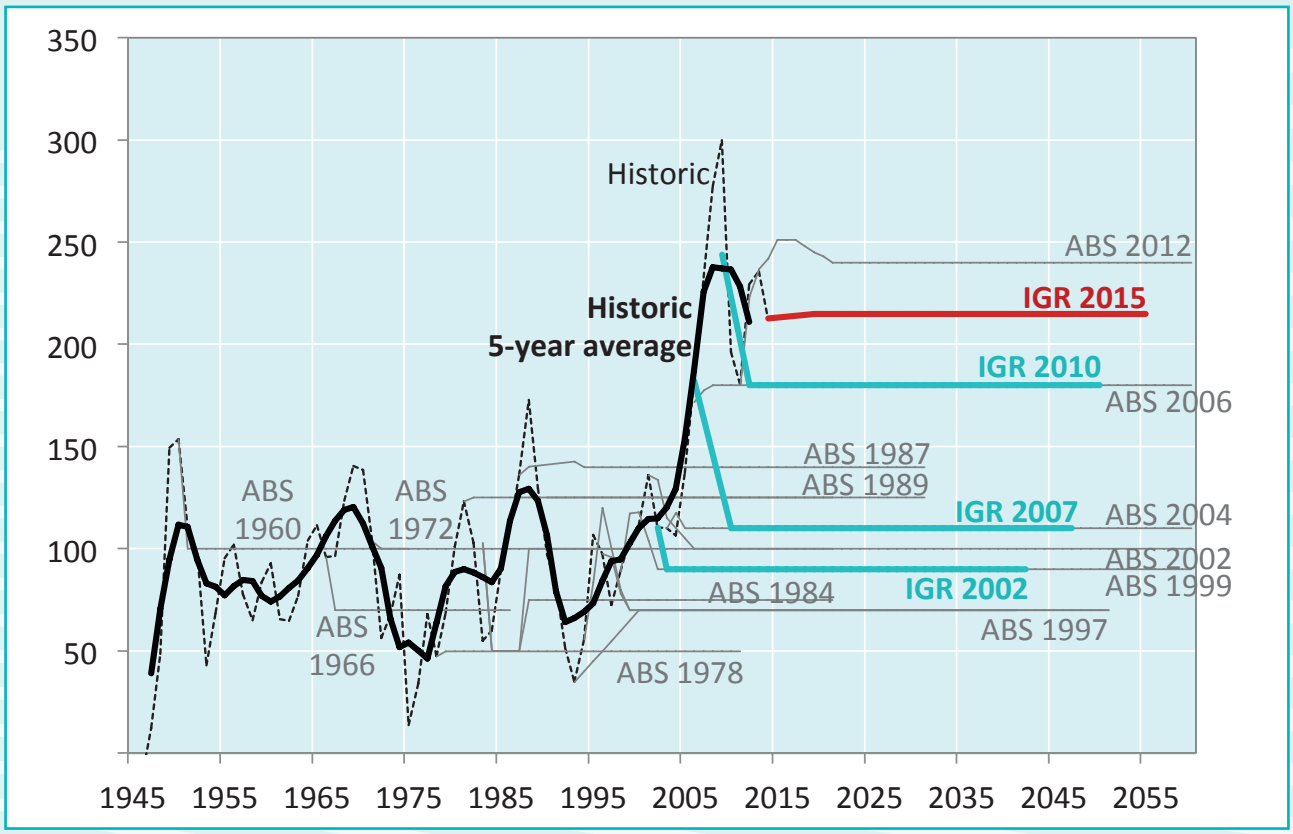
PROPORTION OF PEOPLE AGED 65+ IN TOTAL POPULATION (%)



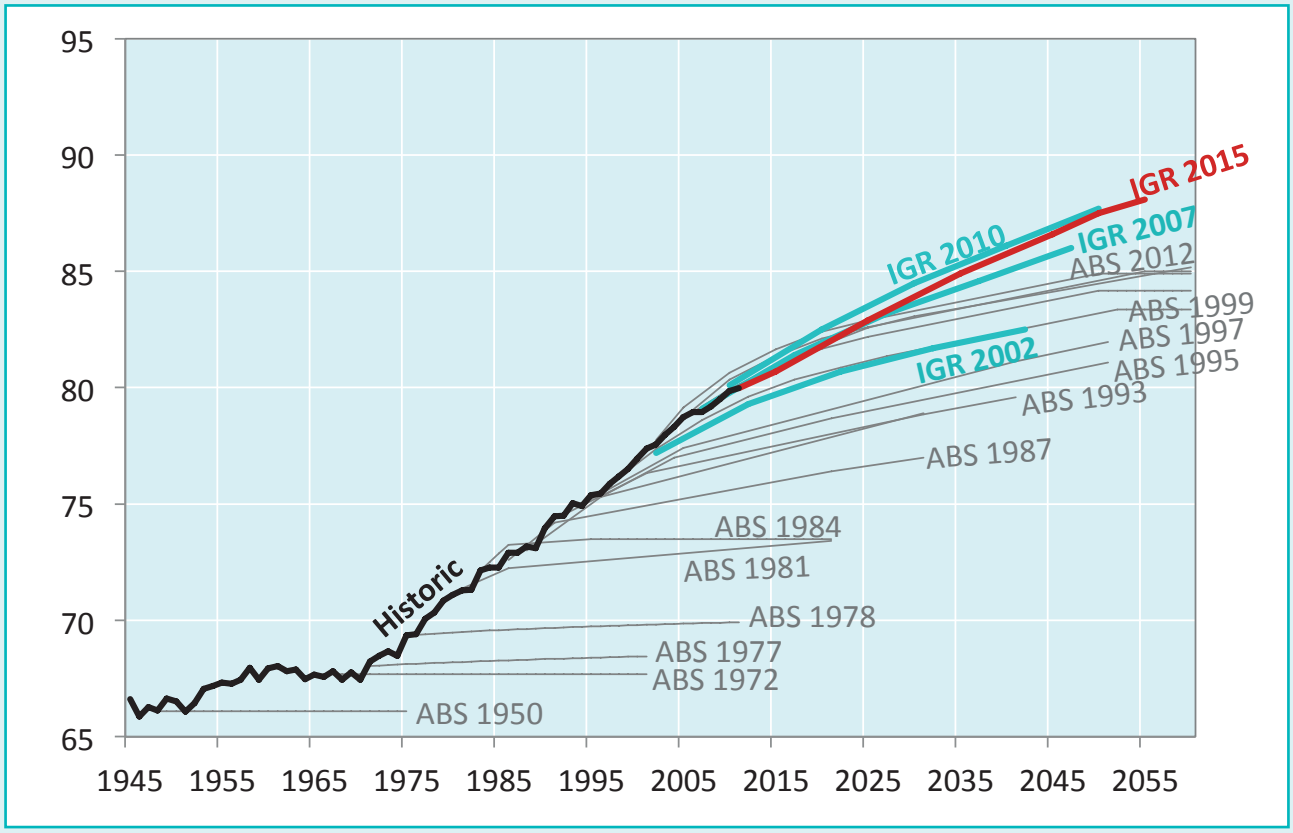
TOTAL FERTILITY RATE (children per woman)



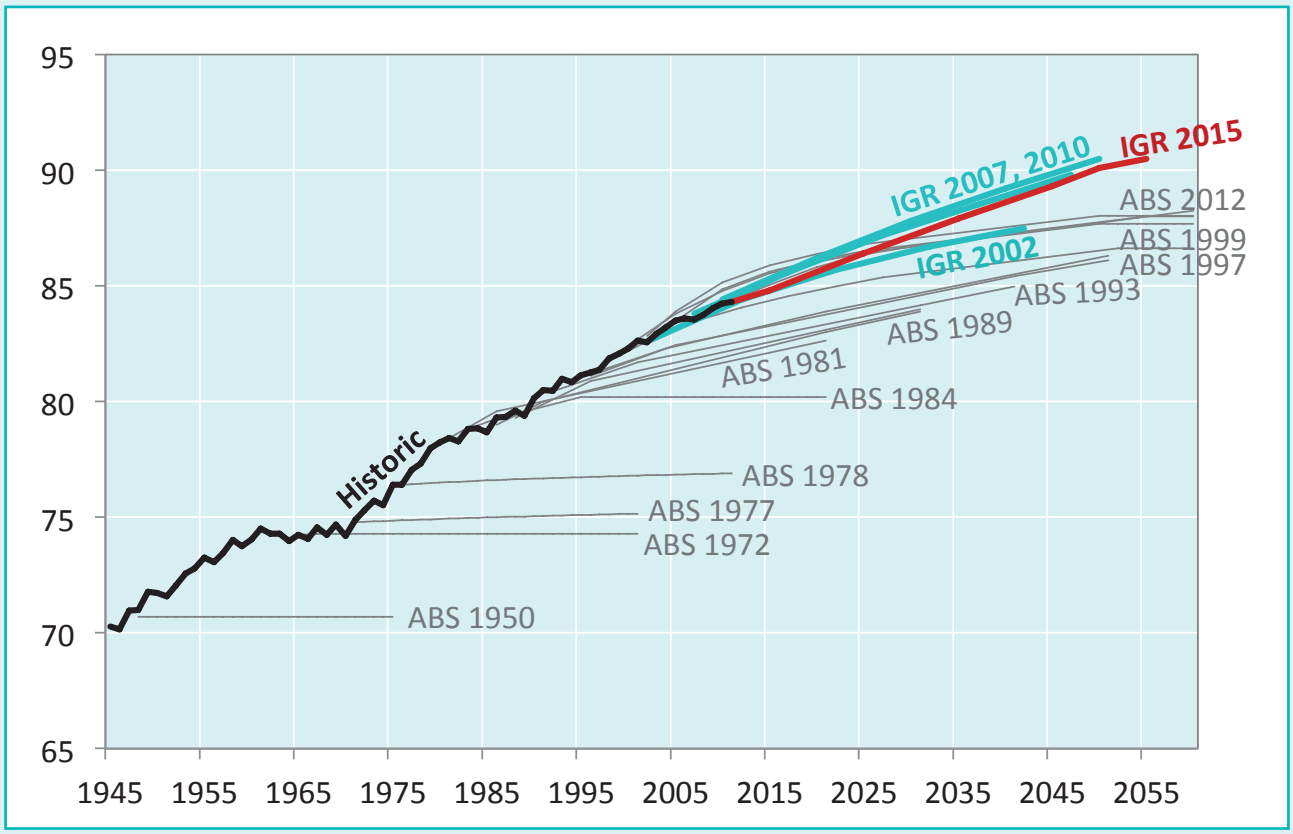
PERMANENT NET OVERSEAS MIGRATION (thousand persons)†



MALE LIFE EXPECTANCY AT BIRTH (years, period measure)



FEMALE LIFE EXPECTANCY AT BIRTH (years, period measure)



LIFE EXPECTANCY

Charts relating to life expectancy are perhaps the most striking in showing bias. Demographers in Australia and elsewhere (OBR 2014) have systematically underestimated life expectancy increases. Assumptions typically anticipated no further improvements in mortality, or, at best, that trend improvements would decelerate. In practice, life expectancy has been rising more or less linearly for over four decades.

Period life expectancy at birth is the most common measure. To construct it, demographers look at population-wide survival probabilities at each age in a given year; then they hypothesise how long a child born in that year would live if all those probabilities applied over their lifetime. So it takes account of improvements up to the year of birth but not in future years of life.

Period life expectancy has been increasing by about three months per year to reach 81 and 85 years for men and women born in 2015.

Until 2002, ABS included a single assumption for mortality rates. Since then, projections include a medium variant where life expectancy increases decelerate and a high variant where trends are expected to continue.

Treasury models a deceleration in future mortality improvements that sees an average increase in period life expectancy of only about two months per year between 2015 and 2055.

Treasury and others (e.g., PC, 2013) have sensibly begun reporting cohort life expectancy, which represents the years an average individual is actually expected to live since it includes mortality improvements within their lifetime. Though implicitly included in demographic modelling, the measure is seldom published. According to Treasury, it is about 92 years for men and 94 for women born in 2015, and projected to rise to 95 and 97 for those born in 2055.

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ENDNOTES

* The focus, including in all series shown in charts, is on the central, medium, or middle projection. In recent years this refers to ABS series B. In years with an even number of series, the middle projection is one that is closest to the average of population projections in the final projection year.

† Series break in historical estimates in 2007 due to a methodological change in measuring migration. Notable changes to the series also took place in 1983 and 2000.

ABOUT CEPAR

Based at the University of New South Wales (UNSW) with nodes at the Australian National University (ANU) and the University of Sydney, the ARC Centre of Excellence in Population Ageing Research (CEPAR) is a unique collaboration bringing together academia, government and industry to address one of the major social challenges of the twenty first century.

July 2015

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