



Australian Demographic Estimates and Projections 2009

PRODUCT GUIDE

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Introduction and Methodology

The Pitney Bowes Business Insight Estimates and Projections database for Australia is an annual demographic update based on the Census 2006 enumeration.

These post-censal estimates update demographic variables, such as total population and total households, for most geographic entities in Australia, down to the smallest areas or Census Collection Districts (CCDs). Also included are estimates of the characteristics of populations (for example, age and sex) and characteristics of households (for example, income).

These variables are 'updated' from their Census 2006 values in accordance with the processes described in [Methodology](#) starting on page 2.

The specific product details are covered in [Product Specifications](#) starting on page 7.

This 2009 release of the Pitney Bowes MapInfo Demographic Estimates and Projections for Australia contains data for 2009, 2014 and 2019. This data is generally consistent with the latest 'high level' estimates and projections databases of the Australian Bureau of Statistics (ABS).

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Methodology

This section presents an overview of the methodologies used by Pitney Bowes Business Insight to develop a set of small area estimates and projections for Australia.

Whilst Australia has the advantage of taking a census enumeration every five years, businesses often require updated and projected demographic information for their decision-making. The importance of up-to-date demographics for 'business insight' cannot be overstated as it relates to competitive issues in the context of limited opportunities to initiate, expand, or optimise operations.

At the outset, Pitney Bowes Business Insight's demographers and geographers would like to thank their colleagues at the Australian Bureau of Statistics (ABS) for providing valuable assistance at many points during this project. Public sector demographers, especially those working for national statistical agencies and regional planning authorities, are often called upon to develop population estimates and projections for larger areas: nation, state/territory/province, and statistical region. Applying the best tools and techniques available, along with the most thoughtful assumptions, public sector demographers have consistently generated reasonably accurate estimates and projections that have proved useful to myriad public and private agencies. However, consumer-oriented businesses, and some public sector agencies, have characteristically demanded more current information for smaller geographic entities and projections pushed out to ever more distant futures. That is the rationale for this project, which created a set of current and projected data for all Census Collection Districts across Australia. Ultimately, the information produced by this project combines the best work of ABS experts as well as the many years of global data development work on the part of Pitney Bowes Business Insight.

Geographic Issues

Using the data from Census 2006, Pitney Bowes Business Insight's analysts had to deal initially with geographic correspondences between the 2001 and 2006 Australian Standard Geographical Classification (ASGC) systems. Typically, from one census to another, official census geographic boundaries are changed to reflect new realities; for example, agglomeration of two municipalities into one or annexations of new developments into a growing city. However, in even the smallest formal areas (Census Collection Districts), boundaries are changed to implement census enumeration strategies effectively. In order to estimate population change from 2001 to 2006 (a first step in assessing differential growth for small areas), Pitney Bowes Business Insight's analysts had to develop 'correspondences' that permitted fair comparisons of population counts at two points in time within a relatively fixed boundary.

Whilst higher levels of geography are often intentionally held constant for statistical and political considerations, the definitions of smaller areas depend on variable settlement patterns of the population, and the need to maintain a relatively constant size range for the population living in each geographic unit. It is generally desirable to shift boundaries, or dissolve/split geographic units, to achieve target population sizes that allow for the publication of census data while maintaining confidentiality rules and minimising the need for data suppression.

In the case of Australia, Pitney Bowes Business Insight's analysts worked with a set of Census 2001-based Collection District boundaries and a set of Census 2006-based updated boundaries.



The Australian Bureau of Statistics has developed a 'Mesh Block' system that permits relatively easier comparisons of change over time in census results for small areas of analysis. However, the project described here has not made use of Mesh Blocks. Furthermore, it is unclear at this stage when the Australian Bureau of Statistics will formally migrate its data reporting to the Mesh Block standard.

For the purposes of this project, Pitney Bowes Business Insight's analysts used an ABS classification of 2006 Census Collection Districts (CCDs) that describes the extent to which each is comparable to 2001 CCDs. The following codes and their corresponding descriptions should give the reader a sense of the nature of this problem, as well as the extent of the difficulties:

A Classification of 2006 Census Collection Districts (CCDs)

Field	Description
0	2006 CCD is perfectly comparable to the 2001 CCD.
1	Although a change to the CCD boundary has occurred, there is no change to population and dwellings.
2	CCD is comparable within a 2% dwelling limit (that is, a boundary change occurred). However, no more than 2% of the 2001 dwellings in the CCD have been subtracted from or added to the CCD.
3	CCD is comparable within a 10% dwelling limit (that is, a boundary change has occurred). However, no more than 10% of the 2001 dwellings in the CCD have been subtracted from or added to the CCD.
4	CCD is not comparable due to a split into two parts (the 2001 boundary being retained around the two new 2006 CCDs).
5	As for 4 above, except that the split has involved the creation of three or more new CCDs.
6	CCD is not comparable due to the extent of boundary variation.
7	CCD is not comparable because it is an amalgamation of two 2001 CCDs to give a new 2006 CCD (the 2001 outer boundaries are retained).
8	CCD is not comparable due to an amalgamation of three or more 2001 CCDs, retaining the same outer boundaries.
9	The 2006 CCD has changed slightly when compared with the 2001 CCD due to the supply of a new basemap. The CCD boundary follows the same features. However, due to the new basemap, the boundary has been re-aligned accordingly.

Source: Australian Bureau of Statistics, document number: 2919.0.55.001 - 2001 to 2006 Census Collection District Comparability Listing, August 2006.

Selecting codes '0', '1' and '2' provides a set of CCDs with little or no change to their geographic boundaries, thereby providing a comparison between consistent geographic units.

Sets '4' and '5' are also fairly straightforward in that the analyst can sum two or more CCDs on the 2006 grid to create a unit comparable to a single CCD on the 2001 grid. The same is true for set '8' which has a many-to-one relation between a group of 2001 CCDs and a single 2006 CCD.

Beyond the above sets, a more sophisticated approach was needed to create comparable geographic units. Pitney Bowes Business Insight's analysts therefore created 'super CCDs' by using spatial analytic tools to aggregate CCD units from either or both of the 2001 and 2006 sets, such that at some higher geo-spatial scale a new single unit was created (a 'super CCD') that best approximated a comparable geographic unit in the corresponding year. The 'super CCDs' can be used in combination with those CCDs experiencing minimal geographic change, to establish average annual change rates. The overall objective was to compile a set of rates of population change on consistent geographic units at the lowest possible level of analysis relevant to the inter-censal time period. These rates were then to be made available as inputs into mathematical projection formulae.

Due in part to the nature of governmental regulations and the regional planning process across Australia, a key source of indicators of local demographic change are the 'Building Approvals' published by the Australian Bureau of Statistics (ABS). 'Building Approval' data was therefore another input to the projection model. This data, collected from a variety of planning agencies, provided a basis for assessing relative growth for small areas, including Census Collection Districts (CCDs). Pitney Bowes Business Insight's analysts used this data, primarily for Queensland, New South Wales, and Victoria, to evaluate specific areas where new housing and population growth were likely to occur. Furthermore, a set of Estimated Residential Populations (ERP), based in part on 'Building Approval' data, is available for the period 2007 to 2008 from ABS on 2006 CCDs.

Chapter 1: Introduction and Methodology

Estimated numbers of households and implied average household sizes were also used from the ERP data. The overall result of the small area modelling exercise was to establish consistent trends that could be matched to the higher level estimates and projections produced by ABS experts.

High Level Estimates and Projections

The Australian Bureau of Statistics continually produces population estimates and projections, updating the base year information with each census. For example, a recent projection series dates from 2004 to 2101, essentially a 100-year projection from the base year 2001 to 2101 (ABS, Population Projections for Australia, 2004 To 2101, document 3222.0, published in 2005). Subsequent projection series published by ABS in 2006 and 2008 are currently under evaluation by Pitney Bowes Business Insight's analysts and will be incorporated into the 2010 update.

There are three published scenarios – A, B, and C – which correspond to three sets of assumptions with respect to fertility, mortality, and migration. Whilst there are other scenarios, these three encapsulate the primary set of reasonable assumptions. Scenario B – the middle series – was selected by the Pitney Bowes Business Insight project team as representing a set of assumptions that could reasonably be incorporated into the present project. The fertility assumption in Scenario B foresees the Total Fertility Rate (TFR) falling slightly from 1.75 children per woman in 2004, a level consistent with current estimates from 2001 to 2006, to 1.7 children per woman by 2019. The net immigration assumption for this scenario is 110,000 net permanent immigrants to Australia per year.

Whilst this assumption is below the 250,000 net new migrants to Australia in calendar year 2008, there has been considerable fluctuation in this annual number over the past decade. Scenario B's assumption, however, seems most in line with current policy and likely cumulative impact of near-term projections. The Pitney Bowes Business Insight project team will continue to monitor net overseas migration trends and incorporate any significant long-term shifts into the annual update of these projections. The mortality assumptions for Scenario B are also in line with current levels of life expectancy for males and females in Australia. Whilst the constancy of these key assumptions out 100 years is certainly not known, Scenario B provides a reasonable set of assumptions that will likely be closer than those represented in the alternative scenarios, especially in the near term. This Pitney Bowes Business Insight project is concerned primarily with the assumptions trajectory going out ten years.

Another ABS resource utilised in these estimates and projections was the current Statistical Local Area (SLA) estimates. These post-Census 2006-based estimates established for SLAs an updated population number to which lower level estimates for 2009 could be matched. Two basic points can be made to summarize this process:

1. Pitney Bowes Business Insight's analysts tried to make use of the most current work of ABS experts despite some differences in time frames and underlying geographies; and
2. Pitney Bowes Business Insight's analysts applied standard methodologies and 'best practices' to reconcile the estimates and projections such that the result was a 'best fit' given the available information and the most reasonable demographic assumptions.

Demographic Characteristics beyond Total Population and Households

Consumer-oriented businesses have an interest in small area demographic estimates. Such businesses are typically looking for growth areas where new populations are settling and driving demand for an array of consumer products in the retail market. Similarly, residential areas are differentially served by retail establishments which either by location or design cannot serve all areas equally. The expansion plans of a retailer may involve detailed comparative analysis of potential markets or a consideration of an optimal network of retail outlets that maximises the company's profitability.

These issues may require demographic inputs beyond indicators of market size and growth as shown by the magnitude and projected growth rates of the total population and households. Fundamental to most demographic estimates and projections efforts are the traditional cohort component models which have much relevance to 'higher level' geographics such as states, territories, and nations. However, cohort component models quickly lose relevance for small areas such as Collection Districts, where patterns of housing

construction, vacancy rates, and even residential demolition can impact the accuracy of estimates. Nevertheless, building on census enumerations, analysts can estimate and project such characteristics as the population by age and sex, and household income.

As long as assumptions are clear, it is straightforward to incorporate population distributions by age and sex into the analysis. Using the census enumeration as a starting point, for example, local age distributions can be 'advanced' in line with the results of full cohort models at higher geographic levels. Keys to accuracy, however, hinge on such intangibles as the net effects on the age structure of in-migrants and out-migrants. A housing development, for example, may attract young families who over a period of time can be expected to age and ultimately be replaced by similar families. However, a university town may experience considerable turnover in a young adult age group, say 18 to 24, which consequently would not be expected to age into older age brackets. Through the various tools available to demographers—iterative proportional fitting, multi-dimensional raking, and plus-minus apportionment—the estimation results will sum to high level control totals.

Household characteristics present similar challenges. Average household size, for example, has fallen as more people live alone, more couples have fewer children or none at all, and population ageing and other factors replace 'traditional' families with all manner of coupling. The Pitney Bowes Business Insight approach is to establish local trends in household size based on the relative growth rates of the household population and total households. Beyond household size, the wealth of Australian census variables offers numerous ways to characterise households in small geographic areas. The challenge is to update such characteristics to the current year and to project out five years. The approach taken here was to establish a 'household maintainer' age distribution based on the ages of persons in households and their relationship to 'person one' (the householder). Then, by shifting the age distribution of householders via a headship rate projection model, updated estimates and projections of households by age of householder were produced.

Household Income Distribution

The method for estimating household income began with the weekly income distributions. The distributions of households by income group at the CCD level are moved from the Pitney Bowes Insight 2008 Estimates to estimated 2009 distributions, using trends based on information from the Taxation Statistics report from the Australian Taxation Office (ATO). The Taxation Statistics report provides mean taxable income per taxpayer for each Australia Post postcode. ATO calculates mean taxable income by taking the total taxable income accruing to each postcode and dividing by the number of taxpayers. Pitney Bowes Business Insight's analysts compared the mean taxable income from the 2004/05 Taxation Statistics with the same data in the 2006/07 Taxation Statistics (the most current tax year for which data are available) and calculated a compound average annual growth rate. This growth was further refined by matching to the state income patterns published by the ABS in the National Accounts (the GDP statistics).

Once the postcode level trend is established, the rate is applied to each of the CCDs within a postcode, based on a concordance table which aligns the Australia Post postcodes with the ABS Postal Areas and CCDs. The CCD income trends are then used to establish a target mean for the household distributions. Finally, the Pitney Bowes Business Insight 2008 income distributions are shifted in a manner that preserves the general shape of the distribution but conforms to the new target mean income for 2009. Mean weekly income is estimated from the distribution of households across the income groups at the CCD level then annualised to create an Average Annualised Household Income.

General Caveats

The information derived from these methods can provide cost-effective inputs to business decision-making relevant to local markets. The key to interpreting this information, however, is not to view it as a certain forecast but as one likely projection scenario given a set of reasonable assumptions applied within standard methodologies, but subject to the inherent uncertainty of future population movements.

The data represents the best estimates of how observed trends and regional projections might roll out at a small spatial scale. The data is not based on anecdotal data and should be used in addition to any local area knowledge that analysts may have.

i Due to updates in the source data, improvements made to methodologies, and geographic changes, users are urged to use caution when making year-over-year comparisons. In general, census year to current year average annual change represents a more stable trend than year-over-year change.

Product Specifications

This chapter covers the records and variables in the Pitney Bowes Business Insight Estimates and Projections database for Australia.

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Number of Variables

184

Coverage Area

This database covers the entire area of Australia's eight states and territories, and outlying regions.

Reference Dates

All variables are referenced as of July 1 of each given year. This reference date represents the mid-point or average value for the year, and does not imply anything about seasonal variations in housing unit occupancy.

Records by Geographic Layer

Number of Records by Layer

Layer	Abbreviation		Number of Records*
Australia	AUS	ABS, 1259.0.30.002 - ASGC Digital Boundaries, 2006 (released 14.07.2006)	1
State/Territory	STE	ABS, 1259.0.30.002 - ASGC Digital Boundaries, 2006 (released 14.07.2006)	9
Major Statistical Region	MSR	ABS, 1259.0.30.002 - ASGC Digital Boundaries, 2006 (released 14.07.2006)	23
Statistical Region	SR	ABS, 1259.0.30.002 - ASGC Digital Boundaries, 2006 (released 14.07.2006)	75
Statistical Region Sector	SRS	ABS, 1259.0.30.002 - ASGC Digital Boundaries, 2006 (released 14.07.2006)	98
Statistical Division	SD	ABS, 1259.0.30.002 - ASGC Digital Boundaries, 2006 (released 04.08.2006)	78
Statistical Subdivision	SSD	ABS, 1259.0.30.002 - ASGC Digital Boundaries, 2006 (released 14.07.2006)	226
Statistical Local Area	SLA	ABS, 1259.0.30.002 - ASGC Digital Boundaries, 2006 (released 14.07.2006)	1,435
Local Government Area	LGA	ABS, 1259.0.30.002 - ASGC Digital Boundaries, 2006 (released 14.07.2006)	685
Postal Area	POA	ABS, 2923.0.30.001 - Census Geographic Areas, 2006 (released 17.07.2007)	2,524
Census Collection District	CCD	ABS, 1259.0.30.002 - ASGC Digital Boundaries, 2006 (released 04.08.2006)	38,713

* Users may note additional records in some layers due to the fact that Pitney Bowes Australia Pty Ltd. includes within the roster those records that account for persons who were enumerated in Census 2006 at a place other than their usual residence on census night, and for whom the geographic entity of their usual residence was unknown. Some of these records may contain zeros, whilst others may contain data. The **Number of Records** column represents the official ABS record count for a given roster.

Table Structures

See *AustralianDemographicEstimatesProjections_variables.xls* in the *docs* folder on the product media for a complete list of the variables in this data product. This file is a Microsoft Excel spreadsheet. If you do not have Microsoft Excel, then you can download the Excel Viewer from <http://office.microsoft.com>.