Building in Australia
2011 – 2026
31st Edition

EXTRACT TO INDICATE THE GENERAL NATURE OF THE REPORT

BUILDING AND CONSTRUCTION

BIS Shrapnel
BUSINESS RESEARCH AND FORECASTING

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1. INTRODUCTION

1.1 Objectives

"*Building in Australia 2011 to 2026*", is the 31st edition of "*Building in Australia*". It is intended to assist builders, developers, manufacturers, financiers and public sector agencies with their planning process. Focus is on the medium and long-term outlook for the building industry in Australia, which makes it a most effective tool for medium and long-term planning in both private industry and in government. It provides senior executives with an overall view for prospects, which can be held with relative confidence because of the detailed analysis underlying the forecasts. It can also be used by corporate planners and line managers as a source of detailed forecasts for specific sectors.

"*Building in Australia"* is published annually. Each edition is completely revised and rewritten. New information is incorporated on industry trends, on short-term changes in government policies, demographic factors and on economic conditions. Long-term prospects for the building industry can be influenced by such short-term changes.

1.2 Methodology

Given the volatility of swings associated with cycles in the building industry, the forecasts are only indicative fifteen years out. Cyclical movements tend to dominate activity levels in the short to medium term. However, information about longer-term prospects, as well as short- to medium-term prospects, is essential for effective planning and investment decisions.

A key objective is to identify the underlying trends in the building industry and to analyse the long-run structural influences on building activity. This is achieved by placing current activity levels into an historical perspective and by distinguishing between the cyclical and underlying structural components of growth. A detailed analysis of the underlying level of demand for dwellings based on estimates of household formation by age groups is an integral part of the analysis. This methodology takes account of the changing age structure of the population, as well as assumptions on net overseas and interstate migration.

The medium-term forecasts for the five years to 2015/16 provide a link between the short-term forecasts published regularly in *"Building Industry Prospects"*, a monthly publication, and the long-term fifteen-year forecasts in this report. Medium-term forecasts incorporate the cyclical influences on the level of building activity over the next five years.

The longer-term forecasts for the next ten years to 2025/26 are estimates of average annual demand over 5-year intervals. The building cycle represents short-term fluctuations around the underlying trend. It is not possible to accurately forecast short-term fluctuations beyond five years.

Methodology behind the building investment cycle is explained in Section 1.3.

1.3 The building investment cycle

In an environment of volatile interest rates, the building investment cycle plays a crucial role in determining activity levels in the **short to medium term**. The building industry and property markets are subject to very strong cyclical fluctuations in activity levels, in real estate prices and in real estate sales volumes. These cyclical fluctuations are influenced by financial capital flows into and out of investment in real estate.

The long-term level of activity depends on the “underlying demand”. While the underlying demand determines the sustainable level of activity in the building industry, the underlying demand, in turn, depends on economic and demographic factors. Actual activity levels tend to fluctuate around these sustainable levels with a corresponding cycle in prices. In practice, the cyclical element typically dominates longer-term factors in the short to medium term.

Sustainable level of building activity and underlying demand

The ‘sustainable’ level of building activity is determined by the underlying demand. The **underlying demand for new dwellings** is in turn, determined by economic and demographic factors. The main factors are:

- household formation,
- demolitions, and
- the demand for second homes.

These factors which determine underlying demand, in turn are **influenced** by:

- rate of population increase,
- the changing age structure of the population,
- employment and unemployment,
- real incomes,
- the relative price of housing,
- the age of the housing stock,
- natural disasters (such as damage by storm, flood and bush fire),
- urban consolidation.

The underlying demand for office space similarly depends on:

- office employment,
- the average floor area per employee, and
- the space required or saved by the introduction of new office technology.

Generally, in any specific sector of the building industry, the sustainable level of building activity is determined by the underlying demand for the services provided by that sector, in light of economic and demographic trends.

In practice, actual activity levels in each building sector tend to cycle around sustainable levels with a corresponding cycle in prices. In the short to medium term, the cyclical element dominates the underlying influences on activity levels. However, over a long period of time, the short-term fluctuations even out to the long-term level.

Real estate prices

The long-run underlying **'equilibrium'** price of real estate increases over time because of the following factors:

- the rate of inflation (somewhere between price inflation, which reflects building costs, and earnings inflation, which reflects capacity to pay for dwellings and the labour component of building costs),
- the increasing scarcity of land close to urban centres, and
- expenditure on improvements to dwellings.

Real estate prices **cycle** around equilibrium prices through the building cycle. The course of prices over the cycle depends on:

- the nature of investors and their liquidity situation, and
- the short-term relationship between supply and demand for real estate.

Prices are not generally symmetrical in the upturn and the downturn. In the *upturn*, prices tend to rise in real terms at a faster rate than general inflation. However, there is a tendency to hold real estate rather than to sell at a capital loss, and this means that there is often not a dramatic fall in real estate prices in a *downturn*. Rather, nominal prices tend to flatten out, rising at less than the rate of inflation, but, nevertheless, falling in real terms.

Real estate sales volumes

Real estate sales volumes similarly, are subject to **cyclical influences** for a variety of reasons, including:

- stronger interest in the upturn by both vendors and purchasers, and
- an asymmetry in the reaction of vendors' and purchasers' expectations to changing market conditions.

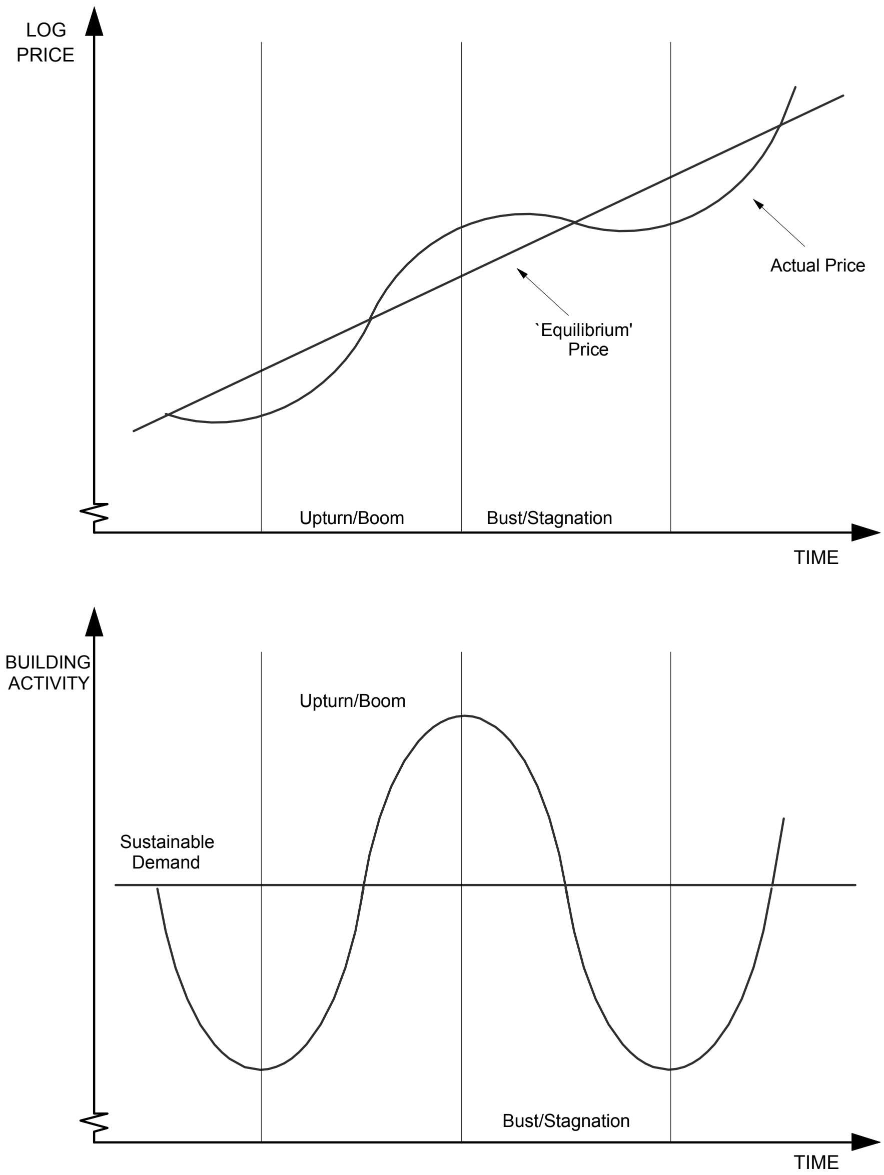
In the *upturn*, price expectations of vendors and purchasers are buoyant, resulting in an influx of new investment capital and a perceived pressure on purchasers to buy quickly in a sellers' market. This results in buoyant market conditions and high sales volumes. In the *downturn*, there is less purchaser interest and purchasers' price expectations tend to adjust downwards more quickly than those of vendors.

The **speed of adjustment** of vendors' price expectations depends on:

- their reluctance to sell at a capital loss, and
- the extent of forced sales.

Real estate sales volumes tend to be high in the *upturn* phase of the cycle when there is an influx of investment capital, particularly speculative investment capital. Sales volumes tend to be lower in the *downturn* phase when there is an exit of investment capital and when vendors' and purchasers' price expectations are mismatched. Activity levels recover somewhat during the *stagnation* phase as price expectations are adjusted and more normal conditions are restored.

Chart 1.1: Price and Activity in the Building Investment Cycle



The building cycle

The building cycle is essentially a **natural stock cycle**. Uncertainty and long lead times between planning and completion influence the de-stocking and stocking process. The cycle is influenced by **uncertainty** about:

- the underlying demand,
- the amount of building being undertaken, and
- prospective yields.

This uncertainty, which accompanies the building cycle, is particularly evident in office developments which may take up to four years to complete, in addition to several years of planning.

A **building investment cycle** is superimposed on the stock cycle. The building investment cycle is caused by financial capital flows moving into and out of the building industry, which substantially enlarges the amplitude of the cycle.

There are three main types of **investment capital**:

- Capital flows associated with owner occupiers are the most stable, but are influenced by economic conditions.
- Yield-seeking capital flows are sensitive to economic conditions through their effect on portfolio choice considerations. Because of sensitivity to yields, yield-seeking capital tends to flow into the building sector when prices are undervalued and yields are high, and tends to exit as the strength of the upturn raises prices and lowers yields.
- Investment flows which seek capital gains are the least stable, because of their speculative nature. Capital gains seeking investment tends to enter midway through the upturn when the potential for capital gains has been clearly established. This boosts investment, often turning the upturn into a (less realistic) boom. During the downturn, these funds tend to exit, thereby deepening the decline in activity.

The momentum provided by the interaction of investment capital flows, uncertainty and long lead times, override the influence of underlying economic and demographic factors, and result in cyclical fluctuations.

The **building cycle** typically has four phases: the upturn, the boom, the bust and stagnation. Each of these phases is discussed below:

- After a period of stagnation in building activity (below the long-run sustainable level of demand), excess demand emerges. Deficient stock leads to rises in rental levels and, because prices are undervalued, yields are relatively high and rising. These high yields attract investors into the market and cause both prices and activity levels to rise. The upturn is characterised by rising rentals associated with excess demand for space. It is also characterised by increased prices and activity associated with the entry of yield-seeking investment capital flows.
- The boom is characterised by the entry of speculative capital with investors seeking capital gains. These investment flows are volatile. After a period of rising prices, expectation of further rises in prices becomes self-fulfilling as new investors enter the market. With these rising prices, developers’ margins become more attractive and activity accelerates to a level greater than sustainable by the underlying demand. The influx of investment into real estate causes both prices and activity to overshoot. During the upturn and boom, prices typically rise at a rate greater than the rate of inflation so that the real prices are rising and yields are falling. At the peak of the boom, property is substantially overvalued, yields are low, excess stocks result in high vacancy rates and in pressure to reduce rents.
- Excessive building activity during the boom eventually leads to oversupply. Rental yields are at low levels, because of the previous rises in prices and rents and because prices and rents are not expected to rise further. Investors seeking yields withdraw from the market. Those investors not locked in also withdraw their funds from the market, sales volumes fall and nominal prices stop rising. Activity levels fall dramatically. The course of prices depends on the nature of the market. Although forced sales during the bust can result in a substantial decline in prices, in the housing sector people tend to hold on to their property rather than to sell at a capital loss. As it takes time for vendors to adjust their price expectations, asking prices tend to be too high during the bust and the volume of real estate sales drops

dramatically. Average prices in the market tend to flatten out rather than decline and rise at a rate much less than the rate of inflation. Accordingly prices fall in real terms.

- After the bust, activity levels stabilise below long-run levels, sowing the seeds for the next upturn. The period of stagnation allows absorption of excess stocks built up during the boom. As investors recall the last boom/bust, this period typically lasts until excess demand becomes evident and creates conditions which lead to the next upturn. Low nominal price increases mean that real prices are falling until, at the end of the stagnation phase, prices tend to be undervalued in real terms. This, together with a deficient supply of dwelling stock, leads to pressure on rentals, high yields and the next upturn.

Speculative investment behaviour is destabilising. It is the inflow of investment capital which creates the boom. The high activity levels during the boom create an oversupply of buildings and are, therefore, inevitably followed by a bust which is accentuated by the exit of investment capital. The greater the boom, the greater is the bust. The recession in activity is an integral part of the cycle. The longer the stagnation after the excess supply has been absorbed, the greater the build-up of latent excess demand and the higher the probability of a subsequent boom.

Short-term economic factors can crucially influence the timing and extent of the cycle. The cost and availability of housing finance affects the demand for real estate by owner occupiers. Property investors are more concerned with interest rates compared with yields on alternative investments from a portfolio choice perspective. Government policies, such as changes that have been made to the capital gains tax, the introduction and subsequent reversal of quarantining of negative gearing for property investors and the stimulus provided by depreciation allowances on buildings, and the introduction of a goods and services tax can also influence property investment.

Finally, the economic environment may influence the building cycle through its effects on the demand for buildings for business purposes. The cyclical variations in the demand for office space, hotel services, warehousing and factories are examples. Thus an adverse economic environment can bring an upturn to an abrupt end, accelerate a downturn or delay recovery, and conversely for favourable economic conditions.

These cyclical influences are important for the course of building activity. In the long run, the over-building during the boom is counter-balanced by the under-building during stagnation. But in the short term, cyclical factors dominate the course of building activity.

While the time period and amplitude of prices and activity through the cycle vary between sectors and states, the patterns are consistent as illustrated in chart 1.1. Cycles in the residential sector vary in length from five years to eight years and up to fifteen years in the commercial office market. The residential building cycle can involve rises in an upturn of between 50% and 80%. In the office sector, building activity can increase by up to 400% during an upturn and the boom can last for six or seven years, while prices may rise from 30% to 80% in real terms in an upturn, depending on how undervalued prices were at the end of the last recession.

In this report, short-term cyclical influences are considered in the broader context of the underlying demand. The objective of the report is to place short-term building activity levels within a longer-term perspective. The forecasts attempt to capture the influence of the cycle five years out and thereafter estimate underlying trends. The cycles around these underlying trends will determine actual levels of activity. Forecasts beyond five years do not fully capture these cyclical influences.

1.4 Definitions for dwellings

Dwellings versus commercial accommodation

In this report, the term “dwelling” has been used in a narrow sense to include only those structures used specifically for private living purposes. “Commercial” accommodation establishments, such as hotels, motels, holiday apartments and hostels are excluded from this definition. The Australian Bureau of Statistics (ABS) defines a dwelling or residential building as:

- a rigid, fixed and permanent structure which has a roof and whose intended purpose is primarily to house people and as such, has a self-contained suite of rooms, including cooking and bathing facilities and is intended for long-term residential use.

Houses versus other dwellings

Residential or dwelling buildings can be either houses or other residential buildings. The ABS definitions are as follows:

- a house is a detached building which is primarily used for long-term residential purposes and which consists of one dwelling unit. In addition, detached granny flats, detached dwelling units (e.g. caretakers’ residences) associated with a non-residential building, cottages, bungalows and rectories are defined as houses.

- an other dwelling is a building other than a house, which is primarily used for long-term residential purposes and which contains (or has attached to it) more than one dwelling unit. In this report, we divide the other dwelling sector to medium density and high density segments. Medium density dwellings include semi-detached and terrace houses, townhouses, duplexes and villas. High density dwellings include flats, units and apartments.

Private dwellings versus public dwellings

From the 16th edition of “Building in Australia” the term “public dwellings” has replaced the previously used term “government dwellings”, to be consistent with the Australian Bureau of Statistics. Separate forecasts have been made for private and public dwellings. Again, the Statistician’s definitions have been followed, by using “private” to distinguish between “privately-owned” and “publicly-owned” dwellings.

This differs from the definition used for Census purposes where dwelling ownership is divided into private and non-private to differentiate between dwellings for private living purposes and commercial i.e. non-private accommodation.

Conversions versus alterations and additions

From the 17th edition of “Building in Australia” the number of dwelling units created from alterations and additions to, or conversions of, existing residential or non-residential buildings and as part of the construction of non-residential building is shown separately in the tables under the heading of total “Conversions”, and is included in total other dwellings. Conversions are not classified as new.

“Alterations and additions” is defined as building activity carried out on existing buildings, including addition to or reduction in floor areas, alteration to the structural design of a building and affixing rigid components, which are integral to the functioning of the building.

The alteration & addition to dwelling building jobs that do not create separate dwelling units, are not included in the dwelling table for approvals, commencements and completions. However these are included separately in the total value of building commenced tables for both current and constant prices.

1.5 Time taken between dwelling approvals, commencements and completions

This section outlines the methodology used to estimate the average timing between approval, commencement and completion of dwelling projects. There is substantial variability of time taken between individual projects. The following estimates relate to average times. These estimates were last revised in the *27th edition* as it was felt that the drop-off rate between the approval and commencement stage had declined more significantly over the previous five years. The estimate for conversion was also added in that edition.

The results presented below are based on quarterly regression analysis of Australian data between 1989 and 2006.

The following **notation** is used:

A	=	number of approvals
M	=	number of commencements
P	=	number of completions
PH	=	private houses
PSH	=	public sector houses
PO	=	private other dwellings
PSO	=	public sector other dwellings
CON	=	Conversion
D	=	drop-off rate

A lag is denoted by a subscript. P_{-2} is the number of completions lagged 2 quarters.

Although most approvals do reach the commencement stage, there is a small drop-off rate (D) of approximately 5% in the private sector. The **lag between approval and commencement** is relatively short. The regression results indicate lags of the following magnitude:

PH : $M = .66A + .32A_{-1}$ (D = 2%)
PO : $M = .74A + .23A_{-1}$ (D = 3%)
PSH : $M = .48A + .51A_{-1}$ (D = 1.1%)
PSO : $M = .36A + .64A_{-1}$ (D = 0%)
CON : $M = .26A + .67A\text{-}_{1}$ (D = 7.0%)

The second formula above, for example, states that approximately 74% of private other dwellings are commenced in the same quarter as they are approved, 22% are commenced in the following quarter, and 3% do not reach the commencement stage.

Unlike the lag from approval to commencement, the **lag between commencement and completion** varies greatly between houses and other dwellings. This is because of the size of projects and the type of builders involved. In a boom where there are capacity constraints, the length of time to complete a dwelling may increase substantially. It appears that the lag between commencement and completion in the public sector has become shorter over the last seven years.

PH : $P = .53M_{-1} + .16M_{-2} + .31M_{-4}$
PO : $P = .51M_{-1} + .49M_{-4}$
PSH : $P = .69M_{-1} + .31M_{-2}$
PSO : $P = .58M_{-1} + .25M_{-2} + .17M_{-3}$
CON : $P = .44M_{-2} + .31M_{-3} + .25M_{-5}$

The lag estimates detailed above relate to quarterly data and are used in the derivation of the short-term forecasts of commencements and completions from the forecasts of dwelling approvals.

Most *private houses* are completed relatively quickly, in the quarter after commencement. These are usually jobs undertaken by large volume project home builders. A significant proportion are completed about four quarters after commencement and are jobs which would most likely be either up-market or owner-built houses.

In the *other dwellings* sector, relatively small projects can be completed quickly, but larger projects take longer. This, together with differences between builders, means that it requires lags of four quarters to capture the significant parts of the industry. Some of the very large projects may take even longer, but they are not numerically significant.

Most *conversion* projects are completed between the second and third quarters after commencement. A quarter of the projects are completed about five quarters after commencement.

1.6 Definitions for non-dwelling building

With our latest round of non-residential forecasts, BIS Shrapnel has made the transition from the Australian Bureau of Statistics 1986 Function Classification of Buildings to its 1999 Function Classification of Buildings. The reasoning for this:

- Persisting with the old categories was being increasingly unworkable.
- The new categories system provides a more detailed breakdown.
- It allows us to produce more accurate and target forecasts.

Stalling our transition to the new classification system was that the Australian Bureau of Statistics was still releasing data under the 1986 Function Classification of Buildings up until 2009. The absence of historical data pre 2000/01 for many amended categories under the 1999 Function Classification of Buildings also acted as a delaying factor. Now, with over a decade of historical data under the new classification system, this concern has lessened.

The core changes for our reporting of non-residential are that:

- Other business premises (OBP) no longer exists. Building activity that used to come under this category is now predominately split into the transport, warehouse and other commercial and industrial building sectors.
- The previous definition of Health is discontinued. The old category definition of health included aged care buildings. This has now been separated out into its own sector. Health now only relates to health facilities (GP clinics, hospitals, laboratories etc.).

The new structure under which BIS Shrapnel reports non-residential building is not 100% consistent with that of ABS. The reasons BIS Shrapnel reports under an amended structure are to better reflect the core market components and to present non-residential building market in a more simplified manner.

Highlighting the structure variation:

	BIS Shrapnel breakdown	Default ABS breakdown
	Commercial and industrial	**Commercial**
	Retail and wholesale trade buildings	Retail and wholesale trade buildings
	Offices	Offices
	Accommodation	Transport buildings
	Transport buildings	Other commercial buildings n.e.c.
	Factories and other secondary production buildings	
	Warehouses (excluding produce storage)	**Industrial**
Other C&I	Agricultural and aquacultural buildings	Factories and other secondary production buildings
Other C&I	Other commercial buildings n.e.c.	Warehouses (excluding produce storage)
Other C&I	Other industrial buildings n.e.c.	Agricultural and aquacultural buildings
		Other industrial buildings n.e.c.
	Social and Institutional	
	Educational	**Other non-residential building**
	Aged care facilities	Educational
	Health facilities (non-aged care medical services)	Aged care facilities
	Entertainment and recreation	Health facilities (non-aged care medical services)
Other S&I	Religious	Entertainment and recreation
Other S&I	Other non-residential buildings n.e.c.	Religious
		Accommodation
		Other non-residential buildings n.e.c.

Other commercial and industrial is an amalgamation of the agricultural and aquaculture, other commercial and other industrial buildings. These are all very small sectors, each representing less than 1% of total non-residential building activity, and have been grouped for simplicity and consistency reasons.

Other social and institutional is an amalgamation of the religious, and other non-residential building not elsewhere classified building sectors. Religious buildings are a very small sector, representing less than 1% of total non-residential building activity, and have been grouped with other non-residential building not elsewhere classified, again for simplicity and consistency reasons.

The non-residential sectors under the 1999 Function Classification of Buildings are defined as followed:

Sector	Definition
Retail	Buildings primarily used in the sale of goods to intermediate and end users
Transport	Buildings primarily used in the provision of transport services, including passenger transport buildings (e.g. passenger terminals), non-passenger transport buildings (e.g. freight terminals), commercial car parks (excluded are those built as part of, and intended to service, other distinct building developments) and other transport buildings not elsewhere classified
Offices	Buildings primarily used in the provision of professional services or public administration (e.g. offices, insurance or finance buildings).

Accommodation	Buildings primarily providing short-term or temporary accommodation, including self-contained short-term apartments (e.g. serviced apartments), hotels (predominantly accommodation), motels, boarding houses, cabins, and other short-term accommodation not elsewhere classified (e.g. migrant hostels, youth hostels, lodges).
Other Commercial	Commercial buildings not elsewhere classified, such as garage – smash repair, marina, mail sorting centre, metering station and petrol stations.
Warehouse	Buildings primarily used for storage of goods, excluding produce storage.
Factory	Buildings housing, or associated with, production and assembly processes of intermediate and final goods.
Agriculture	Buildings housing, or associated with, agriculture and aquaculture activities, including bulk storage of produce (e.g. shearing shed, grain silo, shearers' quarters).
Other Industrial	Industrial buildings not elsewhere classified, such as crusher house, and oil depot (buildings, not tanks).
Education	Buildings used in the provision or support of educational services, including group accommodation buildings (e.g. classrooms, school canteens, dormitories).
Religion	Buildings used for or associated with worship or in support of programs sponsored by religious bodies (e.g. church, temple, church hall, dormitories).
Aged care	Building used in the provision or support of aged care facilities, excluding dwellings (e.g. retirement villages). Includes aged care facilities with and without medical care.
Health	Buildings used in the provision of non-aged care medical services (e.g. nursing quarters, laboratories, clinics).
Entertainment & rec.	Buildings used in the provision of entertainment and recreational facilities or services (e.g. libraries, museums, casinos, sporting facilities).
Other non-res n.e.c.	Non-residential buildings not elsewhere classified, such as council depots, police stations, veterinary premises and public toilets.

1.7 Constant price estimates — new series

The forecasts of the value of non-dwelling buildings commenced have been expressed in constant rather than current prices, to remove the effects of inflation and to measure **real activity**. The Australian Bureau of Statistics publishes data in current prices. It is therefore necessary to deflate the available series by an appropriate index before the forecasting models can be used.

In the *19th edition*, there was a change to the implicit price deflators used to calculate constant price series. The 'deflators' now used by the ABS to deflate current building commencements to obtain real or constant building commencements, are referred to as 'Laspeyres' **chain volume measures**. These chain volume or constant prices estimates measure changes in value after the direct effects of price changes have been eliminated and therefore only reflect volume changes. An individual annually re-weighted Laspeyres Index is used for each state. Chain volume measures are used to provide a more accurate picture of real activity.

The **basic deflators** used are derived from the same price data underlying the deflators compiled for the dwellings and non-dwelling construction components of the national accounts aggregate ‘Gross fixed capital formation’. The chain volume measures of commencements are annually re-weighted chain ‘Laspeyres’ indexes referenced to current price values in a chosen reference year (currently 2008/09). The reference year is updated annually.

1.8 Data sources, discontinuities and difficulties

Unless otherwise stated, all historical data on building activity in the tables and charts of this report are sourced from the Australian Bureau of Statistics.

At the time of writing, actual building data for the 2010/11 financial year was not available. As a result, the tables and charts in this report include actual data for 2009/10 and estimates (based on actual data for six months) for 2010/11.

These are some **problems** associated with the historical **building statistics** series:

- The first discontinuity was the inclusion of alterations and additions over $10,000 in approvals, commencements and completions data of dwellings until the September quarter 1973. Prior to the change, this had only minor consequences as relatively few alterations and additions exceeded $10,000. However, as they increased the Statistician provided a separate series on alterations and additions over $10,000, as well as, on ‘new’ houses and ‘new’ other dwellings. This problem was most significant in New South Wales.
- The second discontinuity results from varying definitions of what constitutes a “house” and what constitutes an “other dwelling”. In Tasmania, South Australia and Western Australia, breaks in the continuity arose because dwellings such as duplexes, villa units and town houses were classified as “houses”, rather than as “other dwellings”, as has been the case since September 1973.
- The third discontinuity arises from changes associated with the introduction of a Building Activity Survey from the September quarter 1980. Further changes were introduced from September quarter 1981 to minimise the incidence of the significant revisions required under the September 1980 procedures. As a result, commencements in say, the June quarter, only includes projects which were approved up until the end of May, (projects approved in June and commenced in June, appear in the September quarter statistics).

While the data for dwelling completions is available from regular Australian Bureau of Statistics’ collections, data on unoccupied dwellings, total dwelling stock and demolitions is only available from the population Censuses conducted at five-year intervals. There are a number of **difficulties** associated with using **Census** data:

- the number of occupied dwellings is equal by definition to the number of households. This is not necessarily the number of actual dwelling structures, as it is possible that more than one household may occupy one dwelling,
- the main requirement for forecasting is to estimate the underlying number of occupied and unoccupied dwellings and demolitions. However, Census data is collected at a specific date and is affected by general economic influences, as well as, changing stock holding patterns through the building cycle. Allowance must be made for economic and building industry conditions at Census time,
- changes in definitions from one Census to another, as well as
- varying rates of under-enumeration at each Census.

1.9 Charts

An extensive range of charts typically spanning an historical period of over thirty years supplements the analysis of trends and forecasts. The ratio scale or semi-logarithmic format used in the charts has the advantage of giving a rate of growth of the variable plotted, which is equivalent to the slope of the curve. In other words, a given slope of the curve represents a constant rate of growth. The semi-logarithmic format also has the advantage of giving growth readings which are directly comparable over the entire time period of the chart.

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