STUDY REPORT

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New house price modelling

I.C. Page

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Preface

This report analyses the factors influencing house prices in recent years, including a discussion on land, materials, labour costs, profits and other cost impacts. A spreadsheet model was produced enabling the effect of price changes in any input to be assessed as a change in the final $/sqm rate. Productivity in the industry was examined and reasons for a declining trend are discussed. A comparative analysis is undertaken of big and small builders and it is concluded that the large volume builders can produce houses significantly cheaper than smaller builders.

Acknowledgments

This work was funded by the Building Research Levy.

Note

This report is intended for designers, major builders, developers and officials. It supports earlier work that raw land costs and industry regulation have a significant impact on new housing prices. In contrast to most recent work on housing which has concentrated on affordability, this report examines the supply side of the housing sector and the potential for cost savings.

New house price modelling

BRANZ Study Report SR 196

I.C. Page

Abstract

This report considers the relative contribution of the various inputs into the price of new housing. It finds that land is the major segment, with raw land the larger part and development costs somewhat smaller. Materials are the next largest segment, and the economic scale of local manufacturing is discussed. Labour is the third major input and there is some analysis of the productivity of the industry and reasons for its long-term decline, including regulatory impacts and skill shortages. Profit levels in the industry are modelled. Multi-unit and multi-storey house construction is compared to detached single-storey construction. The report suggests large-scale builders produce new housing significantly cheaper than most low volume builders. It suggests there is a significant cost associated with one-off designs that are currently the most common new house type, and that standardisation can achieve cost savings.

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1. SUMMARY

This report is an analysis of the factors affecting the price of housing from a supply side perspective. It looks at the major inputs of labour, materials, plant, land and regulation. Industry productivity is considered. There is a brief focus on demand factors such as the level of workloads on profit levels, but the main focus of the report is on the input components into new housing supply.

The work included the development of a spreadsheet model which breaks down the costs for three different house types into resource and component categories. The models enable the change in prices of any resource for any component to be assessed as a change in new house price. The analysis in this report helps answer questions commonly asked of the industry such as:

- What are the main components of new housing prices?
- What effect does the change in costs for any input (labour, materials, land etc) have on new house prices?
- What is the make-up of land prices?
- What role does construction industry productivity play?
- What are economies of scale in new housing supply?
- What is the potential for cost savings on the supply side?

The main findings are:

- The section price is the largest cost item for new detached housing, about 40% of the total package including construction and design and council fees. The raw land cost is typically about 50% of the section price and the rest is infrastructure development, developers margin, and council fees.
- Major house builders offer standard houses about 15% cheaper than the one-off designs typically provided by small-scale builders.
- The economies for major builders arise from a limited range of designs and materials, and discounts from bulk purchases.
- Productivity in the industry is poor and technical and managerial efficiency appears to have declined in recent years. Recent skills shortages and increased compliance costs have also adversely affected productivity.
- Compliance costs such as building code changes, stricter health and safety, and more consent documentation and council delays have added significantly to new housing costs in recent years amounting to about 16% over five years.
- The main scope for cost savings is more standardisation of design and materials, with potential savings of about 15% compared to one-off designs.

2. GOVERNMENT REVIEW OF HOUSING AFFORDABILITY

2.1 Select committee

Submissions to the select committee inquiry into housing affordability covered a number of aspects related to new housing cost, with the main themes being:

- Land costs
- Compliance costs
- Government interventions to require or facilitate low cost housing in new developments.

A selection of the submissions is as follows:

Beacon Pathway: Part of the reason for new housing cost increases is that the average new house size has increased significantly in recent years. They state that much rental stock is not suitable for middle income households. Beacon sees a serious problem with middle income households who receive minimal government assistance and cannot afford a first home. The only affordable housing for these and the lower income groups is in the outer suburbs with considerable transport costs and expensive infrastructure. The solutions are for government (central and local) to land bank, facilitate amalgamation of land within cities and to assist in redevelopment. They believe covenants excluding community housing should be banned. Good examples of design/build which are cost-effective should be encouraged and promoted.

Centre for Resource Management: The "impact levy" provided in the Resource Management Act 1991 (RMA) for housing developments has been widely interpreted by some councils to include facilities outside the basic infrastructure. This includes libraries and sports grounds which the Centre believes are more fairly paid for through rates. In their view the basic affordability problem is restricted land supply and high compliance costs. They call for a cost-benefit analysis on all requirements of the RMA.

Some building cost increases are due to stricter compliance costs because councils are in the role of "last-man-standing". Hence they mitigate their risk by "gold-plating" the compliance procedures. The Centre is concerned about costs associated with sustainability measures such as more insulation, double glazing, and possibly solar water heating. They believe the level of timber treatment is an over-reaction and adds unnecessary cost.

Habitat NZ: This charitable trust assists low income families into first homes. They purchase land and build basic $100,000 homes. Their section costs have risen by 300% in five years and they are now unable to provide housing for lower income groups because these groups cannot afford the repayments. Habitat NZ is asking for nil interest loans for on-lending from the government. They also suggest shared equity programmes, rent-to-buy, capitalisation of benefits, and selling high-value state housing and building in areas of need.

T Hazeldine (Auckland economics professor): The large housing land price movements of recent years is not necessarily because of a zoning shortfall, but it could be due to a general re-rating of land values due to other economic uses for it. Such uses may include agriculture and manufacturing. He believes the land price movements are permanent, and as a resource it is expected to inflate at a higher rate than the Consumer Price Index (CPI). Politicians should facilitate better land use by accepting that stand-alone housing as an aspiration for every family is an unrealistic goal. The solution to affordability is for the government to concentrate on raising incomes and to get interest rates down.

NZ Master Builders Federation (NZMBF): Local authority Infrastructure Fees and Development Levies are being used inappropriately for general infrastructure, to mitigate rate rises, which adds to costs. There are rising compliance costs, particularly consent and inspection delays, which add about 1–2% to housing costs.

Building consent documentation guidance documents are needed so that authorities have a consistent approach. The Department of Building and Housing (DBH 2007) recently published a consent application guide which should, over time, improve consistency of design and consenting practice. However, the NZMBF still believe that the level of detail required for a relatively standard building consent is too high and that there are opportunities for more standardisation across the main documents required for the consenting process. RMA consents are often required for quite minor works, adding to cost, and these approval processes are often not in coordination with building consent processes.

The comprehensive submission can be summarised with four points related to affordability:

- There should be more concerted action on delays in the overall consenting and inspection process
- There should be some rationalisation under the RMA to allow standard minor site works to not require a resource consent
- The consenting process should allow for a greater measure of standardisation e.g. use of standard specifications
- Stronger guidance is required from the DBH to ensure a consistent framework by local authorities around the use of producer statements.

NZ Planning Institute: Shortage of sufficient zoned land is part of the reason for declining affordability. However the Institute sees the tax regime, favouring rental investments, as the main culprit. They state that the Building Act is costly and complicated, and has added to cost, but they provide no examples of this. Material costs are too high due to oligopoly and the Commerce Commission should undertake a wide-ranging review of building material prices. They call for a "third-way" between private ownership and state rentals such as community housing.

Smartgrowth (Tauranga City): They encourage medium-density housing (15 households/ha) for greenfield and 30 households/ha for near existing centres. They cited an example of a greenfield developer who offered to fund the infrastructure beyond what would normally be required, but because it would have detracted from the viability of another recent greenfield development (as disclosed in a comprehensive study of basic infrastructure transport, community facilities, schools etc), they declined the application. They also stated they are not in favour of mandating social housing quotas in new subdivisions because some of the cost falls on ratepayers. They see the solution to affordability as government policy encouraging economic growth, higher wages and wealth.

2.2 Departmental report

A research group within the Prime Minister's Department considered the submissions to the select committee, carried out their own research and produced a report (House Prices Unit 2008). The main findings of the House Prices Unit (HPU) which relate to cost of housing are:

- The primary drivers of housing price rises are long-term structural factors (constrained land supply, increased regulation, population growth, tax advantages of housing investment) rather than speculation by investors. Looking ahead, no sharp fall in prices is anticipated.

- An increase in the land supply and streamlining of regulatory processes (RMA and the building consent), plus more intensification of new housing, are the most likely ways to reduce new housing price growth.
- Urban development agencies, such as exist overseas, have demonstrated commercially viable, sustainable, urban regeneration, including provision of affordable housing.
- The productivity performance of the construction industry is not good due to its small scale and lack of repetition, and inadequate skill levels.

In summary, the submissions to the select committee and the HPU report focused mainly on regulatory and compliance impacts on building and land costs. There are brief references to construction industry productivity and very little about the factor inputs (labour, materials, capital or profits). This report concentrates on the latter, in particular:

- Trends in the input prices
- Profit margins
- Industry productivity
- Components of land costs
- A simple supply side model showing all inputs.

2.3 Other research on housing costs

Kenley (2003) compared new housing costs in New Zealand with Australia. He found that housing costs were higher in this country for a number of reasons including:

- Materials costs were generally higher in New Zealand, including timber-based products.
- There was more standardisation of designs in Australia, including choice of claddings (mainly brick veneer and tile roofs), a limited range of window sizes, simple building forms (i.e. rectangular), which improved efficiencies in construction compared to New Zealand.
- The New Zealand construction industry appears to be less efficient in site organisation, sub-contractor management and systems rationalisation.
- The framing timber typically used in New Zealand is a lower strength than in Australia and hence is more labour intensive as more of it is used.
- The economic scale argument (Australia viz New Zealand) is not valid as there are a number of New Zealand companies producing about 50 houses per year, which is said to offer a “managed workflow with dramatic productivity gains”. No evidence is provided by Kenley for this threshold number.

Much of the research on housing cost locally and overseas has been in the context of affordable housing. Research funded by the Centre for Housing Research Aotearoa New Zealand (CHRANZ) has been in this area. One paper (DTZ Research 2004) has a section on housing cost. Their findings were:

- Despite the Kenley finding on housing costs comparing New Zealand to Australia, they say “a strong emphasis on the impact of housing cost on affordable housing may not be warranted”. They say this is supported in the literature which indicates the key ingredient affecting affordability is price, not cost.
- Of all the inputs into new housing, land cost escalation has had the major impact on affordability in New Zealand.
- The emphasis should be on affordability and in particular land prices: “we are of the view that research into the determinants of land pricing is clearly warranted”.

The paper says that of all cost inputs, investigation into land prices has the highest priority. There is an implication in the paper that little can be done to influence the other inputs.

2.4 Government response

In response to affordability concerns the government introduced the Affordable Housing: Enabling Territorial Authorities Bill (29 February 2008, 8 July 2008) which allows for territorial authorities (TAs) to require developers to make provision for affordable housing in new subdivisions. This legislation, if passed, would enable TAs to require developers to provide a proportion of affordable houses in new subdivisions and the TA may provide financial incentives to offset the cost to the developer. The government is also reviewing Crown land ownership in the main centres and the possible establishment of urban development authorities (UDAs). These would be a partnership of central and local government to identify and plan land use for housing and other uses.

The Minister for Building and Construction announced (11th June 2008) the building regulations will be amended to allow for multi-use building consents for simple house designs, and a reduction in the need for PIMs and consents for minor work. Other proposed changes related to the licensed practitioners being able to certify some work, reducing the number of council inspections, and a shared building products database to speed up consent approvals. The details of all these proposals are yet to appear, but they are likely to save costs in the consenting and compliance process.

2.5 Interviews of NZ builders

Interviews were held with three group builders. One is a wholly "spec" builder, and the other two have a mix of clients and build some "spec" houses.

Company A "spec" houses only: They build in the Auckland and Bay of Plenty (BOP) regions and constructed about 150 houses in 2007. Most are detached houses on 400 sqm sections (some on 300 sqm sections), often two-storeys, averaging about 190 sqm and $1,150/sqm. Buyers prefer detached housing, even though a duplex type arrangement would enable better use of land and larger open lawn/garden space. Sections cost about $300,000, and the housing package is about $520,000 including GST. Costs rose about 6% in 2007 with the main increases being earthworks and foundations, pre-fabricated frames, scaffolding (a 40% increase due to more rigorous safety enforcement), kitchens and roofing.

The company has run down its raw land reserves because of the high financial costs due to time delays in obtaining subdivision approvals. Building consent documentation costs are up about 50% over the last three years, including higher fees and more drawings. They employ most of their labour on contract only, with carpentry work in two person gangs. Other trades are on contract, but not usually exclusive to the firm. As demand rises they suggest that carpentry gangs split and each train up a friend. This causes quality assurance problems and more management time on inspections and remedial work. They do some in-house training on basic building skills. Generally they believe their operation produces new houses efficiently.

Company B mainly building for clients: They build over 200 houses per year nationally. Usually the owner provides the section, but sometimes the firm provides the section, up to about 650 sqm in size. They do almost zero land development themselves. The firm has about 100 sets of designs New Zealand wide and there is little extra cost in offering such a range and doing slight modifications for clients, which many of the clients request. They do not specifically design for 1.2 m material size modules but believe their designs are efficient

in terms of waste. Teams of sub-contractors (concrete, roofers, lining, window installers, plumbers and electricians) are used. The price is set by negotiation for a period of time and sub-contractors are not reimbursed for over-runs. Bulk material purchases are also negotiated. The advantage to sub-contractors and material suppliers are guaranteed payments on time and regular workloads. Carpentry work is a fairly small part of the process. The firm's carpenters are usually on-site for only 10 days per house, plus some finishing work. They suggest the profit margins for the majority of builders in New Zealand are in the 8–12% range. They would not confirm their range and say their margins vary around the country. The majority of their houses are single-storey brick clad un-treated framing i.e. the designs score favourably on the NZ Building Code Clause E3 risk matrix so the houses are probably fairly easy to build. They are typically three bedrooms plus office, 200 sqm. The few houses they build with upper storeys increase the building cost by about 20% on a whole house $/sqm basis.

They are critical of the inconsistency between TAs about which design details are acceptable. Documentation for consents is now some three times larger than in earlier years. Due to staff shortages the TAs are employing the wrong people with poor understanding of the building process. Site inspections have typically gone up from five to about 12, all adding to management costs. Their scaffolding costs have risen significantly in 2007. Their processes are efficient and it is difficult for them to see where they can reduce their internal costs.

Company C various market segments: They build over 100 houses per year, mainly in Auckland. They have different companies for the various segments of the market, each offering about 10 different layouts, and most clients require minor changes. The firm targets both the higher cost market and the average market. The quality home sector is typically around $850,000 excluding GST with the house and land package. This includes driveway, landscaping, often two-storey, four to five bedrooms, three car garage, and about 200–250 sqm. An upper storey increases the building costs significantly on a $/sqm basis, compared to single-storey. The cheapest package is about $550,000 excluding GST for a four bedroom single-storey house. They say most customers require four bedrooms, regardless of family size. A significant number of their clients are immigrants upgrading after about three years in the country. Some clients are on their second upgrade after about two years' tenure.

The firm believes overseas speculators are a significant factor in the high land costs in Auckland. The firm has its own land holdings and also jointly develops new areas with other landholders. They believe many medium-density townhouses in the inner suburbs are poor quality, they will end up as "slum housing", and the type/quality of the housing is out of line with the high land value.

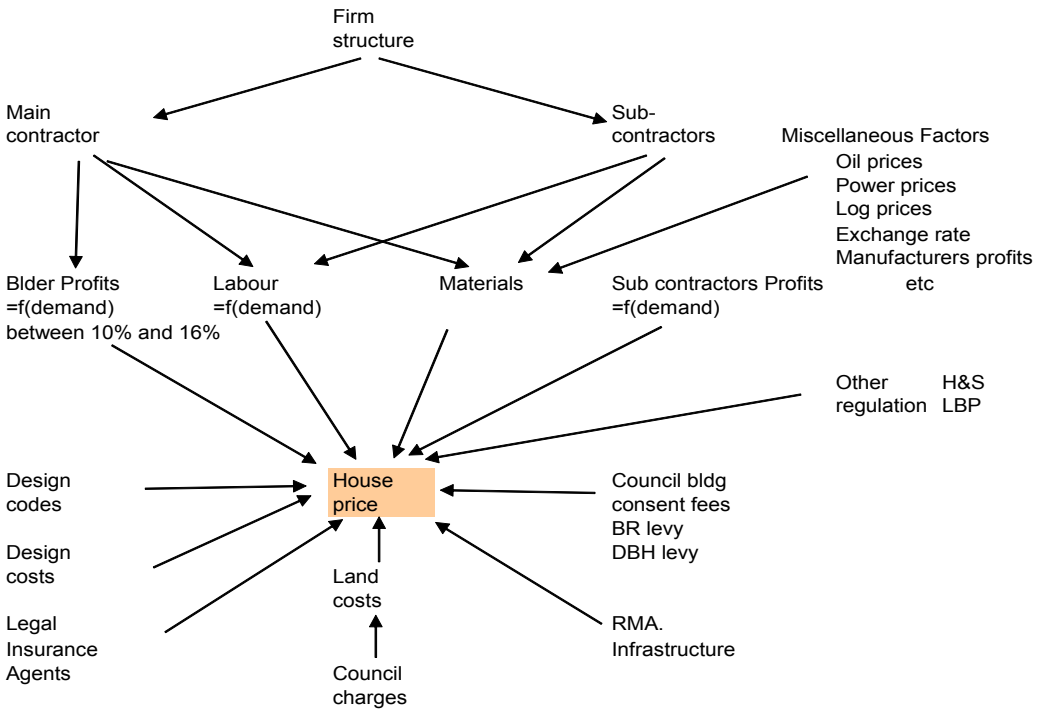
The themes coming out of the three interviews were:

- Compliance and land costs have risen significantly in recent years
- New Zealand owners expect to have significant input into the layout and features of their new house, and they like them to look "different" to their neighbours
- New owners want large houses (subject to their budget constraints), regardless of family circumstances
- Large-scale builders believe their processes and management are efficient.

3. NEW HOUSE PRICE MODEL

This research concentrates on the supply side of the housing market, and in particular the components or sectors that provide input into the construction process. The model showing inputs into new housing is in
Figure 1. The main inputs used by the builder are labour and materials, but the price to the owner includes many other costs such as land, builders' profit, and various levies and fees. The following sections show the trends in the price of these inputs, and other sections discuss some of the influences affecting the price of inputs.

Figure 1. Supply side new housing model



4. PRICE TRENDS

4.1 House price trends

The trends in prices related to housing are shown in Figure 2. The series shown are:

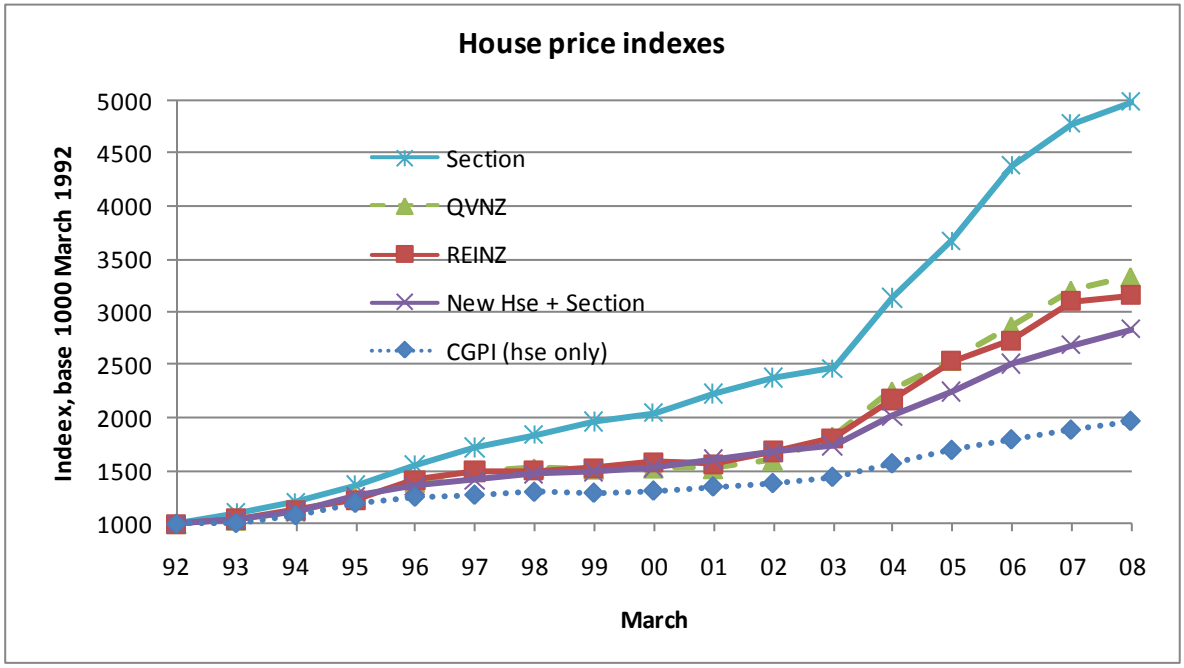
- Sections: Based on the average section sales price from Quotable Value New Zealand (QVNZ). There is no adjustment in this index for changing section sizes.
- QVNZ: An index on existing house (plus section) sale prices. The index is based on the sales prices compared to the house valuations and hence adjusts for changes in sales in the different value ranges.
- REINZ: The Real Estate Institute of New Zealand median sales price. Medians are used rather than averages since the latter tends to be between 17–25% higher than median prices (see Figure 4).
- BRANZ new house and section price index: The new house price was calculated for a 158 sqm house at 1992 which is adjusted since that time by the Capital Goods Price Index (CGPI) for dwellings and outbuildings from Statistics New Zealand (SNZ).

The average section sale price from QVNZ by year is added to the house cost to give the combined price which is then expressed as an index. A 158 sqm sized house was chosen because it is the average floor area of an existing house, so a direct comparison can be made between an existing house (and section) and a new house (plus section).

- CGPI: The Capital Goods Price Index (previously called the Capital Expenditure Price Index) for housing and outbuildings, from SNZ. It represents the output price of a standard house including profit margins.

It is apparent from Figure 2 that the largest escalation has occurred in section prices. The QVNZ and REINZ indexes give very similar results, which is to be expected since they purport to be measuring the same market. The new house and section index has tracked slightly lower than existing house prices. Note, this index assumes a constant house size of 158 sqm, whereas we know that average detached new house sizes have increased in recent years (see Figure 5). The annual rate of escalation over the period of the chart 1992 to 2008 is 10.8% for sections and 4.3% for new houses (CGPI).

Figure 2. House price indexes



The DBH have developed their own building cost series for different building types and regions, shown in the Appendix. It does not include consent costs or the financial costs of delays in approvals. The data is the building cost in $ per sqm for small and medium-sized houses by six regional centres and includes profit margins. Costs are for one-off “spec” houses and do not reflect the scale economies of group houses or the additional costs of architecturally designed houses.

A composite index was developed by BRANZ from the DBH series (see Figure 3) using regional housing activity as the weights. It is interesting to note the DBH index escalates faster than the CGPI. It is believed the DBH consultants, Maltby’s Ltd, have a more immediate insight into cost impacts on builders, whereas the SNZ change their regimes fairly infrequently.

Another observation from the chart is that inflation in the small house is larger than the bigger house. This is believed to be because services costs, namely plumbing and electrical,

have risen sharply in the last four years. These costs impact more heavily on smaller houses i.e. the total cost of these in a small house is not proportionately less than for a larger house.

Figure 3. DBH index versus CGPI

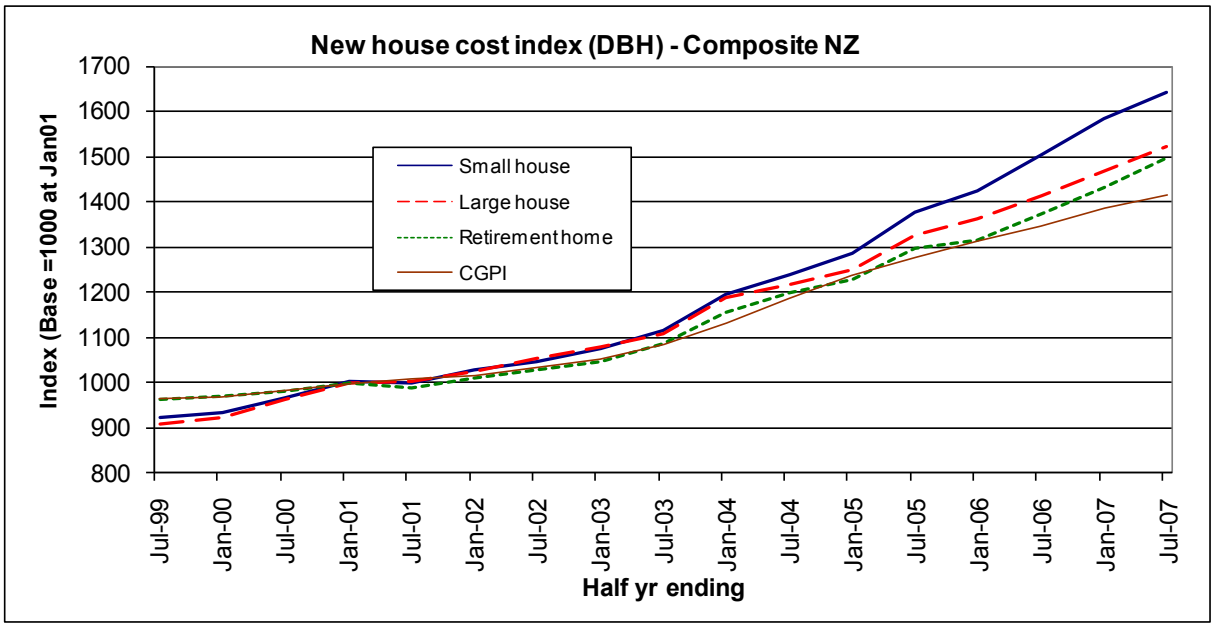


Figure 4. Median existing house sale prices versus average prices

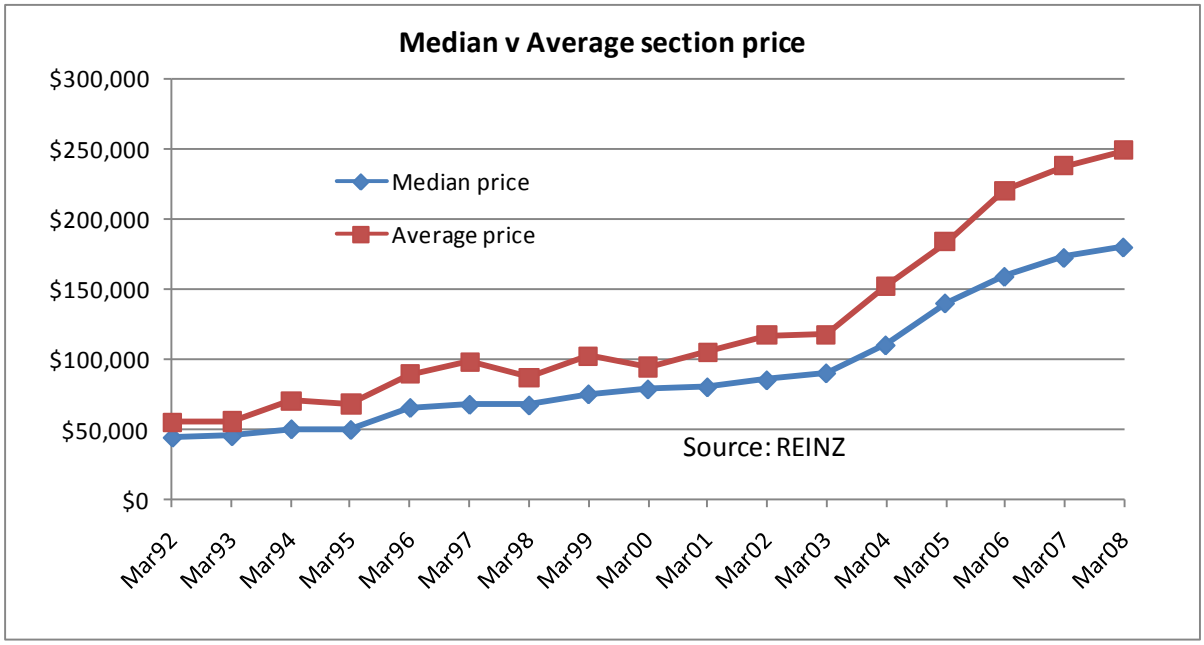
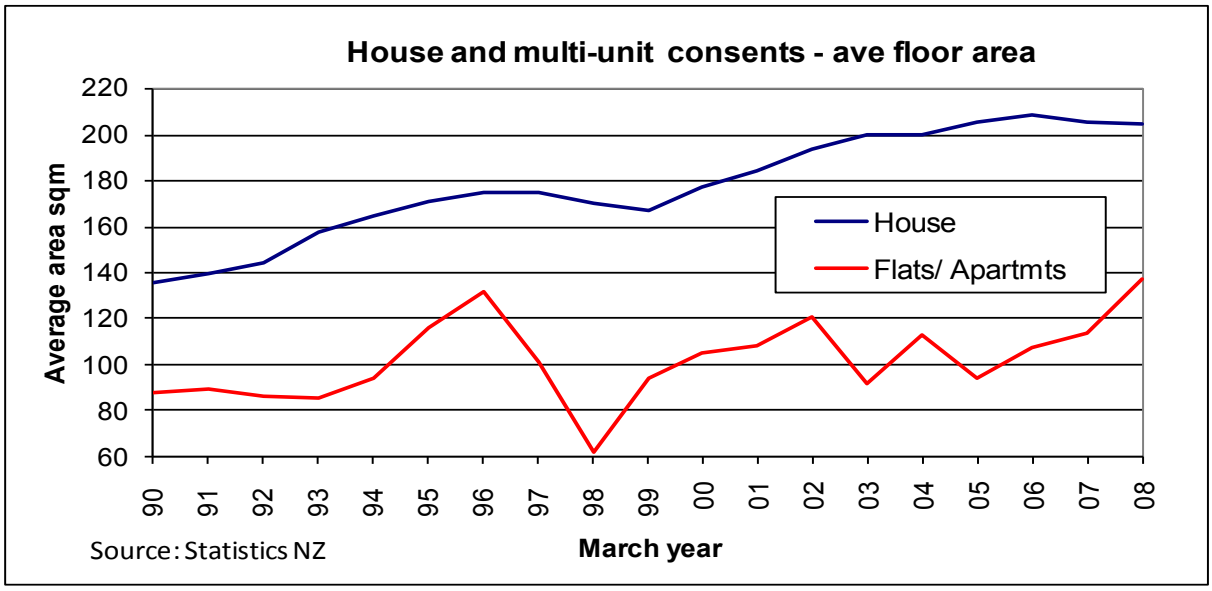


Figure 5. Average floor areas new houses and multi-units

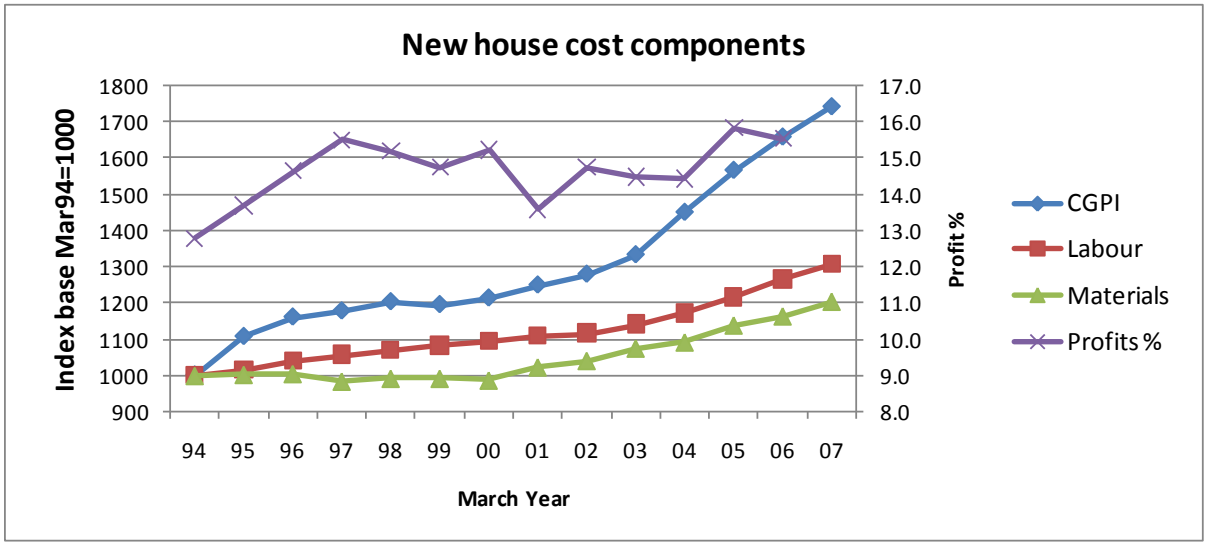


4.2 Component price trends

The main factors of production for new housing are labour, materials, profits (or return to capital and managerial expertise) and land. These factors are discussed next. There is also a small amount of plant required for new housing but less so than other sectors of construction.

Price movements in the labour and materials inputs to new housing are shown in index form in Figure 6. Both labour and materials have been running well below the new house cost index (CGPI). The percent profit margins are also shown, and are derived from the operating surpluses divided by turnover, from national accounts data published by SNZ.

Figure 6. New house price components



Profits increased in the period 1993 to 1996 but have since levelled out at around 15%, so the quite sharp rise in the CGPI since 1997 needs explanation. There are several reasons:

- The profit margins shown are for the whole construction industry (housing, non-residential buildings and civil engineering), and profit trends in new housing construction are different from the whole industry number.
- Design changes resulting from leaky home issues, and regulatory requirements in inspections, documentation and health and safety have added additional costs to new housing. This is discussed later in Section 4.2.5, where these increases alone are estimated at about 16% in the last five years.
- Labour shortages and lack of skills in recent years have resulted in less productivity in the construction of new housing. Productivity is discussed in Section 9.3.

4.2.1 Labour costs

SNZ publish two series for labour costs in the building and construction industry. These are shown in Figure 7 and Figure 8.

The charts have a very similar pattern and the main difference is the second chart has additional costs such as superannuation, holidays, ACC levies, loans and overtime, as well as the base wage/salary cost. It is interesting to note the escalation since 1992 is almost the same for both series for the construction industry, namely a rise of about 36%. This is despite some costs such as annual leave entitlements and ACC levies (see Figure 9) changing in the period. Since about 2004 labour costs in construction have escalated at a faster rate than other industries, whereas in the late 1990s and early 2000s, when construction industry demand was low the industry wages dropped back slightly compared to other sectors of the economy.

Some construction skills are transferable between manufacturing and the electricity, gas and water industries so these indexes are included for comparison. However, the main conclusion is that construction industry labour cost escalation is similar to that in other industries in the long-run.

Figure 7. Labour costs – wages/salaries only

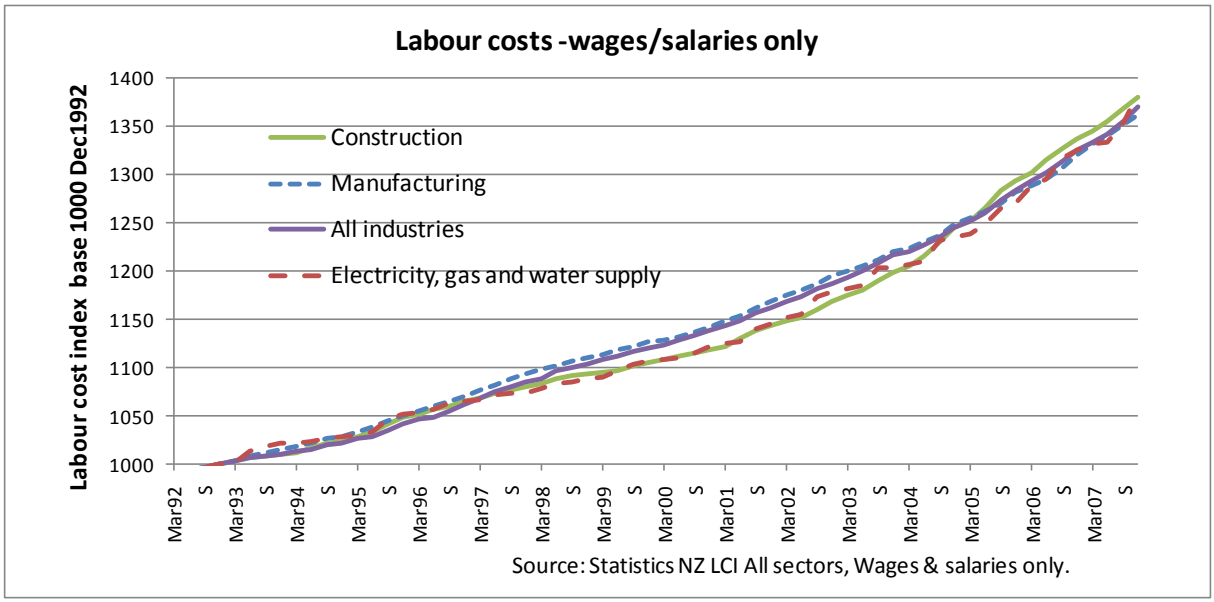


Figure 8. Labour costs – all costs

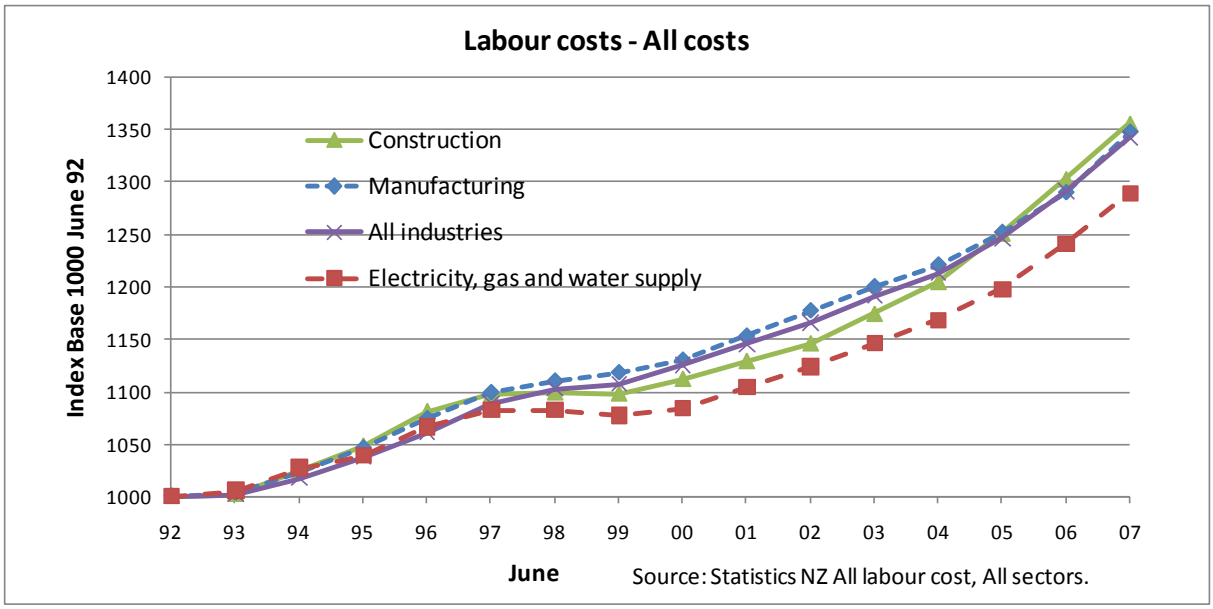
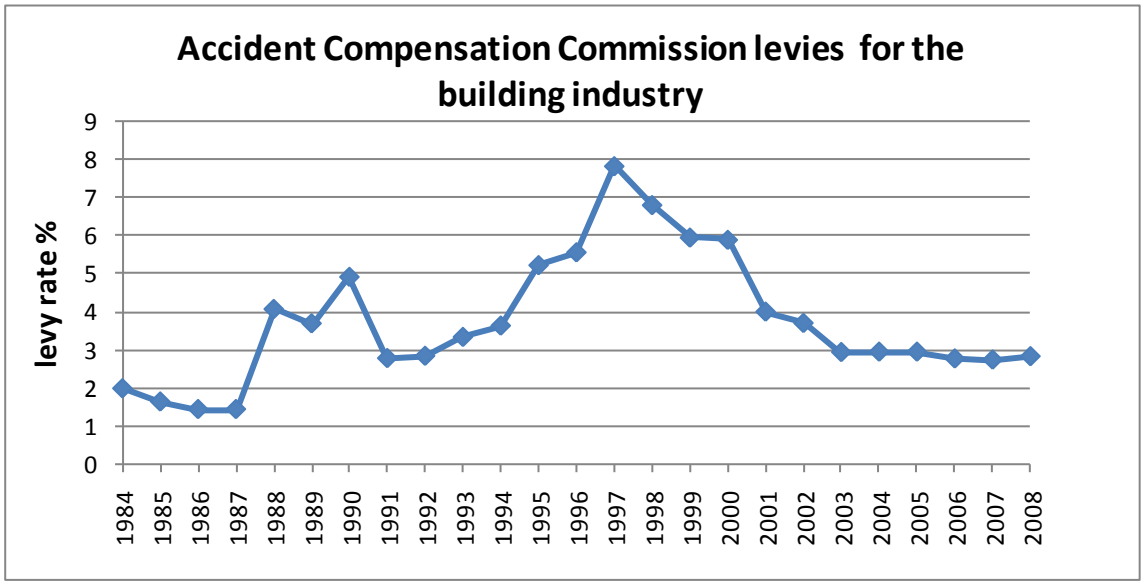


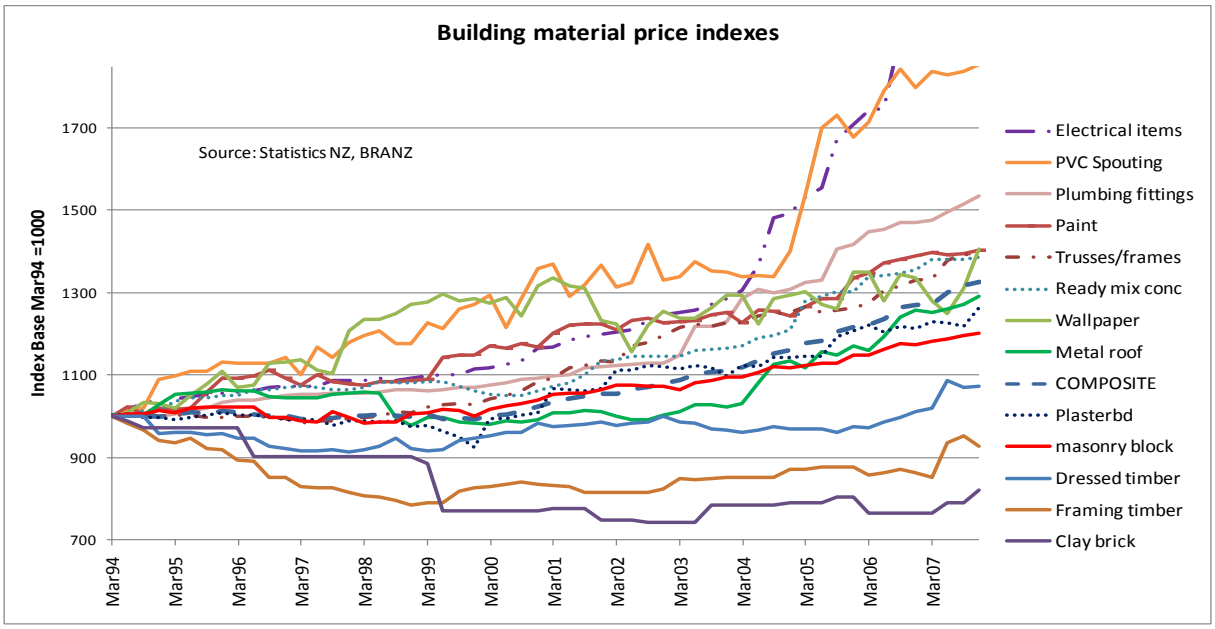
Figure 9. ACC levies



4.2.2 Materials

SNZ collects data on price movements in a variety of building materials and products for their Producer Price Index (PPI) and the CPI. These are shown in Figure 10, and since 1994 the largest escalation has been in plastic products (e.g. spouting, mouldings, and pipe), paint, wallpaper, ready-mix concrete and pre-fabricated truss and wall frames. Clay bricks have decreased in price significantly since 1994, and framing and dressing timber has also decreased.

Figure 10. Material price indexes



A composite index was produced by BRANZ for materials in a new house using the 13 items costed by SNZ, and this composite index is also shown on Figure 10. The weights are shown in Table 1. These percentages are based on an analysis of the material cost for the Exemplar House (Willison 2002). It is acknowledged that some materials are absent from the SNZ data so the index is not a complete one. However, the materials listed cover about 74% of the value of all materials that go into a new house. The main items not covered include hardfill, windows, insulation and carpets.

Table 1. Composite materials price index weights

Composite materials price index weights Base on materials in the Exemplar House.		
	Percentage	Percent ignoring "Other"
Wood structural manuf.	21.4	28.9
Metal roofing	6.4	8.6
Clay brick cladding	8.1	10.9
Ready-mix concrete	7.4	10.0
Framing timber	6.9	9.3
Dressed timber (finishing)	2.1	2.8
Paint	1.5	2.0
Wallpaper	1.5	2.0
Concrete Masonry	0.4	0.6
Plasterboard	4.9	6.6
PVC spouting/ jointers	1.0	1.4
Electrical items	5.4	7.2
Plumbing/drainage items	7.2	9.7
Other	25.9	100.0
	100.0	
Wood structural manufacturing includes pre-fabricated frames, doors and joinery.		
Other includes items for whom Statistics NZ do not appear to have a price measure, e.g. hardfill, windows, insulation, heating appliances, floor coverings, fibre cmt sheet, fabricated steel items, sheet polythene, etc.		

Over the last five years the average annual price increases were electrical items 9% pa, PVC spouting 7%, plumbing items 6.5%, metal roof cladding 5%, ready-mix concrete 4%, and the other materials at 3% pa or less. It is likely the large increases for electrical (plastic components, copper wire), spouting and plumbing items (oil-based plastics), and metal roofing (steel) represent the effects of strong worldwide demand for these materials.

The above table shows the materials monitored by SNZ. It can be used to monitor the effect of changes in prices of particular materials on house construction prices. For example, a 10% rise in the price of metal roofing gives a 0.9% rise in the cost of all materials, and with materials at 30% of the total house cost (see Section 6.2), the house price rises by 0.27%. A more detailed breakdown of materials is shown in Section 5.1. That breakdown enables specific material cost changes to be monitored for the overall effect on house costs, although substitution of materials may occur to mitigate any overall cost changes.

4.2.3 Land cost

The trends in the price of an average section are shown in Figure 11. The chart also shows land as a percentage of the total house and section package, assuming an unchanged average new house size of 158 sqm floor area, cost adjusted by the CGPI for housing. The chart indicates that the section component has risen from 22% to 46% of the total price of a new house and section since 1987. This ignores the increase in new house sizes and other costs (design, legal etc), which bring the section component back to about 40% (see Section 6.2).

Figure 11. Section price trends

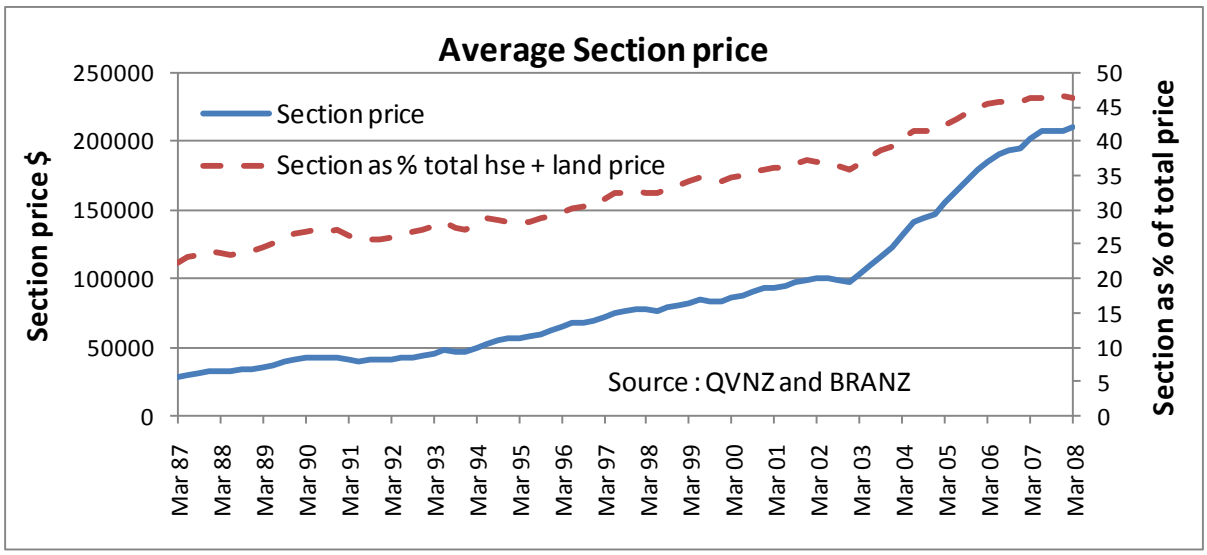
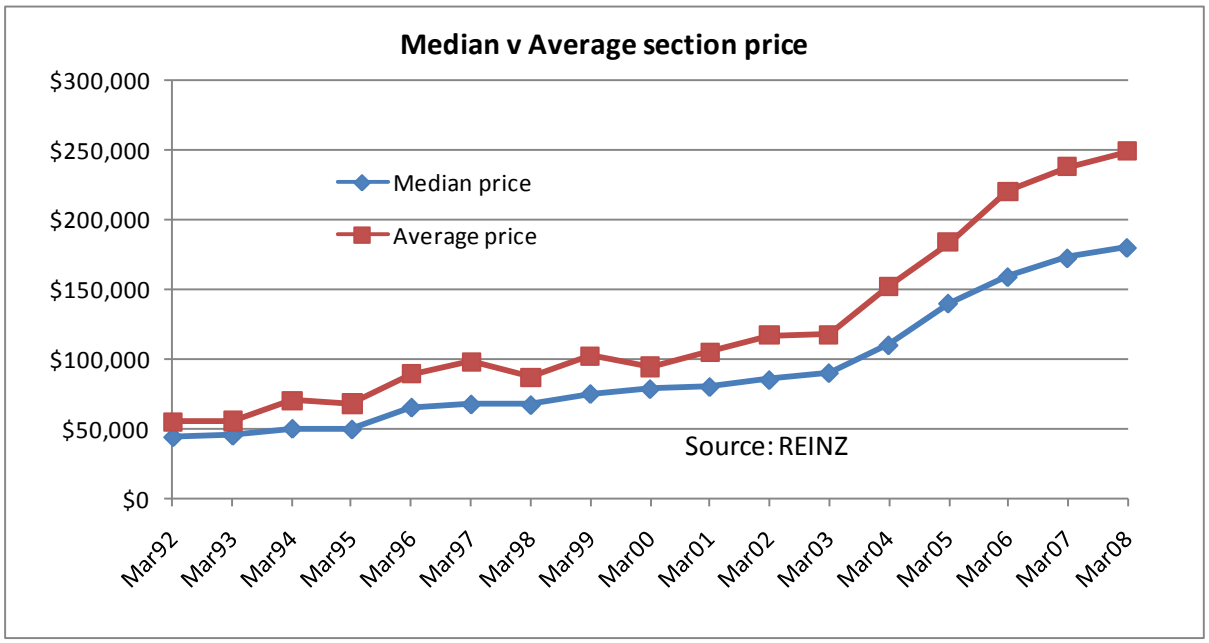


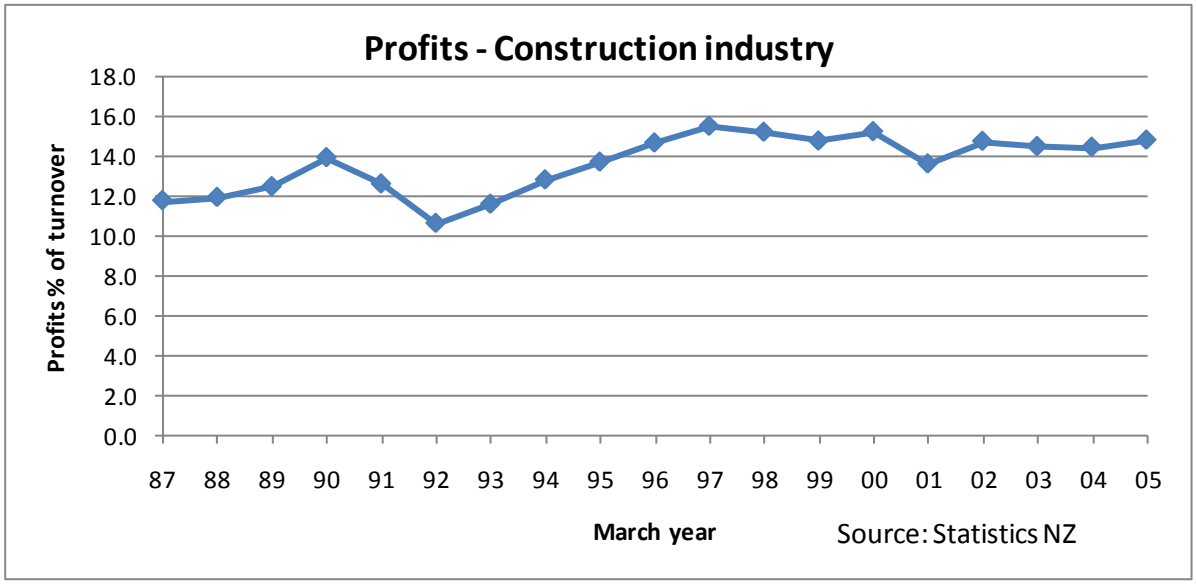
Figure 12. REINZ median and average section prices



4.2.4 Profit margins

The national accounts produced by SNZ enable a measure of profits in the construction industry. Profits are calculated as the operating surplus as a percentage of total turnover, and are for aggregated buildings and civil engineering work. Separate residential construction profit data was not available and 2005 is the latest year that SNZ has published data. For the total industry the profits average about 14.5% and it is believed, based on the 1996 input/output tables, that civil engineering profit margins are larger than building construction profit margins.

Figure 13. Profit margins – all construction



4.2.5 Other cost impacts

As a result of the leaky home syndrome a number of building regulation changes were made including drainage cavities, treated timber and waterproofing at openings. The approving authorities became more risk adverse and required more documentation before issuing building consents. Health and safety provisions were more rigorously enforced affecting scaffolding and other on-site requirements. All these factors over the last few years have added significantly to building cost.

The NZMBF quantified some of these impacts, as shown in Figure 14, for the select committee submission. A Federation member produced the data for a single-storey 199 sqm house design in Canterbury which his firm had built several times essentially unchanged over the five year period, and the cost breakdowns in each year are shown. The changes in material, labour and land costs over the five year period are approximately in line with New Zealand averages reported in earlier sections. The other three components provide new information related to compliance and management costs, namely:

- Building consent fees – increased from $1,510 in 2002 to $2,393 in 2007
- Project management, sales costs and overheads – increased from $23,700 in 2002 to $44,200 in 2007
- Infrastructure development fees – increased from $1,000 in 2002 to $10,000 in 2007.

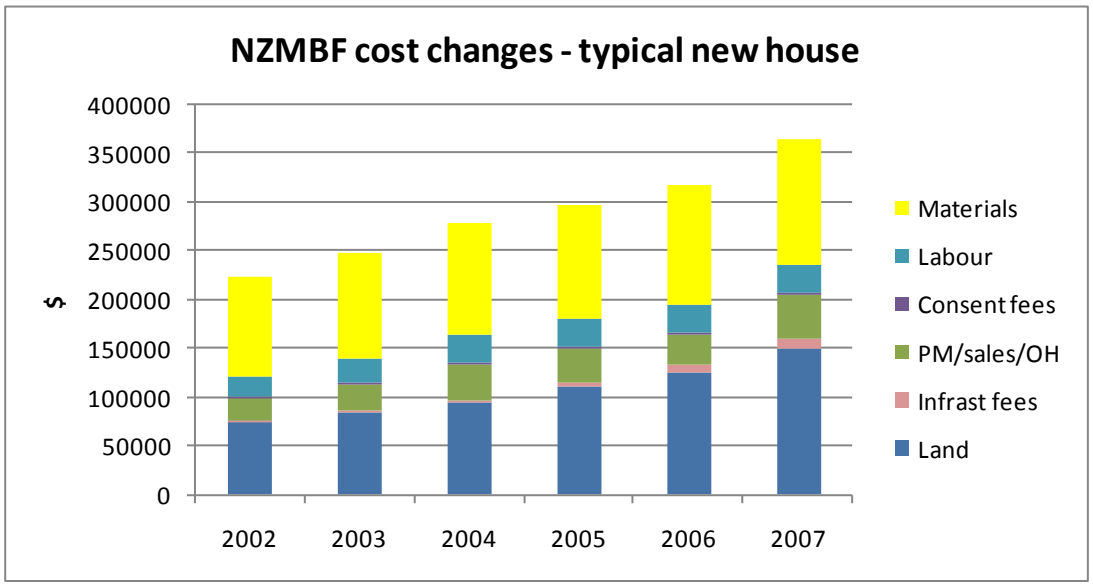
All these increases are well above the rate of general inflation. The notes accompanying the NZMBF submission outline the PM/Sales/OH factors as the need for more drawing details (typically from 10 pages in 2002 to 30 pages in 2007), more office and on-site staff to facilitate the consenting process and additional inspections, and a higher risk margin to allow for consenting slippage. These increases are about $31,000 per house or an increase of over 10% on the cost of building a new house.

Another housing company noted that site safety enforcement is now more rigorous. One outcome is that on many sites it is easier for the builder to contract in a scaffolding firm, whereas previously the builder would have erected their own scaffold at a lower cost. The scaffold cost is typically $6,000 on a two-storey house (less on a single-storey house) making the site safer and these measures are presumably cost-effective.[1]

The construction changes relating to drained cavities and increased use of treated timber were estimated as adding about 2.3% to the cost of a typical house (PriceWaterhouseCooper 2003). Their study was prior to finalisation of the new measures and ignored the subsequent requirement for window opening tapes, so the cost increase is likely to be nearer 3%.

[1] The ACC levy rate has dropped about 3% in recent years, representing a levy saving of about $3,000 on a typical new house. ACC covers all the costs of all building accidents so we would expect the additional health and safety requirements to cost less than $3,000 per house to be cost-effective. Scaffolding costs are probably about this cost or lower on average so the more rigorous health and safety requirements are probably cost-effective.

Figure 14. NZMBF cost influences



In total the building cost increases due to regulation and compliance changes over the last five years amount to about 16% for a 195 sqm house and this ignores the land cost or any inflation in materials and labour (see Table 2).

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Table 2. NZMBF compliance cost increase estimates

Compliance cost increases in new housing 2002 to 2007		
	$ (1) Cost increase	
Consent fees	900	
PM, sales, OH	20500	
Infrastructure fees	9000	
Scaffolding	3000	
		$ 33400
Typical 200 sqm house cost @ $1300/sqm =		260000
		%
Additional compliance costs as a %		12.8
Drained cavity/ treated timber/ window tape (2)		3.0
Total cost incr 2002 to 2007		15.8

(1) NZ Master Builders Federation, for the Canterbury region.
(2) PriceWaterhouseCoopers (2003)

4.2.6 Construction industry productivity

There are various measures of productivity and the simplest is to measure industry output per number of workers. This is shown in Figure 15, where the value added is the industry contribution (buildings and civil engineering) to total GDP, so it excludes inputs such as materials from other industries. Value added is in constant 95/96 $ terms so the chart indicates a slight downward trend in productivity of about 0.3% pa. In comparison, the whole economy number was about $45,000 per person for the 2000–2004 period.

Figure 16 shows fixed capital formation (FCF) per construction worker. FCF is the value of the work placed and includes design, legal and regulatory costs, as well as the construction costs, for all building work (residential and other buildings), and civil engineering (roads, bridges, municipal infrastructure, transport facilities, tanks, silos, masts and towers etc). The chart shows a constant level of FCF per person, in contrast with the previous chart, and suggests that the off-site component (e.g. materials cost, pre-fabrication etc) is increasing gradually with time at about 0.3% pa.

Figure 15. Value added per construction worker

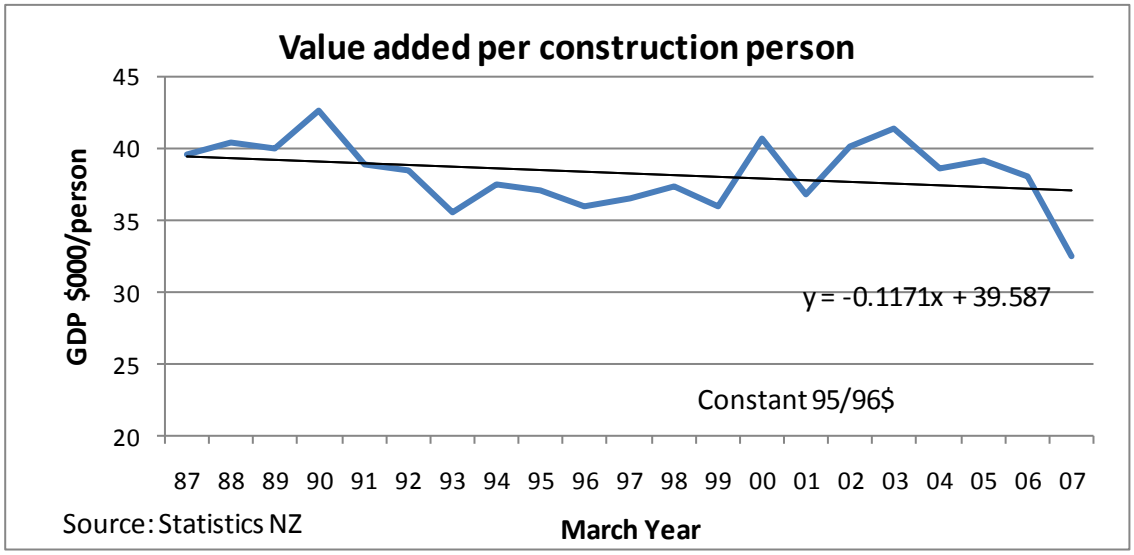
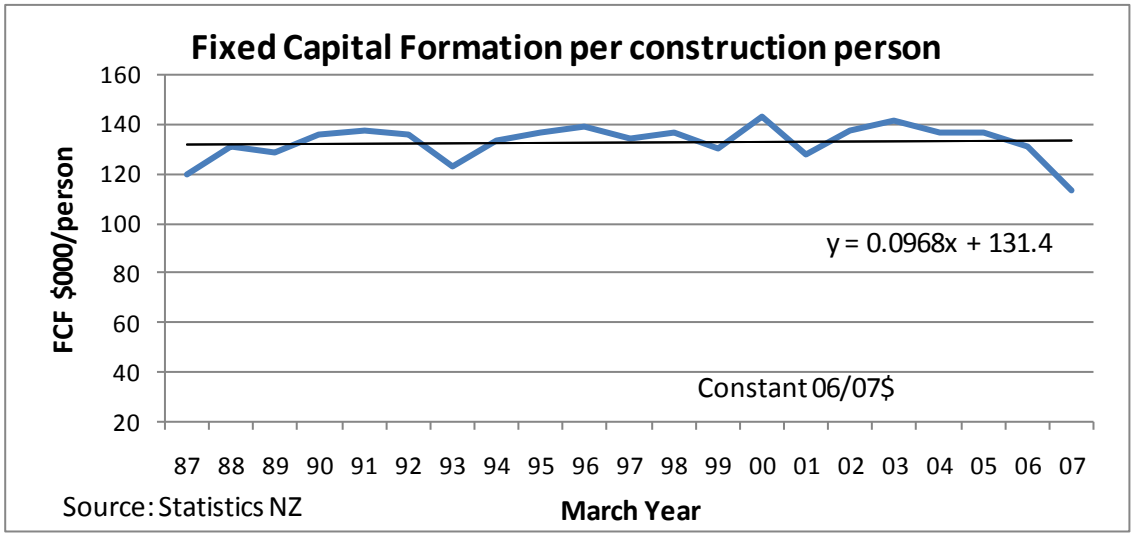


Figure 16. Fixed capital formation (buildings and civil engineering) per construction worker



It is likely that the additional regulatory costs discussed in the previous section have affected productivity. In the recent building boom the increased use of unskilled labour will also have adversely affected productivity. The Appendix has further analysis of productivity separating out the relative effects of labour, use of plant and managerial expertise (see Section 9.3). It has the somewhat disturbing conclusion that technical and management efficiency for all building and construction has been declining by about 2% per year for the last 18 years.

5. INPUT FACTOR DETAILS

This section provides further details of selected inputs and models some of the variables that affect these inputs.

5.1 Material details

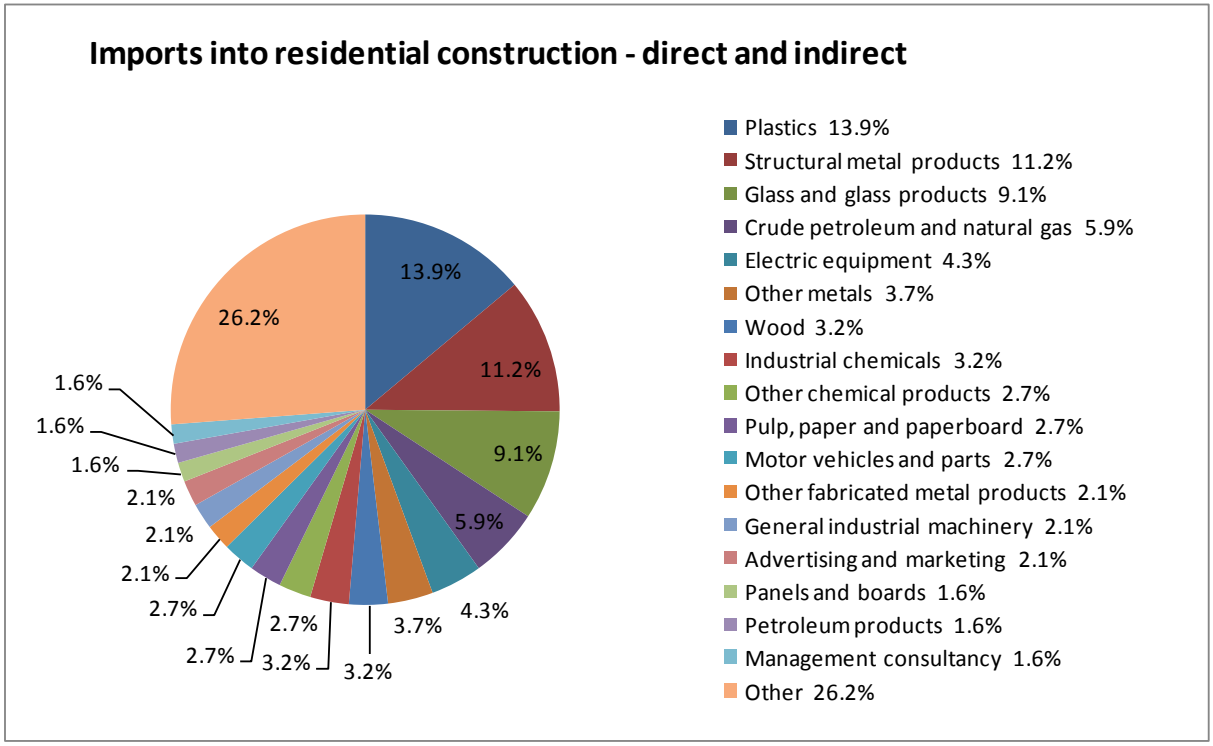
This section considers the import content of new housing and also the energy and petroleum feedstock content.

5.1.1 Imports

The imported component into the building sector is low compared to some other sectors of the economy. Overall, New Zealand spends about 30% of total economic output on imports. For residential construction the total import component, both direct and indirect, is about 19%. This is based on input/output tables of the economy which tracks what each industry sells to other industries through the production chain, and the percent make-up of imports for housing is shown in Figure 17. Hence if the exchange rate varies by 10% the effect on housing costs is about 1.9%, assuming no change in the mix of imports or substitution of local products with imported products.

Apart from "Other", plastics have the largest slice, followed by metal products, glass and petroleum. The "Other" slice consists of a large number of commodities and services, including textiles, paints, rubber products, computers, scientific equipment, architectural/ engineering services, transport services and communication services. Unfortunately SNZ have not produced these tables since 1996 so some of the percentages would have changed since then. In particular, oil prices have approximately quadrupled since 1996 and the plastics, crude petroleum, and industrial chemicals slices are all likely to be larger now.

Figure 17. Imports into residential construction



5.1.2 Energy and oil feedstock content of materials and housing

This section considers the energy content and the petroleum feed stock content in the provision of new housing. Indirect content is included, as well as direct expenditure by the construction industry. The indirect content arises mainly in the materials production process.

The costs of energy for manufacturing have also increased significantly since 1996 (see Figure 18). Electricity is up about 80% and natural gas and heavy fuel oil about 100% over the period 1996–2007.

The energy and petroleum feedstock content of housing, both direct and indirect, is derived in Table 3. The table uses the 1995/96 input/output tables. At that time the table indicates the petroleum feedstock content was 4.4% of the total cost and the energy content was 3.1%. Since that time oil and energy prices have risen significantly and these price changes have resulted in an increased new house cost of 17.7% due to oil price changes and another 2.4% due to energy price changes. This assumes that the mix of inputs into the production of materials has remained unchanged over the period 1996–2007, which is only approximately correct since some substitutes to oil-based products are available, and energy efficiency in manufacturing has improved.

Figure 18. Energy prices for materials manufacturing

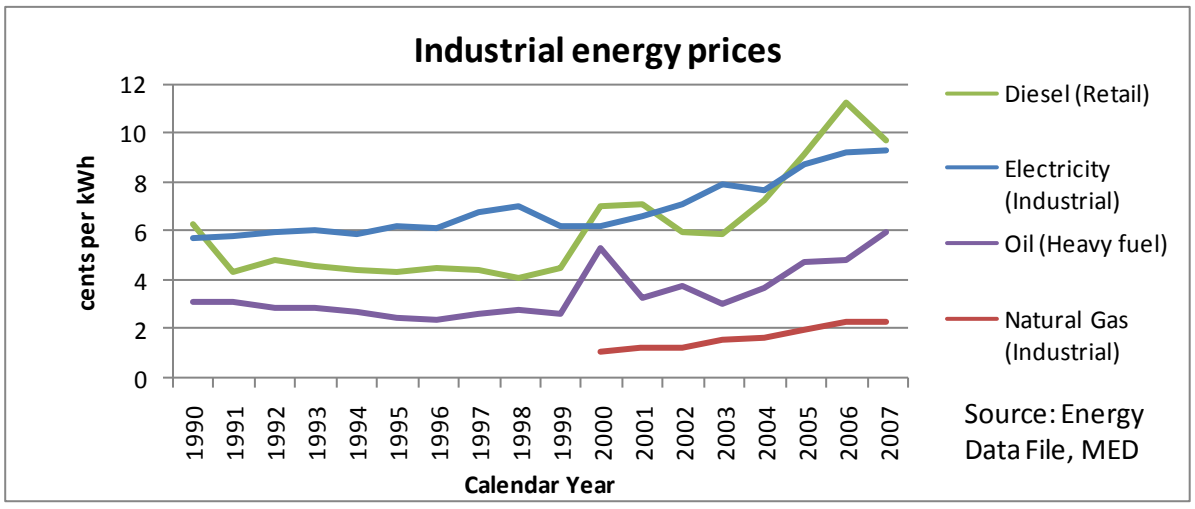


Table 3. Effect of petrochemical feedstock price increases on new housing costs

Petrochem feedstock and Energy inputs used in the production of new housing							
Direct and indirect inputs						**% increase in**	**house costs due to**
	Residential building %	Petrochem feedstock	Energy (coal, electricity, gas)	Petrochem content % in new housing	Energy content % in new housing	petrochem $ incr	coal elect, gas $ incr
		as a % production costs				between 1996 and 2007	
Industries with inputs into new housing construction	(1)	(2)	(3)	(4) (1) x (2)	(5) (1) x (3)	(6) (1)x(2)x(4)	(7) (1)x(3)x(5)
Forestry	5.6	3.3	0.0	0.19	0.00	0.75	0.00
Coal mining	0.07	8.2	9.1	0.01	0.01	0.02	0.01
Oil & gas extraction	0.4	5.2	5.8	0.02	0.03	0.09	0.02
Sawmilling	9.8	1.7	1.5	0.16	0.15	0.66	0.12
Wood product manufacturing (8)	9.6	7.9	2.8	0.76	0.26	3.04	0.21
Paper & paper product manufacturing	1.6	3.7	6.1	0.06	0.10	0.24	0.08
Petroleum refining	1.3	10.7	9.3	0.14	0.12	0.56	0.10
Other industrial chemical manuf	1.0	18.4	8.6	0.19	0.09	0.75	0.07
Other chemical product manufacturing	0.6	18.8	0.4	0.11	0.00	0.44	0.00
Plastic products	2.0	12.1	1.8	0.24	0.04	0.95	0.03
Other non-metallic mineral products	3.8	2.0	2.8	0.08	0.11	0.31	0.09
Basic metal manufacturing	1.2	1.6	13.1	0.02	0.15	0.07	0.12
Structural, sheet & fab metal products	4.7	4.6	0.8	0.22	0.04	0.86	0.03
Electronic equipment and appliances	0.5	5.1	0.6	0.03	0.00	0.10	0.00
Other industrial machinery & equip	0.7	3.3	0.6	0.02	0.00	0.10	0.00
Electricity/gas generation, supply	1.7	5.7	77.0	0.10	1.29	0.38	1.03
Site preparation services	0.1	5.0	0.3	0.01	0.00	0.03	0.00
Building structure services (9)	0.8	3.8	0.0	0.03	0.00	0.12	0.00
Plumbing services	0.8	3.7	0.0	0.03	0.00	0.12	0.00
Installation trade services (10)	2.3	5.0	0.1	0.11	0.00	0.45	0.00
Building completion services (11)	1.7	8.9	0.1	0.16	0.00	0.62	0.00
Other construction services	0.7	8.4	0.0	0.05	0.00	0.22	0.00
Wholesale trade	8.3	2.6	0.7	0.22	0.06	0.86	0.05
Retail trade	2.8	2.9	1.4	0.08	0.04	0.32	0.03
Road freight transport	2.7	3.9	0.0	0.10	0.00	0.42	0.00
Communication services	2.3	0.6	0.2	0.01	0.01	0.05	0.00
Finance	2.0	0.5	0.3	0.01	0.01	0.04	0.01
Technical services	2.2	1.0	0.2	0.02	0.00	0.09	0.00
Legal services	1.3	0.6	0.3	0.01	0.00	0.03	0.00
Accounting services	2.1	0.6	0.0	0.01	0.00	0.05	0.00
Business admin & managemt services	1.4	0.8	0.5	0.01	0.01	0.05	0.01
Other (12)	23.9	5.2	2.2	1.23	0.54	4.93	0.43
	100.0	Total for new housing =		4.43	3.06	17.7	2.4

(1), (2), (3) Direct and indirect inputs are from the 1996 input/ output tables.
(6) Price increase for raw petrochem feedstock = 400 % since 1996 (from $US25/barrel to $US100/barrel in 2007).
(7) Price increase for industrial energy = 80 % since 1996 (see Figure 18).

(8) Wood product manufacturing includes hardboard, plywood, MDF, particleboard, and timber windows, stairs, trusses and frames.
(9) Building structural services includes concreters, roofers, bricklayer, and strucural steel sub-contractors.
(10) Installation trades include electrician, HVAC and fire/security sub-contractors.
(11) Building completion services includes plasterers, flooring layers, and painter sub-contractors.
(12) Other includes miscallaneous business services, commercial property, storage, glass products, prefab buildings, etc, etc.

5.1.3 Economies of scale in material manufacturing

For many materials there are only one or two manufacturers within New Zealand, and this lack of competition may be influencing prices. Much of the reason for the limited number of manufacturers is the manufacturing scale required for many building materials. However, most of manufacturing plants in New Zealand are on a world scale (see Table 4). The fact that local demand is less than world scale does not matter if the product is competitive on the world market (or in Australia) as the remainder is exported and the local users can benefit from the economies of scale.

Some product prices are likely to be higher than world average. For example, clay brick demand is below world scale and we import from Australia as well as making some locally, so unit costs are higher than in Australia. We have two cement plants each at about 700,000 tonnes per year which is well below the size of the newest plants in a number of countries. Note, however, world scale refers only to the unit cost of manufacturing and when transportation of bulky products like building materials is considered it may be more cost-effective to have smaller plants located closer to the main markets. That seems to be the

case for cement manufacturing in New Zealand where the two plants (Whangarei, West Coast) are widely separated and each are believed to have the major market share in their respective hinterlands. However, both manufacturers have a presence in most regions across New Zealand even though transport costs are likely to be excessive for some locations. This type of market behaviour is why material unit costs in a small distributed market like New Zealand are often higher than in large concentrated markets overseas.

Table 4. Economies of scale in manufacturing

Scale economies in building material manufacturing plant

Industry	World scale plant output volumes/ year	NZ Production (5)	Number of NZ plants	NZ new building demand (6)
Softwood milling (1)	150,000 cum	4,506,000 cum	300+	1,200,000 cum
MDF	170,000 cum	766,000 cum	3	?
Particleboard	200,000 cum	253,000 cum	2	20,000 cum
Softwood ply sheet	100,000 cum	428,000 cum	2	5,000 cum
LVL	80,000 cum	254000 cum	1	
Clay bricks (2)	5M sqm		2	1,700,000 sqm
Plasterboard (3)	20M sqm		1	25,000,000 sqm
Cement (4)	0.5 to 1.5 M tonnes		2	1.5 million tonnes
Steel making	1.0 to 1.5 M tonnes	0.8M tonnes	1	0.1M tonnes

(1) Source for all timber based products : http://www.plantationsnortheast.com.au/origin.htm
Plantations Northeast is jointly owned by the Victoria State and Federal Government of Australia.
(2) Morton, Jaggar (1995) Design and the economics of building. Taylor and Francis.
(3) European Commission. Commission Decision 89/22/EEC, Dec 1988.
(4) The Economic and Technical Viability of Various Scales of Building Materials Production (HABITAT, 1989)
United Nations Centre for Human Settlement.
(5) NZ production of forestry products from Ministry of Agriculture and Forestry.
(6) BRANZ estimate of NZ demand in 2007.

Manufacture of plasterboard is on a world scale, and although the local manufacturer supplies over 90% of the local market there is at least one importer of plasterboard from Asia and on occasion from Australia. Local steel making is approaching world scale and most of the production is exported. Some sheet steel coil used for making roofing is imported.

In summary, for the limited range of materials examined the economies of scale are close to or meet best world standards. However, the number of manufacturers is quite small suggesting prices will be higher than in larger economies, due to lack of competition. Imports provide some control on prices but transport costs mean our prices will tend to be higher than world prices.

The supply and distribution chain also has a bearing on material prices. There are four main merchant outlets for building materials which provides for a reasonable level of competition. This situation suggests that competition is not unduly restrained by lack of merchant outlets.

It is not unusual in other countries to have oligopoly or regional monopolies in the manufacturing and outlet of building materials. This is mainly due to the fact that building materials tend to be bulky to transport, and hence it is often more cost-effective to have one manufacturer serving a fairly limited area.

5.2 Builders' economies of scale

This section examines whether larger builders in New Zealand achieve economies of scale compared to their smaller competitors. The article by Kenley (see Section 2.3) suggested that significant economies are achieved at quite low capacity, at about 50 houses per year per firm. Data in the Appendix (Section 9.4) indicates there are about 30 home builders of this size or larger in New Zealand. They include a variety of firms targeting different cost segments of the market, and their average cost was approximately $1,192/sqm compared to the all builder's average of $1,245/sqm for the year ending December 2007. This suggests a price difference of about 4% in favour of the major builders. But prices vary across the country and regional analysis gives a better indication of the differential between small and large builders. In the Appendix two specific regions are examined: Bay of Plenty (BOP) and Canterbury (see Section 9.4). The major builders in these regions have prices about 15% and 10% lower, respectively, than their regional averages.

Some of these major builders are "spec" builders (i.e. no client at the time the construction is started) and the eventual sale price is not accurately known. They are required to estimate the sale price at time of consent application but it is suspected some only supply their input costs. This could bias the apparent $/sqm cost advantage toward these the larger builders. However, examination of the consent and actual house costs reported later in Section 9.2, indicates the under-reporting of profits are spread across both small scale builders and the larger builders including some "spec" builders. There may be some quality differences between major builders and the smaller builders but most of the price difference is believed to be due to scale effects. So we conclude the economies of scale can be up to 15% in reduced unit prices for new housing. The majority of new housing is from smaller builders, over 75%, (see Section 9.4.3). There is considerable scope to make cost savings in new housing construction if new owners are prepared to accept some reduction in choice of building layout and materials, particularly cladding and window types.

As an example, wall claddings are varied in New Zealand compared to Australia. Over 85% of the wall cladding in new houses in NSW and Victoria are clay brick (Australia Bureau of Statistics 2000). In New Zealand the *BRANZ Building Materials Survey* has clay brick at about 41% share. About 48% of new houses have a single wall cladding type, 45% have two cladding types and 7% have three or more cladding types. These multiple claddings add to the cost. Currently a medium standard one-off brick veneer house costs about $A1,070/sqm in Brisbane, and in BOP the equivalent is about $1,450/sqm (DBH Estimated building costs) or $A1,200/sqm. So BOP houses are about 12% more expensive than Brisbane.

5.3 Land cost details

There is spread of sales prices for sections (see Figure 19) where the numbers of sales in 2007 are shown. Note that the total is about 9,800 sections and excludes house and land package sales. The second panel indicates that the lower 25% of sales are priced below $130,000 and the top 25% of sales are over $275,000. These are all New Zealand data and it is likely the distribution is different for the major regions where average prices are higher than the New Zealand total.

Figure 19. Section sales distribution 2007

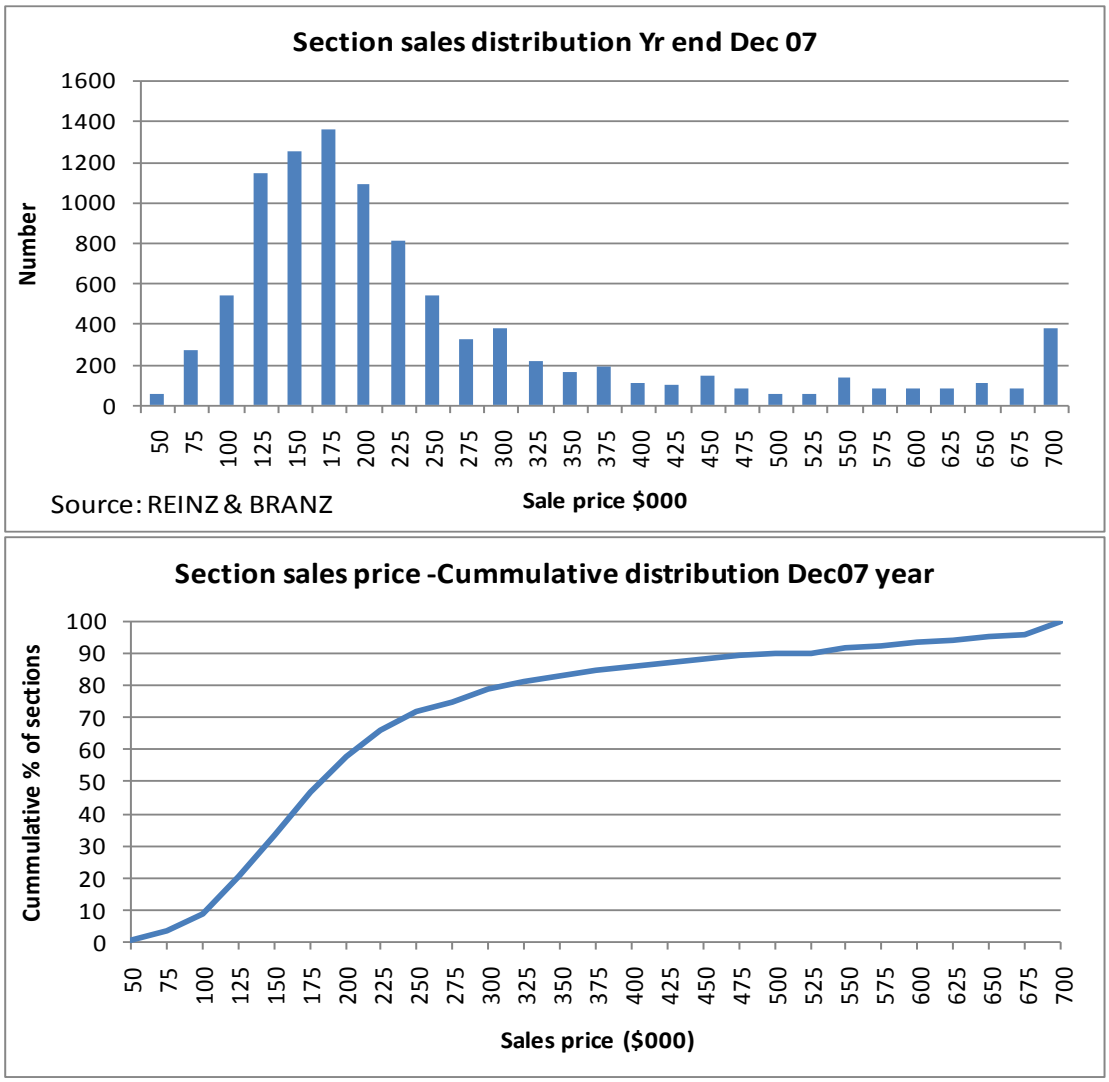
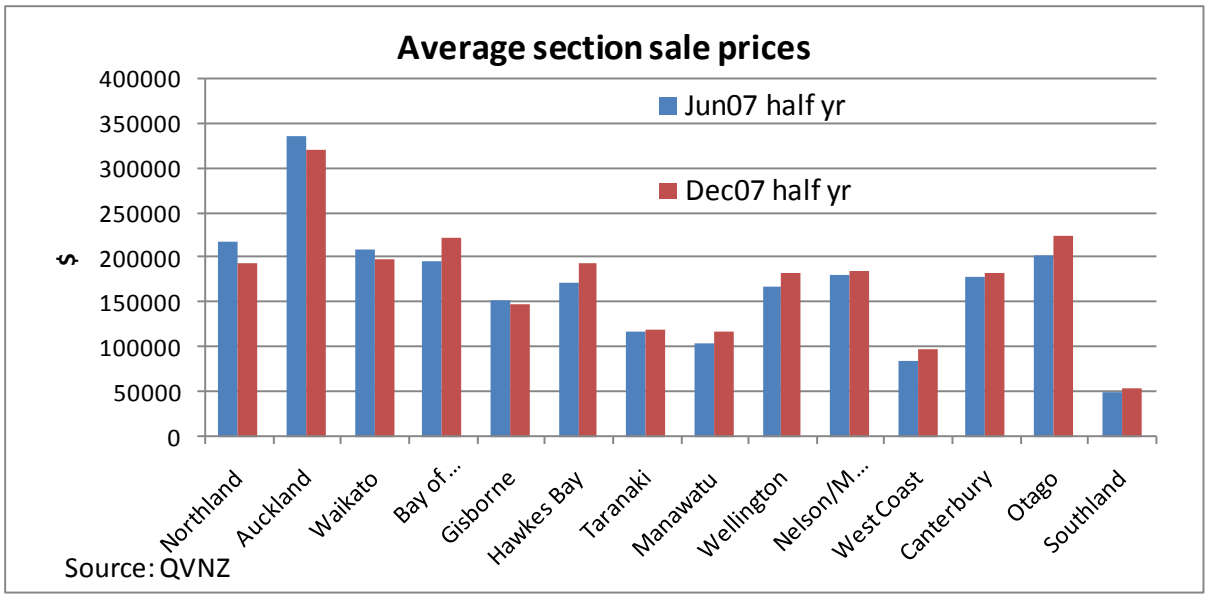


Figure 20. Regional section prices



The regional distribution of average house section prices for the December 2007 half year is in Figure 20. As expected the Auckland region has the highest prices, followed by Otago and BOP.

Building cost consultants, Maltby's, were commissioned to examine the land development costs for projects they had been involved with. The Maltby's report is in the Appendix. Their cost findings are summarised in Figure 21 and Table 5, and indicate the unit cost drops as the size of the development increases. They classed the projects into three categories:

- Rural "spec" housing: Open country, isolated developments, quite large lots which include a new central sewage system.
- Urban "spec" housing: Town infrastructure available and local services are brought in from the existing infrastructure. Usually sold to individual builders for one-off stand-alone housing design.
- Urban mixed use: Small lot sizes within existing town infrastructure. Includes a mixed development of detached houses, duplexes and multi-units.

Note that the unit price does not include the land cost which is typically $60,000 to $150,000 per 400–700 sqm lot (Hutching, NBR 2007). This is for land within the major cities' urban limits, and the price range is lower outside the metropolitan urban limit (MUL) and in smaller centres. Also the Maltby's data does not include the profit margin to the developers, which varies widely.

The Maltby's data shows the cost of the development and council fees is about $60,000 to $90,000 per lot, the raw land is about $50,000 to $150,000, and the developer's profit is probably between $10,000 and $50,000 per section for urban developments which are connecting to existing infrastructure. This gives a price to the owner of between $120,000 to $290,000 for the total section price which straddles the average price in Figure 12 and covers most of the sales in Figure 19.

Figure 21. Residential section development costs

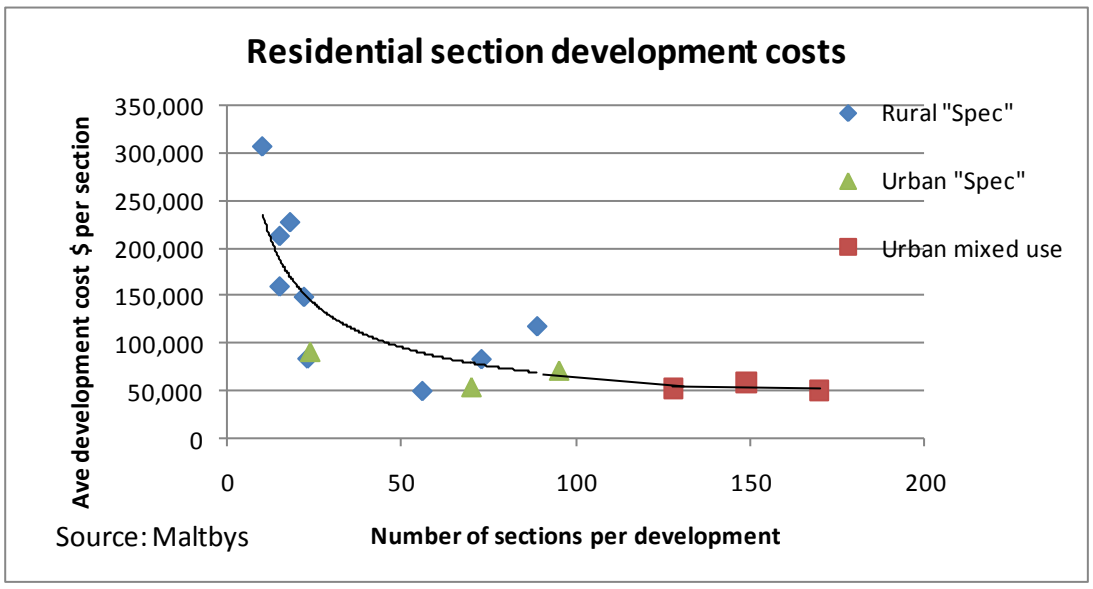


Table 5. Land development cost breakdown from Maltby's Ltd

	Scheme info				Costs/ unit all rebased to 1Q08 values					
	LOCATION	Development type	UNITS (DWELLINGS)	AVG SITE AREA PER UNIT	Site infrastructure costs	Professional Fees	Statutory charges and fees	Time related costs	Contingencies	Total
1	WELLINGTON	Rural, Spec housing	73	6849	$ 59,729.64	$ 10,646.51	$ 5,588.72	$ 691.78	$ 7,450.07	$ 84,106.71
2	OTAGO	Rural, Spec housing	22	40000	$ 119,517.38	$ 27,346.51	$ 2,097.38	$ 684.84	INCL	$ 149,646.10
3	QUEENSTOWN	Rural, Spec housing	89	900	$ 84,516.64	$ 13,859.21	$ 14,889.30	$ 224.97	$ 5,194.64	$ 118,684.75
4	QUEENSTOWN	Rural, Spec housing	15	1400	$ 132,852.25	$ 74,295.41	$ 5,836.86	$ 718.62	$ -	$ 213,703.15
5	NORTHLAND	Rural, Spec housing	56	761	$ 37,638.38	$ 5,704.11	$ 6,524.37	$ 718.62	INCL	$ 50,585.48
6	QUEENSTOWN	Rural, Spec housing	15	8000	$ 138,201.08	$ 20,574.32	$ 1,011.52	$ 858.38	INCL	$ 160,645.30
7	QUEENSTOWN	Rural, Spec housing	18	2500	$ 166,739.75	$ 46,654.29	$ 8,878.32	$ 575.97	$ 5,368.14	$ 228,216.46
8	QUEENSTOWN	Rural, Spec housing	23	80000	$ 68,923.71	$ 13,727.62	$ 1,513.04	$ 496.82	INCL	$ 84,661.19
9	QUEENSTOWN	Rural, Spec housing	10	1200	$ 211,347.73	$ 84,964.01	$ 9,638.51	$ 1,907.82	INCL	$ 307,858.06
10	HAWKES BAY	Urban, mixed use	149	500	$ 25,353.91	$ 26,726.24	$ 6,437.01	$ 718.62	INCL	$ 59,235.78
11	WELLINGTON	Urban, mixed use	170	500	$ 17,009.31	$ 26,726.24	$ 6,437.01	$ 718.62	INCL	$ 50,891.17
12	HAWKES BAY	Urban, mixed use	128	500	$ 18,716.13	$ 26,726.24	$ 6,305.47	$ 718.62	INCL	$ 52,466.45
13	NORTH SHORE	Urban, spec housing	24	2152	$ 65,760.79	$ 9,136.25	$ 6,437.01	$ 718.62	$ 8,529.41	$ 90,582.08
14	QUEENSTOWN	Urban, spec housing	95	800	$ 56,507.38	$ 9,484.95	$ 4,821.70	$ 112.94	INCL	$ 70,926.98
15	SOUTHLAND	Urban, spec housing	70	800	$ 38,100.22	$ 4,321.66	$ 10,138.89	$ 914.05	INCL	$ 53,474.82
	AVERAGE		63.8	9791	$ 82,727.62	$ 26,726.24	$ 6,437.01	$ 718.62	$ 5,308.45	$ 118,378.96
	MIN		10	500	$ 17,009.31	$ 4,321.66	$ 1,011.52	$ 112.94	$ -	$ 50,585.48
	MAX		170	80000	$ 211,347.73	$ 84,964.01	$ 14,889.30	$ 1,907.82	$ 8,529.41	$ 307,858.06
	STANDARD DEVIATION		53	21861	$ 58,538.89	$ 24,250.88	$ 3,561.52	$ 392.23	$ 3,129.23	$ 78,539.70
	VARIANCE AS %				71%	91%	55%	55%	59%	66%

Items in red font are average figures based on those in the study

Key to development types

Rural, spec housing — Open country, typically isolated developments, with no mains drainage or street lighting. Lots tend to be larger in size and may be spread over a large area.
Lots typically sold to single developers for one off designed housing
Costs will tend to include large single infrastructure items such as sewage systems, large new services etc., and so will vary greatly
The average cost per unit of these developments is $155,345.24

Urban, spec housing — Town or previously developed areas, with mains drainage and street lighting, lots sizes will tend to be smaller and within a smaller overall site
Costs will tend to include bringing in services from existing local infrastructure
The average cost per unit of these developments is $71,661.29
Lots typically sold to single developers for one off designed housing

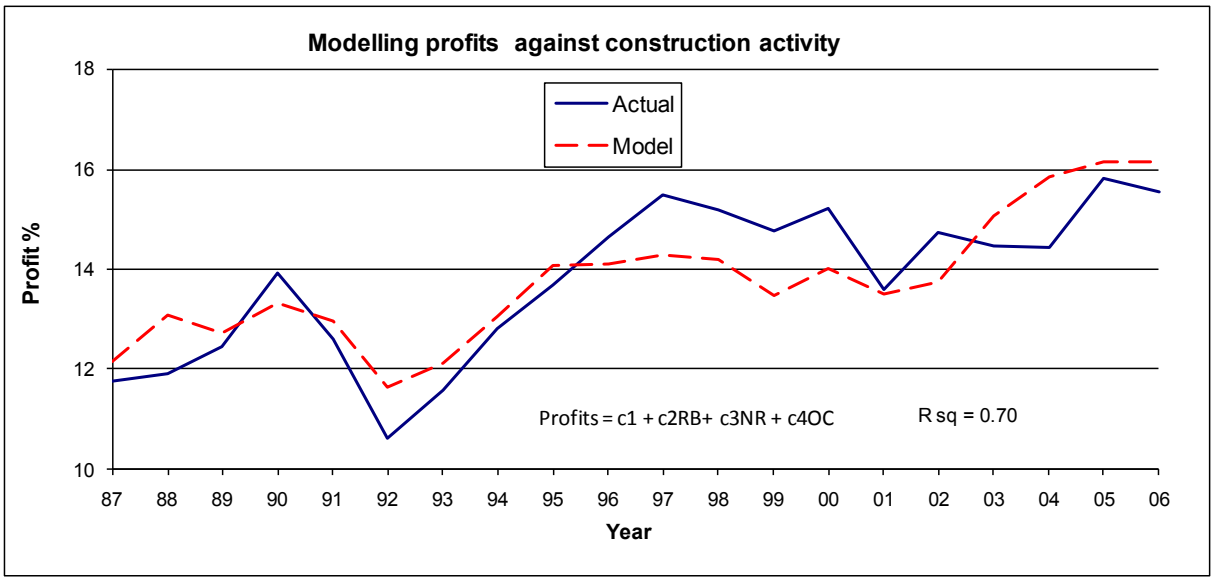
Urban, mixed use — Town or previously developed areas, with mains drainage and street lighting, lots sizes will tend to be smaller and within a smaller overall site
Mixed developments including single housing units combined with townhouses and/ or apartments, so overall unit sizes are lower
The average cost per unit of these developments is $54,197.80

5.4 Modelling profit margins

5.4.1 Margins versus building activity

It is postulated that profit levels depend to a large extent on the level of demand in the industry. One way to test this is shown in Figure 22 where the profit percentage is explained in terms of the new work put in place for housing (RB), non-residential buildings (NR), and civil engineering (OC). A regression analysis was done and the results are shown in the chart, where the dotted line is the model and the solid line the actual profit level. The dotted line is the model which approximately follows the actual profit percentage from year-to-year. The R squared for the regression is 0.70, which indicates workloads explain a lot of the fluctuations in profit levels, but not all the variation. The analysis of the regression in the Appendix indicates that a change of 1,000 new houses in a year produces a profit change for the construction industry as a whole of about 0.3%. Since the housing sector is typically 50% of all building and construction activity the profit change in residential construction is likely to be approximately double or 0.6% for each 1,000 change in new housing numbers.

Figure 22. Construction industry profits modelling



5.4.2 Margins from BRANZ Materials Survey

Profit margins in the residential sector only were investigated using results of the *BRANZ Materials Survey* (BUILD 2004). This survey to builders is done every quarter and over a year approximately 1,200 new dwellings are surveyed. Each survey is for a particular building randomly selected from building consent lists published by territorial authorities (TAs). The data collected includes the building consent value and the actual contract value of the completed building. If there are no extras to the contract then we expect the ratio of consent value to survey value to be close to 1.00, though some contracts allow for cost escalation, in which case the ratio would be slightly below, say about 0.98 (excluding any additional work). Contracts may also include landscaping, the cost of which would not appear in the building consent, although this work is often deferred and done by the owner at a later date.

In many cases the ratio was significantly less than 1.0 and if it is assumed that the consent value excludes profit and the builder's response includes the profit, then the survey can be used to measure profit margins. This is discussed further in the Appendix (Section 9.2)

where it is concluded that the results suggest the profit margin in new housing construction was about 10% in 2007.

6. MODELLING CONSTRUCTION PRICES

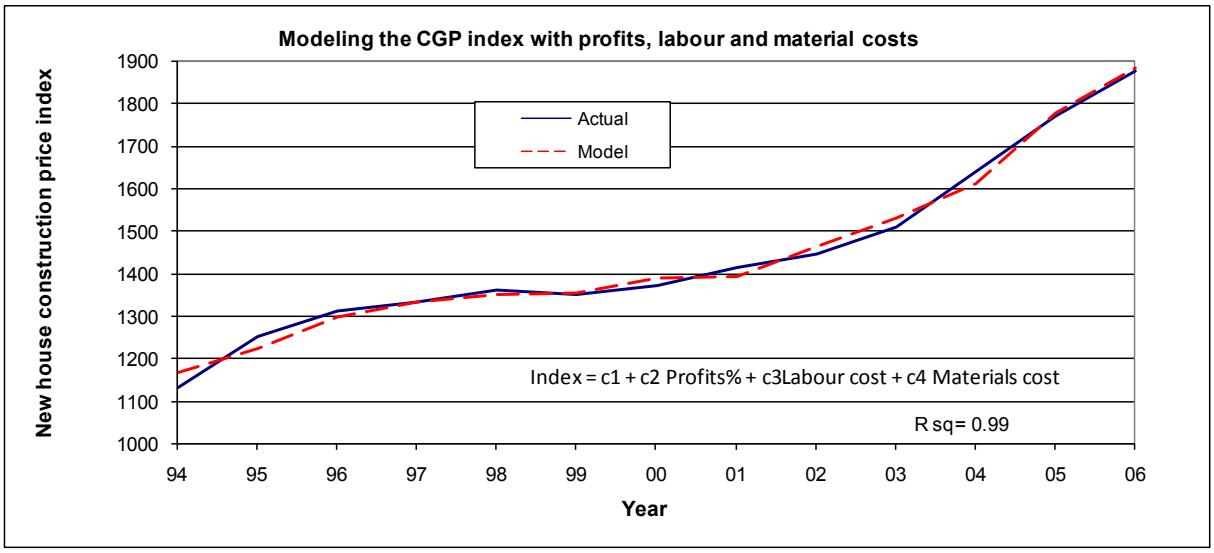
6.1 Regression model

The main cost inputs for building a new house are:

- Labour
- Materials
- Profit margins.

These three factors explain most of the fluctuations in new house building costs in a linear regression equation as shown in Figure 23, where the R squared value measuring the fit of the model is a very high 0.99. Details are in the Appendix. The cost being modelled is the CGPI for new housing discussed earlier. The variables used to explain the construction costs are the construction labour cost index, the BRANZ developed materials cost index described earlier, and the construction industry profits as a percentage, using yearly data.

Figure 23. New house construction cost modelling



There are other inputs that affect the total cost to new house owners and a more complete model of inputs is presented next using the data on the labour, materials, profit, land and administration//overheads costs introduced earlier in Section 3.

6.2 Spreadsheet model

The housing model briefly discussed in Section 3 is expanded in this section. A spreadsheet model of the various components was developed for three house sizes:

- Small house 145 sqm, single-storey
- Large house 199 sqm, single-storey
- Retirement home 394 sqm, single-storey.

These are the model houses published by the DBH for monitoring housing costs in six regions. Each house has been broken down into components by BRANZ and the spreadsheet for the large house is shown in Table 6. The spreadsheet uses the DBH published $/sqm rates and are as at July 2007. The table includes design, legal and consent fees.

The component breakdowns, including land costs, are shown for all three residential sizes in Figure 24 to Figure 26. The spreadsheet model enables other regions to be displayed in the same format. The small and large houses have a similar percentage cost breakdown, but the retirement home cost structure is somewhat different. It has been assumed that the section cost for the small house is at the lower quartile for the region. The large house section cost is the median, and for the retirement home a constant $600,000 land cost has been assumed. Consent fees are assumed to be similar across the country but they increase as the house size increases, as do legal costs.

The model enables the effect of changes in cost for any particular component to be quickly incorporated, which flows through to the effect on the total cost.

Table 6. Building cost components – large house concrete floor slab

Large house (195 sqm) Costs by component				Auckland	
	Tot %	% contribution to total cost			
		Lab	Mat	Plant	
Main contractor					
Component					
Site prep/ general	1.8	1.44	0.36	0.00	
Substructure	3.0	1.63	1.18	0.15	
Frame	10.6	4.77	5.83	0.00	
Roof	3.2	0.97	2.27	0.00	
Wall cladding	2.2	1.10	1.10	0.00	
Windows/Ext door	0.0	0.00	0.00	0.00	
Interior doors	4.3	0.65	3.66	0.00	
Fixtures & Fittings	3.7	0.55	3.10	0.00	
Interior lining	9.9	4.46	5.46	0.00	
Paint	0.0	0.00	0.00	0.00	
Plumbing	0.0	0.00	0.00	0.00	
Electrical	0.0	0.00	0.00	0.00	
	38.7	15.57	22.96	0.15	
less profit	28.7	11.54	17.02	0.11	
Sub contractor					
Site prep/ general	2.7	0.00	0.54	2.16	
Substructure	4.4	1.55	2.22	0.67	
Frame	0.0	0.00	0.00	0.00	
Roof	7.6	2.27	5.29	0.00	
Wall cladding	8.8	4.40	4.40	0.00	
Windows/Ext door	9.4	0.94	8.46	0.00	
Interior doors	0.0	0.00	0.00	0.00	
Fixtures & Fitting	3.7	0.55	3.10	0.00	
Interior lining	2.5	1.12	1.36	0.00	
Paint/ wallpaper	6.4	4.80	1.60	0.00	
Plumbing	8.8	3.96	3.96	0.88	
Electrical	7.1	1.78	5.33	0.00	
	61.3	21.36	36.26	3.71	

	Profit	Lab	Mat	Plant	$ Total
Building cost	28802	94761	153462	10990	288015
	10.0%	32.9%	53.3%	3.8%	100.0%
		Designer (3% constructn$)			11521
		Legal			1300
		Consent fees			3500
		Levies (BRANZ & DBH)			855
		TOTAL BUILDING COSTS			305,191

Figure 24. Small house – Auckland – spreadsheet model cost breakdown

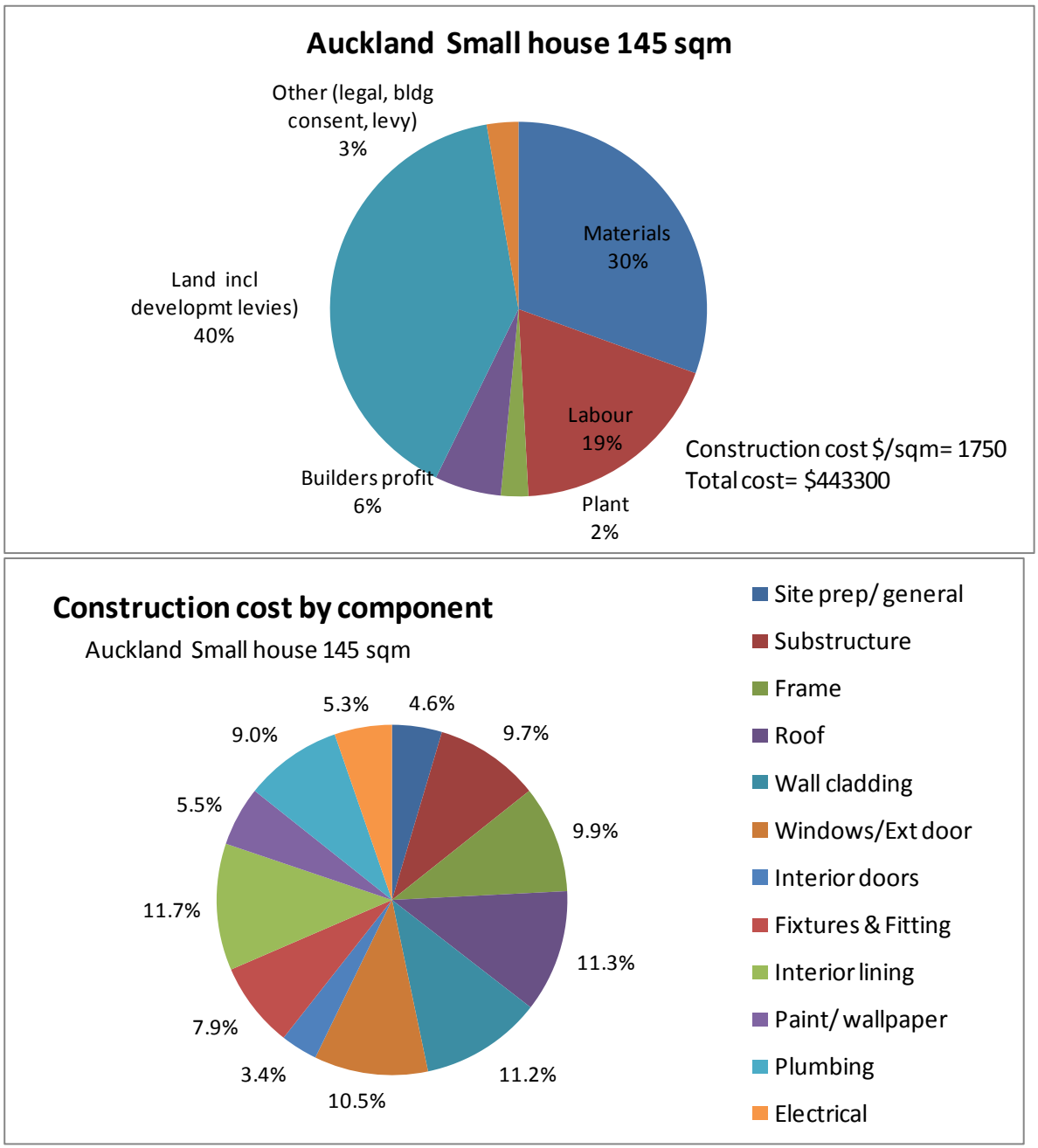


Figure 25. Large house – Auckland – spreadsheet model cost breakdown

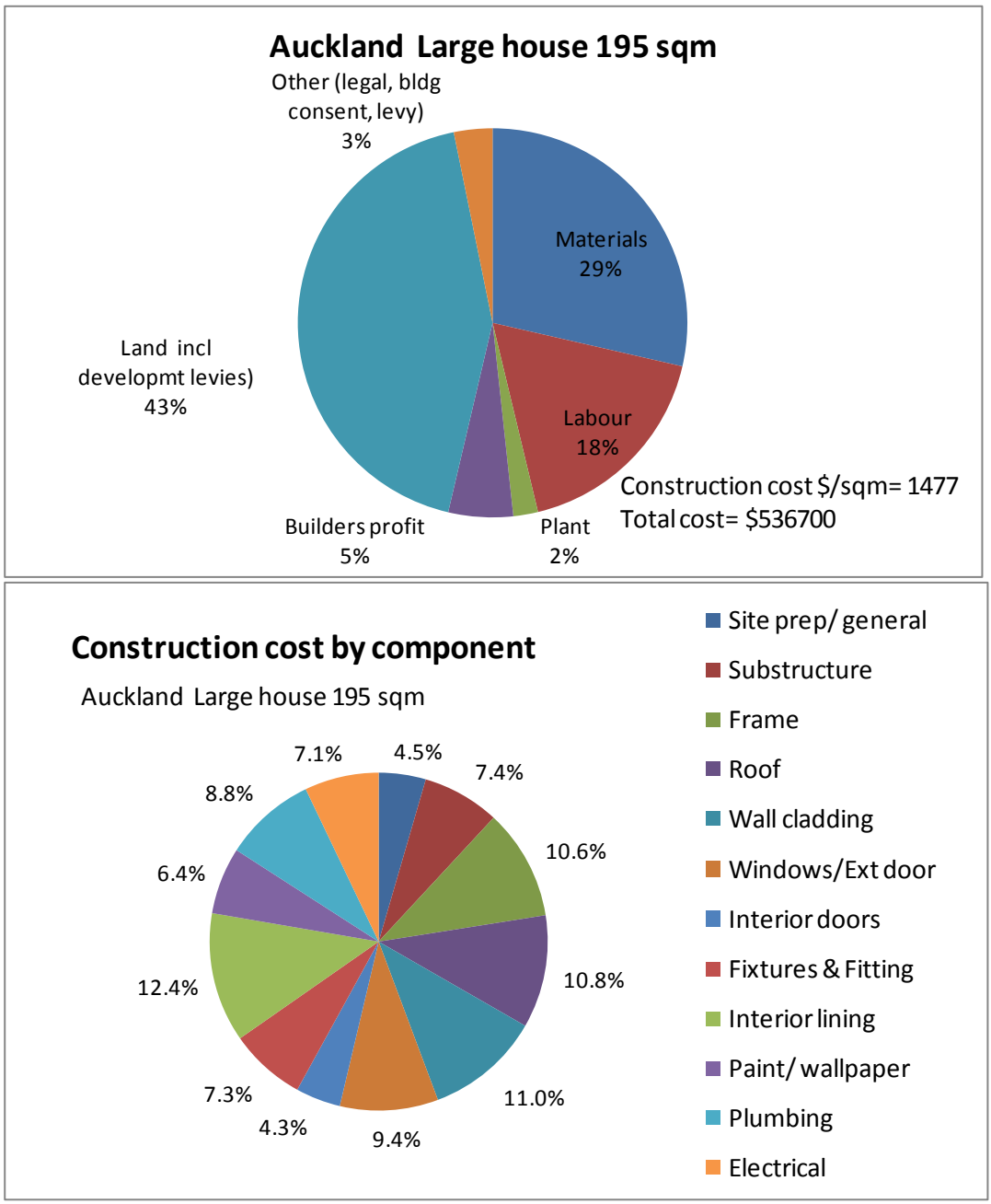
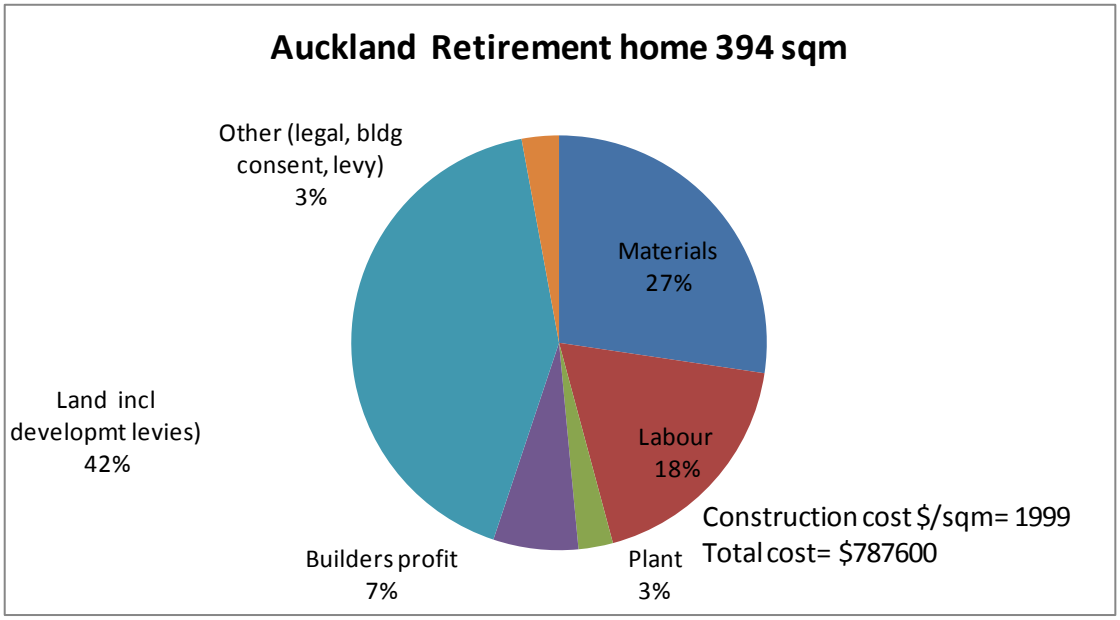
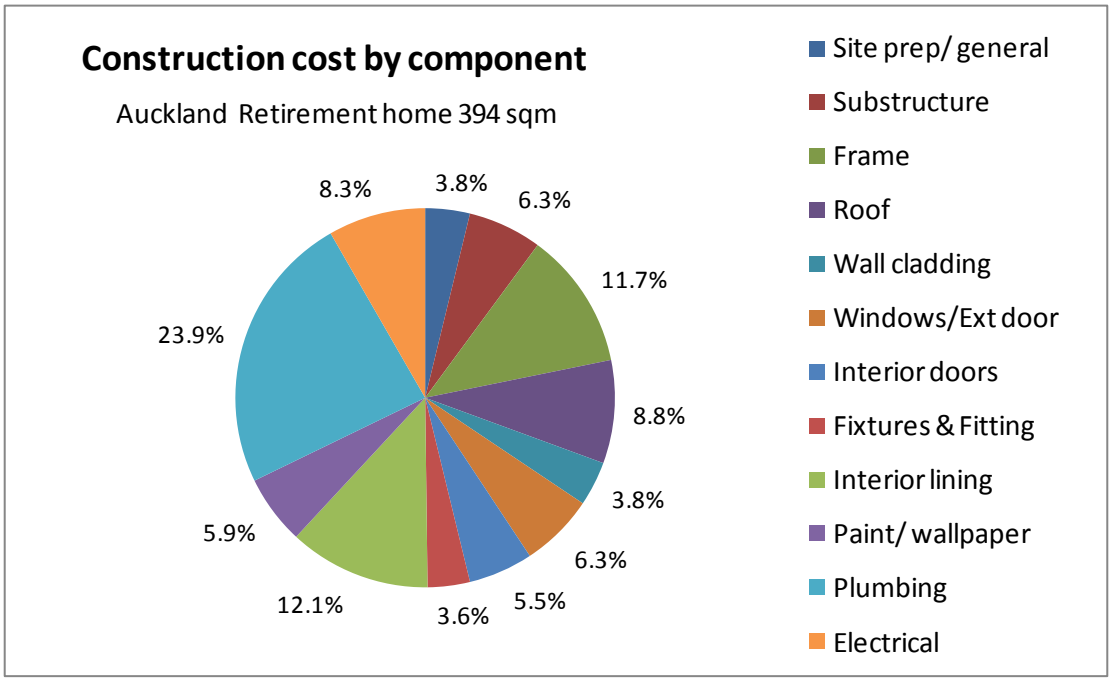


Figure 26. Retirement home – Auckland – spreadsheet model cost breakdown





Note that the $/sqm rates used by the DBH and produced by Maltby's are for "spec" houses, including profit margins and GST. Maltby's state they estimate that group housing is about 21% cheaper than "spec" houses, while architecturally designed one-off houses are about 20% more expensive. The earlier work in Section 5.2, based on an analysis of the major builders in two regions, suggests a price differential of between 10% and 15% between larger-scale builders and the overall industry. So the Maltby's finding is in approximate agreement.

7. DISCUSSION

The main inputs in new housing are land, materials and labour. The largest segment is the section cost at about 40% of the total package. The cost of developing land is about $50,000 to $70,000 per lot for land near existing urban infrastructure. These figures from Maltby's are based on a fairly small sample but are consistent with published data on section prices, allowing for the raw land cost. The analysis shows that greenfield developments away from existing services are much more expensive, at over $100,000 per lot excluding land cost, mainly due to the cost of sewage treatment systems. Subdivisions utilising existing water supply, waste and stormwater infrastructure are able to benefit from the economies of scale but need to contribute to the cost of the base processing station via a development fee.

The Maltby's analysis indicates these council development levies average about $7,000 per lot for urban sections. Table 2 shows a development fee increase of $9,000 in Canterbury (bringing the total to $10,000 currently) and in the Auckland councils the levies are between $6,400 and $14,000 (Hutchings NBR 2007). The method for calculating this charge is not always clear, and the reported practice of some councils to add other costs (e.g. for library, cultural, recreational grounds) would appear to go beyond the immediate impact of the new development and be unjustified as a development charge. Studies in Australia (Property Council of Australia 2007) have identified infrastructure charges many thousands of dollars above the direct infrastructure cost. This report does not consider the details of inter-temporal payment for civil infrastructure, but suggests that some councils are loading the costs upfront onto new developments and this has been given as a major reason for section price escalation. A review of the infrastructure access charging basis is urgently needed and the Ministry of Economic Development is to product a report on this in 2008.

We have not investigated the raw land cost in detail but major builders report this is about $50,000 to $150,000 per lot (up to 700 sqm) near major cities. Add on the infrastructure development of about $50,000 to $80,000 per lot, plus council levies of about $10,000, plus the developer's margin of between $10,000 to $50,000 per lot (to cover financial costs, delays and profit). This brings the section price to between $120,000 to $290,000 per lot, depending very much on the location and circumstances. This range is in agreement with the distribution shown in Figure 19, and sale prices above $300,000 are likely to be prime sections in the inner suburbs and in tourist areas or larger than average sections in rural areas.

The next largest segment of new house cost is materials at about 30%. Generally, most materials are produced locally in manufacturing plants producing on a world scale. However, the limited size of the local market is such that often there are only one or two suppliers for many materials, and given the bulky nature of materials the regional spread of construction further constrains the effectiveness of economies of scale. Actual and potential imports provide some constraints on prices (e.g. clay bricks, plasterboard, insulation, cement) but the transport costs to import product provides some buffer for local producers. The likelihood remains that some materials prices are higher than would otherwise be the case in a larger market and that the homeowner does not always fully benefit from the world scale of some local manufacturers. It is likely that little can be done about this because if new manufacturers start up in competition the scale economies for many products are reduced for all manufacturers and production costs rise. These costs are passed on and the end consumer is no better off.

Labour is also a significant cost at about 20% of the total cost of a house. The major builders believe they are reasonably efficient in organising their labour and sub-contractors, and they say they achieve some economies of size. However, Section 4.2.5 shows declining productivity in construction overall, in large part due to the impacts of regulation, shortages

of skilled labour during high demand, and a large amount of one-off design, including a wide use of different cladding types and windows. This preference for individuality in new housing has a significant cost premium, at least 10% based on our consent analysis and as much as 20% according to Maltby's.

The models described above can be used to answer the types of question posed at the start of this report. For example, using Table 6 the material content of framing timber in a typical house is about 5.8%, so a 10% rise in framing timber prices causes the building construction cost to rise by about 0.6%. An alternative calculation for sawn timber generally is to use the material share in Figure 27 of about 19%, including finishing timber, and we know from Table 6 that materials are 53% of the construction cost. So a 10% rise in all sawn timber increases the house construction cost by about 1% (19% x 53% x 10%).

Another example is oil prices. If these rise further to $150/barrel and remain there the effect on new housing costs is approximately another 9% increased cost. This is based on Table 3 where a rise from $US25 to $US100 has given an 18% cost increase so a price of $US150 adds another 9%. These are very approximate estimates since it is very likely substitution of fuel types in material manufacturing has occurred and will continue to do so. Material substitution also occurs, to some extent offsetting the price rises. Manufacturing technologies and efficiencies have improved in the 10 years since the most recent set of input/output tables (upon which the estimates are based), so that introduces another approximation in the method.

What are the potential for cost savings in the provision of new housing? Raw land cost is a major component and a number of reports, e.g. Motu (2007), have recommended mechanisms for the competitive release of more land near the existing MUL of the major cities. As mentioned above, council charges for access to existing infrastructure needs more investigation. The government's draft Affordable Housing: Enabling Territorial Authorities Bill allows for TAs to require developers to make provision for affordable housing in new subdivisions. This does not address the general question of land zoning, the potential for hoarding, and its effect on cost. That is a separate subject for research and further work is needed.

This report has mainly focussed on the construction process. The above analysis has indicated that major builders are able to produce standard quality houses about 15% cheaper than low volume builders. Some of the latter specialise in quality and architecturally designed homes that are more expensive to build due to complex forms and mixed materials. However, most low volume builders produce a fairly standard quality house and the finding of this report is that the scale effects of the larger builders enable prices to be reduced by about 15% on average.

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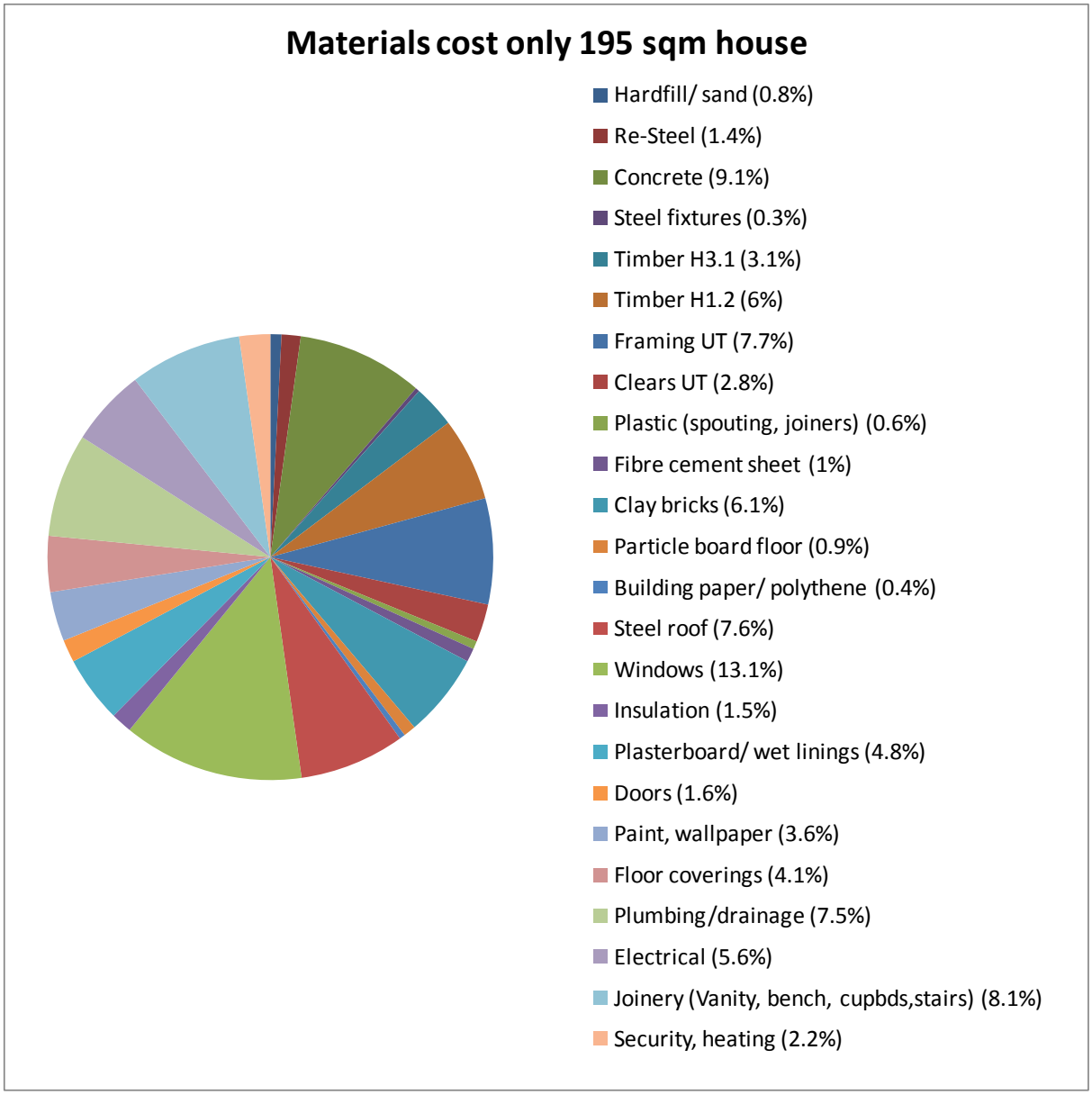
9. APPENDIX

9.1 Material breakdowns

Figure 27. Materials composition in the Exemplar House



The major material types are structural and finishing timber (about 19.6%), concrete (9.1%) and roof and wall claddings (7.6% and 6.1%, respectively). These percentages will change somewhat from house-to-house depending on the cladding types, whether it is on a slab and one or two-storey. But it provides a rough indication of the significance of each class of materials.

9.2 Profits in the construction industry

The level of profits in the industry, measured as a percentage of operating surplus to turnover, was modelled against industry activity, residential (RB) and non-residential (NR) buildings work put in place, and civil engineering or other construction (OC). Segment breakdowns of profits by RB, NR and OC are not available – only the building and construction total was available.

Fixed capital formation (FCF) from the national accounts was the measure of activity. The results of the linear regression analysis are shown below. The coefficient on residential is an indication of the contribution of housing work to the profit percentage, and the coefficient units are the % profit per $ million of work put in place. The R sq of the regression at 0.70 indicates a fairly good fit, and the t-statistic of 3.6 on the residential coefficient is quite high indicating good statistical confidence. Currently 1,000 new houses have an FCF of about $415 million i.e. the cost of all inputs for each house is $415,000 and includes design, construction, legal, financial and local authority cost contributions toward putting new housing in place. So each 1,000 new houses add 0.3% to the industry profits of the total sector (RB, NR and OC). Since residential is about half of FCF it is likely the profits in the residential sector will be double i.e. each 1,000 new houses adds 0.6% to residential builders' profits. Conversely, a drop of 1,000 new housing starts removes 0.6% from the profit margin.

SUMMARY OUTPUT

Model 3
Profits = C1 + C2*RB + C3*NR + C4*OC

additional 1000 houses =$ 415M giving a
0.30 % profit increase
=(415*0.000721)

Regression Statistics	
Multiple R	0.837669
R Square	0.701689
Adjusted R	0.645756
Standard E	0.907186
Observatio	20

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regressior	3	30.97334	10.32445	12.54510688	0.000179436
Residual	16	13.16778	0.822986		
Total	19	44.14112			

		Coefficients	*tandard Erro*	*t Stat*	*P-value*	*Lower 95%*
	Intercept	7.668888	1.127948	6.798973	4.27368E-06	5.277744853
RB	X Variable	0.000721	0.000199	3.617088	0.002314148	0.000298402
NR	X Variable	0.000461	0.000328	1.403723	0.179512425	-0.000235263
OC	X Variable	-0.00046	0.000467	-0.994606	0.334732783	-0.001455185

An alternative measure of the profits in the housing sector was explored using the *BRANZ Materials Survey.* This is a quarterly survey receiving approximately 300 responses per quarter from builders, chosen at random from building consent lists published by TAs. The survey is posted some time after the building consent is issued and generally construction is well underway or complete at the time the builder fills out the survey. The consent application has an estimated $ value for the work but the survey asks builders to record the actual final contract value for that consent i.e. the price of the new house to the owner.

Both numbers should be the same since the consent application form asks for the contract value. However, the two values often differ for a number of reasons including:

- Additions and variations to the contract after signing of the contract,
- The builder has an incentive to under-estimate costs at consent application time since some council fees are based on the building value,
- For "spec" houses the builder has a profit margin in mind at consent time but the final sale price is not known. In these situations it is believed some enter their expected profit but other "spec" builders enter their costs only on the consent form,
- Some other builders misinterpret the consent value as their costs only, not the contract price to the owner.

These factors indicate the ratio of consent value to survey value will tend to be less than 1.00. The ratios of the consent values to the BRANZ survey values are shown in Figure 28 and Figure 29 for 2007. As the figures indicate there is a range of ratios. Only about 16% of houses have a ratio of 1.00 i.e. the consent values agree with the survey value. A number of responses give a ratio larger than 1.00, indicating a survey value less than the consent value. The reason why respondents would give a value lower than the consent application value is not known but could include a reluctance to respond truthfully to a survey, or the scope of the work could have reduced since the consent application.

The most common ratios are below 1.00, between 1.00 and 0.85, and can be interpreted as indicating a profit margin of between 0% and 15%. The survey returns for the Bay of Plenty region were examined to see if the various builders had different patterns of response. It was considered likely that "spec" builders would be more common in the 1.00 to 0.85 ratio range. Instead it was found that all types of builders i.e. large and small scale builders, and high and medium cost builders all appeared in this range. Allowing for some contract escalation this result is taken to indicate a profit margin of roughly 10% or less.

Figure 28. Consent value versus final contract value

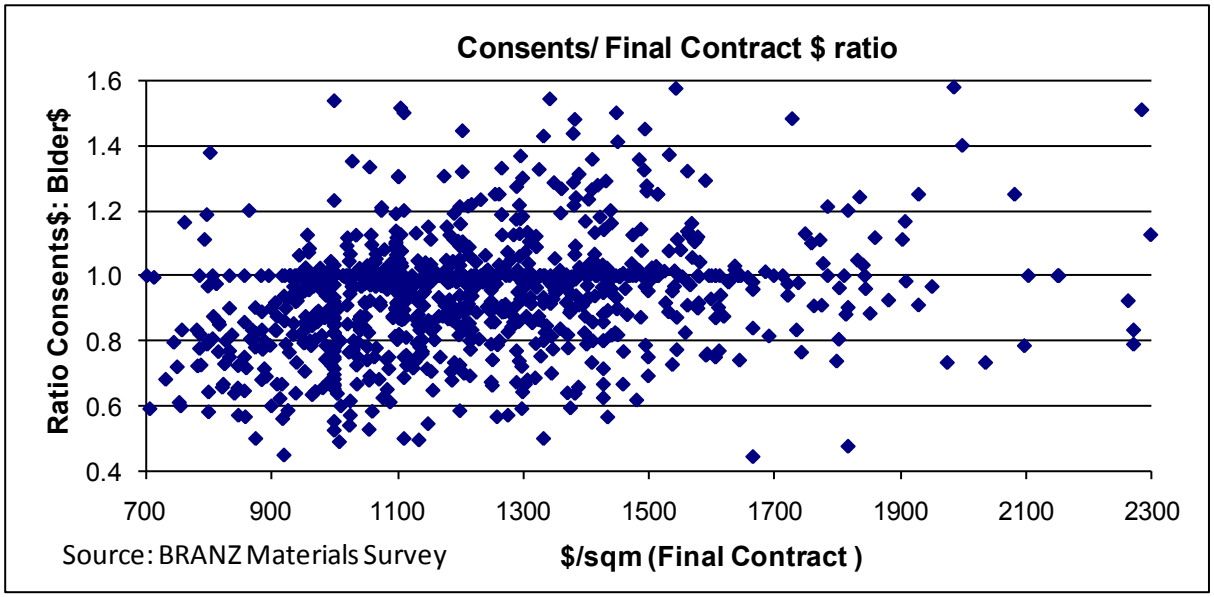
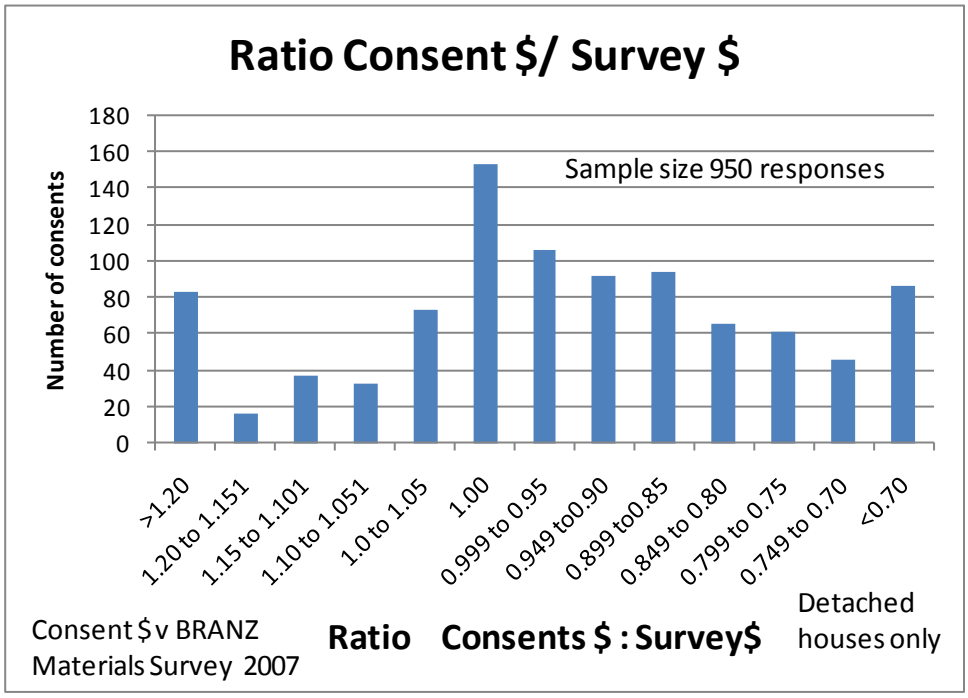


Figure 29. Consents to contract value group distribution



9.3 Construction industry productivity

Figure 15 indicates a trend decline of about $117 in value added per person per year, or a 0.3% productivity decrease per year, on average. This trend is slight and the yearly fluctuations are quite large, so the trend depends to some extent on what period is chosen. For example, a Treasury paper (Jansen and McLoughlin 2008) found construction industry labour productivity declining by about 0.5% per year in the seven years to 2007.

The trend is influenced by changes in use of plant and equipment, and in management efficiency (e.g. organisation of sub-contractors), in which case the apparent decline in labour productivity could be misleading. An alternative measure of productivity is to use a Cobb-Douglas production function, which considers labour and plant/equipment inputs together:

$Q = A L^{\beta 1} K^{\beta 2}$
where
Q = value added by the industry
A = management and technical efficiency coefficient (note: new equipment tends to be more efficient, so the A factor changes year-to-year, similarly management efficiencies can affect the coefficient). Let the technical coefficient change with time, i.e. $A = a e^{\delta t}$
L = volume of labour used by the industry
K = volume of capital equipment used by the industry
a, e, β1, β2, δ are constants
t = time.

The equation can be used to analyse a cross-section of firms (i.e. use individual firm's data for a single year to derive the coefficients for the industry in which case the A factor is a constant), or as a longitudinal analysis (a time series) for an industry in aggregate. The latter method is used below; using time series from SNZ for the construction industry (see Table 7). Taking natural logs on both sides the relationship becomes:

$$\text{Ln } Q = \text{Ln}a + \delta t + \beta_1 \text{Ln}L + \beta_2 \text{Ln}K$$

The constants were solved using regression analysis (see Table 8), for annual data between 1987 and 2005, giving β_1=0.88, and β_2=0.64, and δ= -0.023. The Rsq=0.95. The δ term is the proportional change in management/technical efficiency per year and is negative 2.3% per year.

The equation can also be written as:

$$dQ/Q = \delta + \beta_1 dL/L + \beta_2 dK/K$$

where the d represents partial derivatives or the annual change. With the above β and δ values the proportion changes in output between two periods can be expressed as changes in management/technical efficiency, labour input and plant/equipment use.

For example, over the 18 years of the regression analysis, i.e. between 1987 and 2005, value added increased at 2.2% per year, consisting of a labour volume increase of 2.0% pa, capital equipment increases of 2.5% pa and technical efficiency of -2.3% pa. This shows that while labour and capital inputs were increasing over the period, the management/technical efficiency was declining, and the net result was that real output growth was restricted to 2.2% pa.

The analysis has many approximations, including use of employment numbers rather than labour hours, and capital stock values rather than plant use hours. The quality of labour, and the ability of management to effectively organise sub-contractors and material deliveries, changes over time as the workloads change. Changes in health and safety requirements, and in the council inspection regime, also affect productivity. These approximations and changes appear in the technical coefficient and have had a major effect on the apparent decline in management/technical efficiency in recent years. Note, however, that there is a quite wide error margin of the technical coefficient. It is between 0.1% pa and -4.6% pa, at the 95% confidence limit, but almost certainly the trend has been negative over the period.

Table 7. Construction industry productivity

Construction industry productivity

March Year	Value added 95/96$M Q (1)	Labour Numbers (000) L (2)	Value Added /person $000	Capital Stock K $M95/96 (3)	FCF Bldgs + civil formation $M 06/07$	FCF/person $000
87	4114	103.7	39.7	3,102	12351	119
88	4031	99.6	40.5	3,122	13048	131
89	3894	97.3	40.0	3,161	12456	128
90	4055	95.0	42.7	3,131	12857	135
91	3440	88.4	38.9	3,221	12134	137
92	2905	75.5	38.5	3,216	10207	135
93	2836	79.6	35.6	3,171	9747	122
94	3133	83.5	37.5	3,315	11142	133
95	3520	94.7	37.2	3,461	12918	136
96	3709	102.9	36.0	3,742	14315	139
97	4150	113.3	36.6	3,978	15151	134
98	4290	114.9	37.4	4,188	15622	136
99	3928	109.0	36.0	4,342	14144	130
00	4605	113.2	40.7	4,538	16168	143
01	4293	116.4	36.9	4,717	14844	128
02	4531	112.7	40.2	4,875	15491	137
03	5180	125.0	41.4	5,083	17661	141
04	5604	145.0	38.7	5,535	19728	136
05	6030	153.8	39.2	6,207	20982	136
06	6305	165.7	38.0	na	21625	130
07	6080	186.8	32.6	na	21096	113
08						

(1) Statistics New Zealand, National Accounts.
(2) Statistics NZ , Household Labour Force Quarterly Survey. Year number is 4 quarter average.
(3) Statistics NZ . Value of equipment/ plant used by the construction industry, allows for depreciation.

Table 8. Productivity regression analysis

SUMMARY OUTPUT $\log Q = \log A + \delta T + \beta_1 \log L + \beta_2 \log K$

Regression Statistics	
Multiple R	0.976166
R Square	0.9529
Adjusted R S	0.94348
Standard Erro	0.047576
Observations	19

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	0.686882	0.228961	101.1564	3.5419E-10
Residual	15	0.033951	0.002263		
Total	18	0.720834			

		Coefficients	*SE*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*ower 95.0%*	*pper 95.0%*
	Intercept	-0.90067	2.3883	-0.37712	0.711369	-5.99120615	4.189874	-5.99121	4.189874
β_1	X Variable 1	0.884322	0.197382	4.480266	0.00044	0.46361334	1.30503144	0.463613	1.305031
β_2	X Variable 2	0.642885	0.395619	1.625013	0.124981	-0.20035588	1.48612681	-0.20036	1.486127
δ	X Variable 3	-0.02263	0.011129	-2.03367	0.060069	-0.04635177	0.00108811	-0.04635	0.001088

9.4 Building costs from consent information

The following charts show new housing construction costs by region and for selected building companies. The data is from the SNZ consents database and the What's On database. The former is a 100% record but only provides aggregated data. The latter provides individual consent information, including information on the builder name, location, house cost and floor area, but it only covers about 76% of all new housing building consents.

Individual consents were examined for the year ending December 2007, consisting of approximately 18,500 consents for detached houses. The aim was to investigate pricing, in particular:

- How new housing prices vary nationally
- Whether the large volume builders are likely to have lower unit prices ($/sqm of floor area) than for the average builder
- How prices vary within a region between companies
- The difference between detached housing and multi-unit housing unit prices.

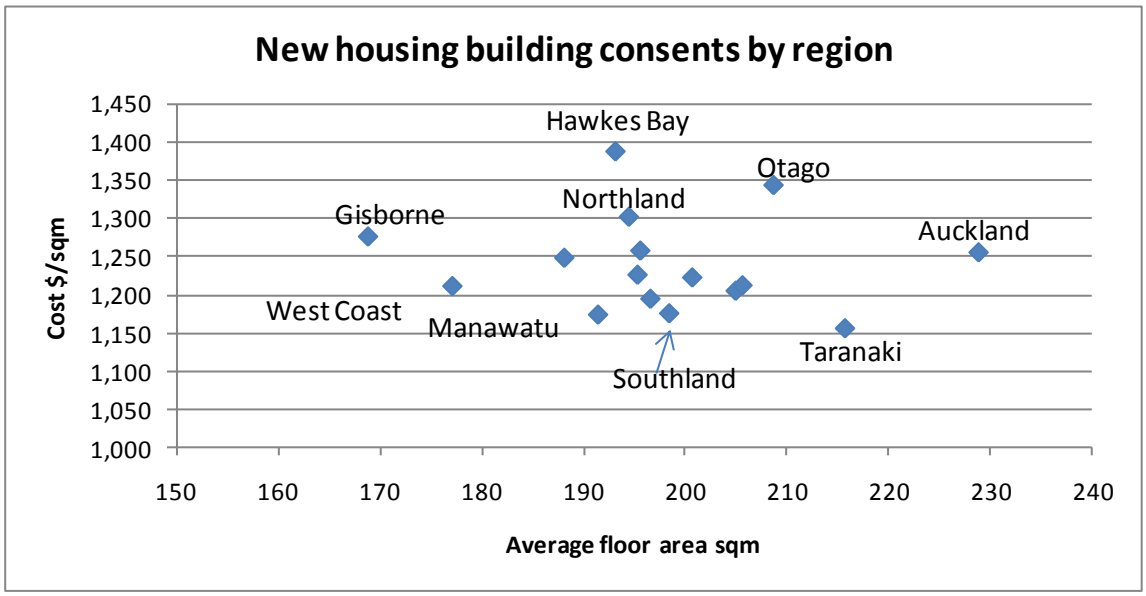
9.4.1 Aggregated consents

The regional totals and averages for new detached housing are shown in Table 9 and Figure 30. The average size was about 204 sqm, but there were regional variations with Gisborne and the West Coast having the smaller new houses and Auckland the largest. The building costs varied somewhat, with the highest in Northland, Hawkes Bay and Otago, possibly due to demand for holiday homes in these regions, which often achieve a price premium.

Table 9. Detached house building consents for the year ending December 2007

New house consents 2007			
Detached houses only			
	Number	Average area (sqm)	$/sqm
Northland Region	1,278	194.5	1301
Auckland Region	4,786	229.0	1255
Waikato Region	3,258	195.4	1226
Bay of Plenty Region	1,645	195.7	1257
Gisborne Region	169	168.8	1276
Hawke's Bay Region	769	193.2	1387
Taranaki Region	586	215.8	1155
Manawatu-Wanganui Region	1,089	191.5	1173
Wellington Region	1,831	188.2	1248
Tasman Region	278	200.8	1222
Nelson Region	328	196.7	1194
Marlborough Region	472	205.0	1205
West Coast Region	265	177.1	1211
Canterbury Region	4,104	205.7	1212
Otago Region	1,382	208.8	1343
Southland Region	408	198.5	1175
Total New Zealand	22,649	204.8	1244
Source: Statistcs New Zealand			

Figure 30 Regional house consents – average floor area versus average $/sqm

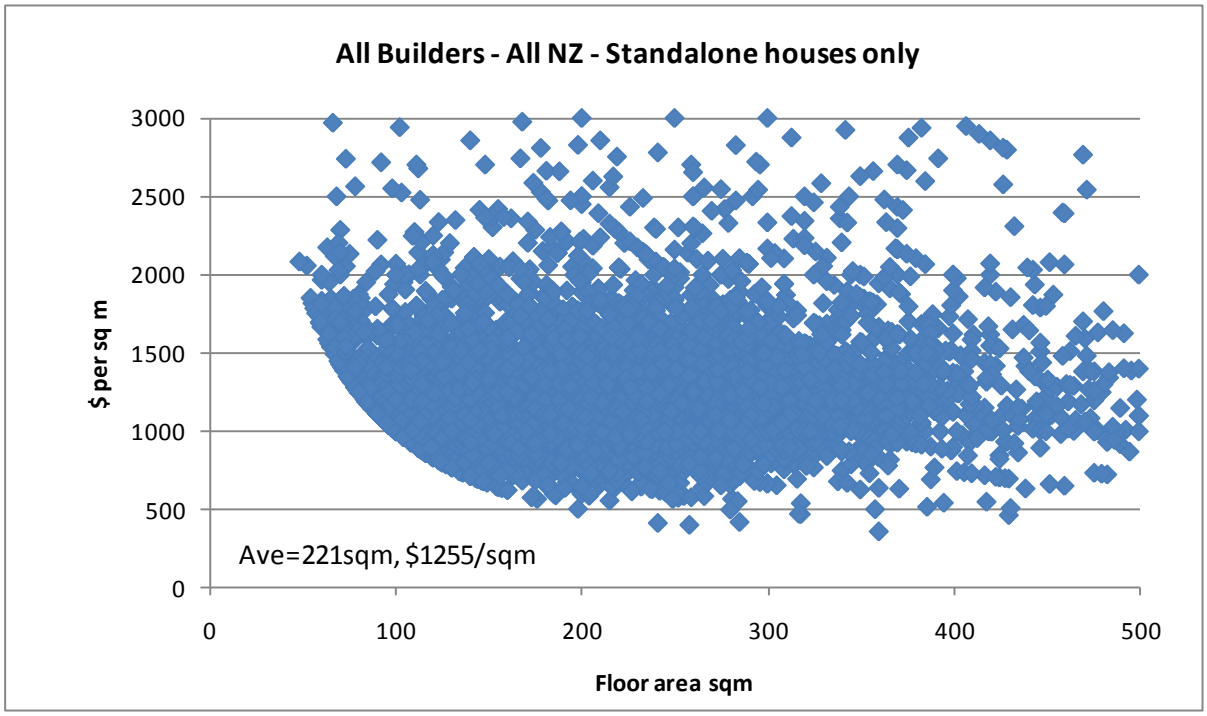


9.4.2 National consents distribution

The What's On database enables an analysis of individual consents. A scatter diagram of all consents in the database is shown in Figure 31. As expected there is a range of results for the house price in $/sqm of floor area. The average price is $1,255/sqm and the average floor size is 221 sqm. For the same period, SNZ data for all new house consents gives an average area of 205 sqm, and $1,245/sqm, so the What's On dataset is slightly biased toward larger houses. The What's On data is incomplete for two reasons. First, it does not include consents issued by private certifiers (some TAs contract out the issuing of consents). Secondly, owner builders and unknown builders at the time of consent issue are omitted from their database.

The chart shows a smooth cost frontier at the bottom left of the chart. This represents a budget of about $100,000, which is about the minimum price for a very basic house. At this price the owner can get a small (80 sqm or so) complete house at a "normal" $/sqm rate, or alternatively a shell-only house, sized about 120–160 sqm, for a lower $/sqm rate. In the latter case the owners would use their own labour to complete the house.

Figure 31. All new housing consents for the 2007 year – all NZ, all builders



9.4.3 Large residential building companies

The 40 largest builders from the What's On database are shown in Table 10, accounting for only 24% of all new housing, so it is apparent the industry is characterised by a large number of small-scale builders. Do the larger builders achieve economies of scale and produce houses at a lower cost?

Table 10. House builders ranked by size

Major Group House Builders
12 months endingDecember 2007

Rank		Location	# of houses	%	Average sqm	Ave $/sqm
1	G J Gardner Homes	NZ	662	3.6	215	1216
2	Jennian Homes	NZ	410	2.2	214	1334
3	A1 Homes Ltd	NZ	253	1.4	162	1105
4	Fletcher Residential (1)	Auckland, Queenstn	223	1.2	252	959
5	Generation Developments	BOP	180	1.0	178	1152
6	Stonewood Homes	South Is, Napier	153	0.8	222	1256
7	Versatile Buildings	NZ	151	0.8	117	1259
8	Gillies Construction	Waiarapa, Wellington	140	0.8	172	1164
9	Universal Homes	Auckland, BOP	139	0.8	195	1147
10	Golden Homes	Whang, Auck, Otago	136	0.7	232	1055
11	Horncastle Homes Ltd	Canterbury	135	0.7	221	1154
12	Peak Construction	South Is	116	0.6	218	1103
13	Sovereign Homes Ltd	Auckland, Nth Auck	115	0.6	232	1326
14	Signature Homes	North Is	113	0.6	240	1591
15	Reid Homes Ltd	NZ	112	0.6	249	1600
16	Fowler Homes Ltd	NZ	113	0.6	229	1180
17	Ray Homes Ltd	Canterbury	102	0.6	255	1083
18	Classic Builders Ltd	BOP, Waikato	88	0.5	191	1046
19	To-day Homes Ltd	Christchurch	71	0.4	239	1058
20	Platinum Homes Ltd	North Is	69	0.4	244	956
21	Paradise Homes Ltd	Hamilton, Otago	69	0.4	158	1017
22	Keith Hay Homes Ltd	NZ	68	0.4	115	1150
23	Carrus Ltd	Wellington	65	0.4	na	na
24	Baywide Construction	BOP/ Gisborne	63	0.3	221	1080
25	Benchmark Homes	Canterbury	58	0.3	231	1232
26	Legacy Developments	Auckland	54	0.3	171	1233
27	Murray Homes	Christchurch, Waikato	53	0.3	186	1130
28	Endeavour Homes	Nelson, Tasman	53	0.3	190	1168
29	Enterprise Homes	Christchurch	52	0.3	213	1000
30	Jag Construction	BOP	44	0.2	229	1125
31	Milestone Homes	Whang, Auck, South Is	42	0.2	157	1192
32	Manawatu Housing Ltd	Manawatu	40	0.2	188	1055
33	Landmark Homes	BOP, Otago	38	0.2	238	1450
34	McClean	BOP	37	0.2	na	na
35	Home Creators Ltd	Manawatu,Kapiti	37	0.2	205	1058
36	Lundo Holdings Ltd	Auckland	37	0.2	149	934
37	Hassall Homes Ltd	New Plymouth	36	0.2	240	1227
38	Harrison Construction Ltd	Whangarei	35	0.2	215	1041
39	Homes by Parklane Ltd	Canterbury	35	0.2	224	1063
40	Location Homes	Auckland, Napier	34	0.2	150	1554
			4431	24.0		
	Others		14028			
	Total in database (2)		18459			
	Total houses for 12 months (3)		22649			
		Difference (4)=	4190			

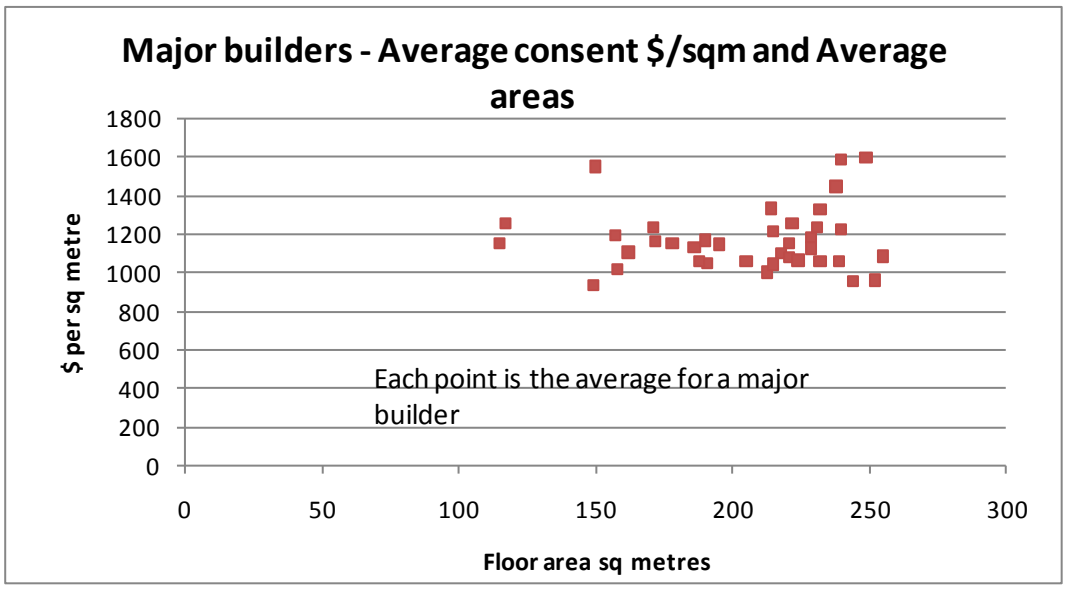
(1) Fletcher Residential includes Fyfe, Winstone Homes, Dempsey Morton, Kingsley, Fletcher Living, Spaceline and Aston Marsh.

(2) Source: Whats-On database. They do not pick up all new houses. Owner-builders are omitted and often the builder name is not available at consent issue time. Also some major builders use private consent authorities for some of their applications and these are not included.

(3) Building consents issued. (4) Builders names are not available for 4190 consents.

Flats/ townhouses and apartments are omitted.

Figure 32. Major builders average sqm versus floor area



One measure of scale effects is to use the $/sqm rate, with the proposition being that large volume buildings will on average have low $/sqm rates compared to small builders. This measure has shortcomings because of regional cost variations noted above and the quality differences between different builders. There is also a problem of builders accurately reporting the contract value at consent application time. Some builders provide only their input costs, though this potential bias is reduced because under-reporting appears to occur proportionally across all builder types, as mentioned in Section 9.2. With these reservations it was decided to proceed with the analysis of consent data using $/sqm as an efficiency indicator.

The unit costs for a selection of the major builders are in Table 10 and indicate a range of between $1,600 per sqm (Reid Homes) and $934 per sqm (Lundo Holdings producing rentals for Housing New Zealand Corporation). As mentioned, some of the variation is thought to be due to differences in the quality of design, materials and finish. Most of the firms on the list operate in the middle to high income market. Recently the NZMBF (Gibson, NZ Herald 2008) issued a press release in which two of its members, Milestone Homes and Stonewood Homes, are promoting “low cost packages” of $200K to $300K for new house and land. Milestone has quoted $895/sqm for these homes (120 sqm), which is well below the $1,200/sqm level and size range (157 sqm) they have recently built. This is an approximate unit price change of about 25% and indicates that the major builders can produce significant savings for “starter” homes. These low cost homes are to a basic standard and a simple form, usually rectangular and one storey on flat land. The price differential gives an indication of the costs associated with allowing customer changes, more complex forms and including quality finishes, which has been the main market over the last few years.

The major builders have a range of prices and to isolate some of the factors it was decided to examine two regions in detail: BOP and Canterbury (mainly Selwyn and Waimakariri). These were chosen as having flat topography and less need to have upper storeys due to lower land prices compared to the major cities. Most houses in these regions are single-storey on a concrete slab and are homogeneous to a large extent.

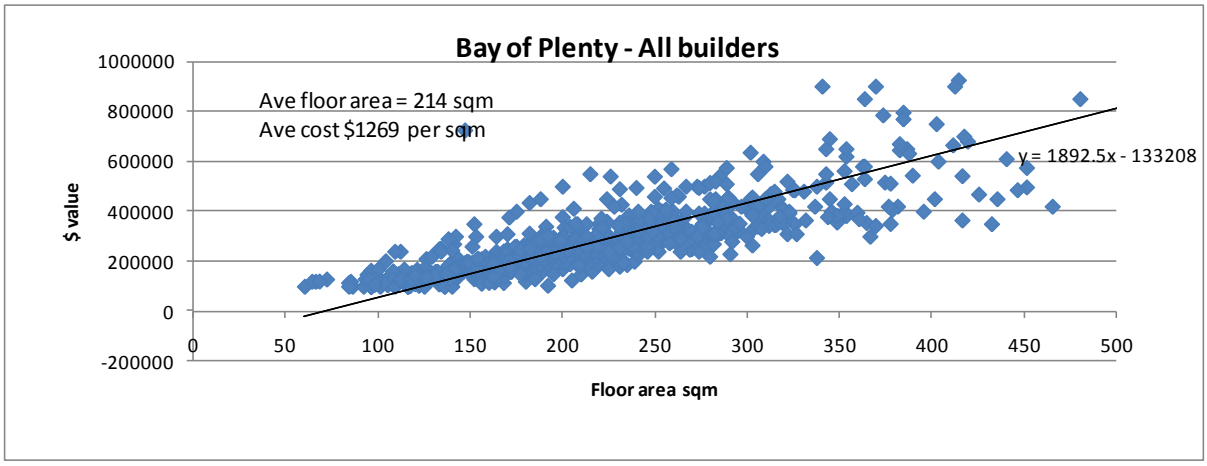
Figure 33 shows six major builders in the BOP region plus the all builders numbers for the region. The first four firms (Generation Development, Baywide Construction, Classic Builders and Jag Construction) operate almost solely in the BOP. Two of these are close to $1,050

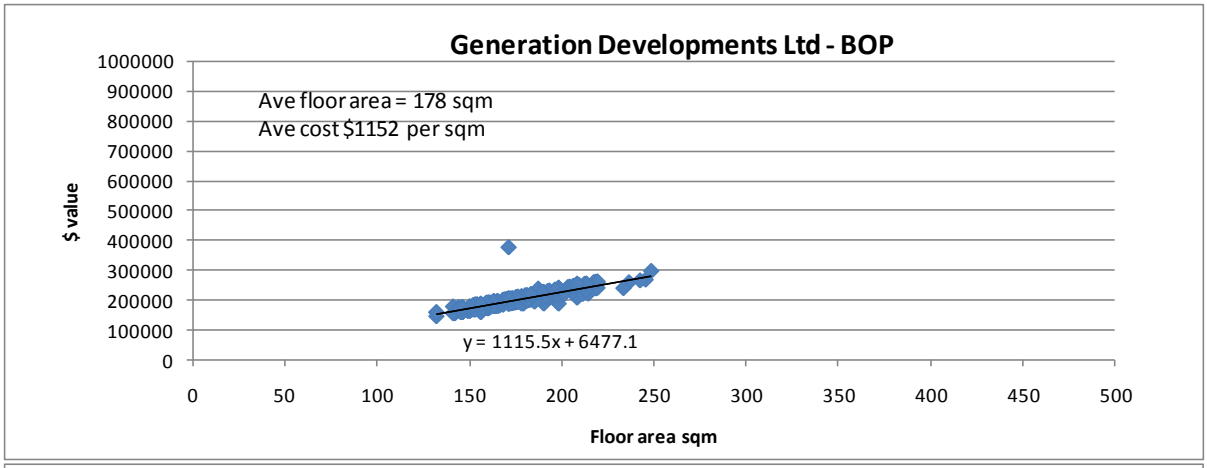
per sqm, and the other two are higher at about $1,150/sqm. For all builders in the BOP the average is about $1,270/sqm. The other two firms in the chart (Gardners and Jennian) are nationwide builders, and their local costs are significantly higher than the other four firms. Another major national firm (A1 Homes) is not in the BOP. It produces low cost housing elsewhere, and it has probably decided that market is well serviced by the existing firms. In contrast Gardners and Jennian cater for a slightly more upmarket segment, hence their higher unit costs in the BOP. If we omit all the major builders (more than 20 houses per year in the BOP) the average cost is $1,324 per sqm, at an average of 224 sqm per house.

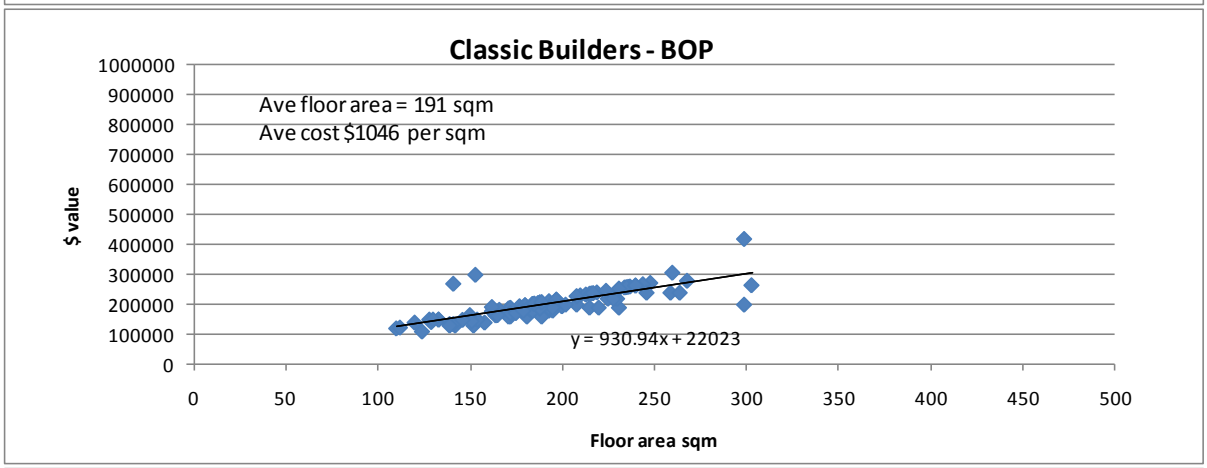
It is known that Generation Development, Baywide Construction, Classic Homes and Jag Construction produce a fairly basic and similar house. They have a cost difference of about $170/sqm to $270/sqm or 13% to 20% compared to the average BOP house. Part of this difference is likely to be due to economies of scale, but is also partly due to quality differences. Generation Development has quite a narrow range of house types, and smaller houses compared to the others which are more spread over the floor area range. Its unit costs ($/sqm) are slightly higher, probably because of the fixed cost component rather than higher profit margins.

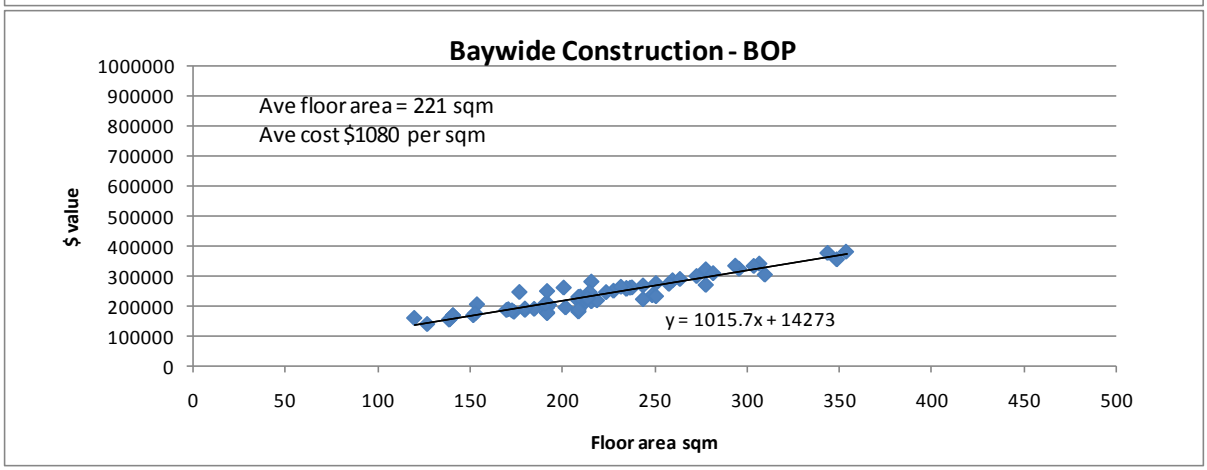
The charts in Figure 33 have linear equations which are an attempt to derive the fixed cost to a builder, such as project management, establishment, consent fees and other fixed overheads. For the Generation Development, Classic, Baywide and Jag panels the indicated fixed cost is between $6,000 and $22,000, and is in the expected range (see the constant term in the equation on the charts). For the other distributions the equation constant is large or negative, making no sense, and is possibly due to a wide variety of designs and a variable pricing model. In contrast it is speculated the other four builders have a limited range of designs and a consistent pricing model.

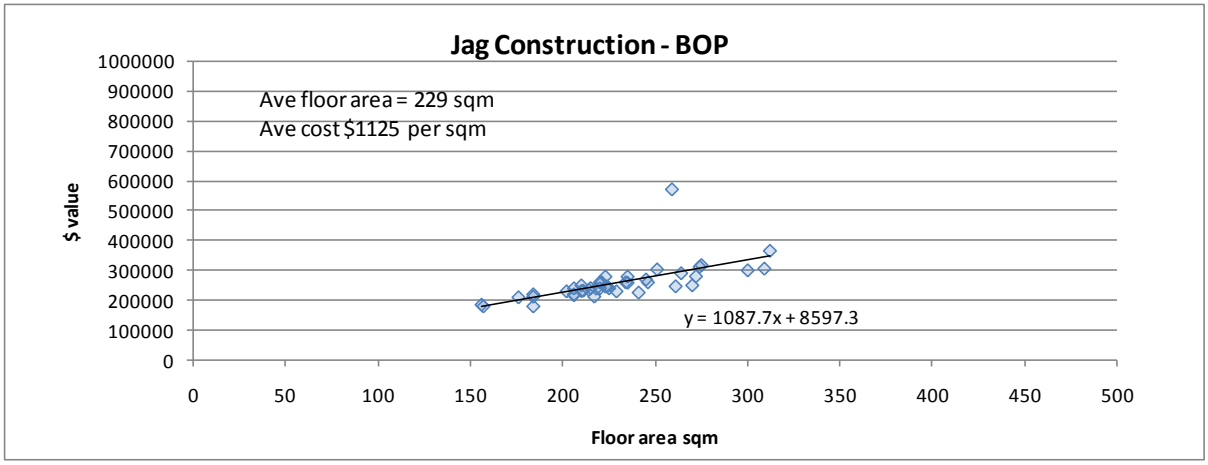
Figure 33. BOP – major builders house size distribution

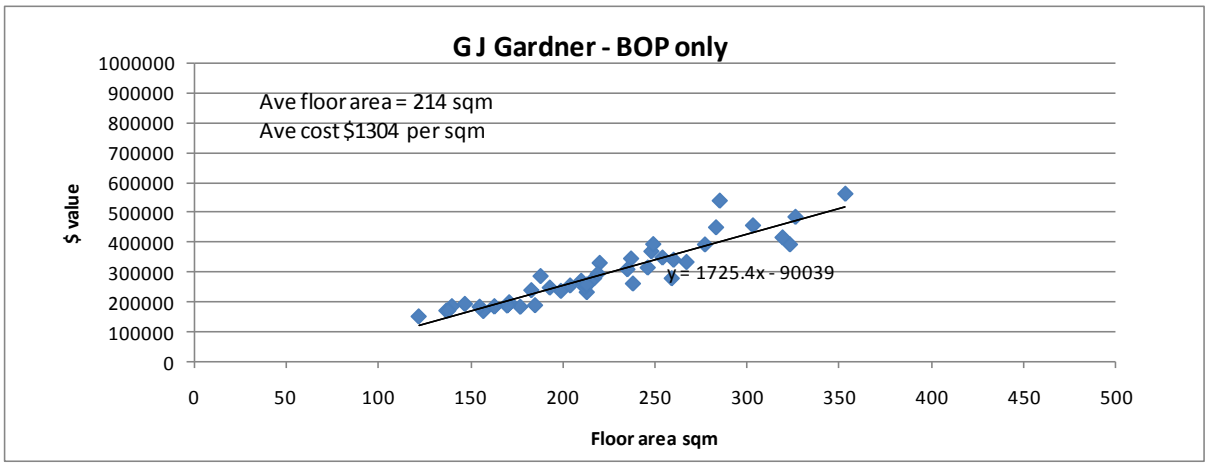


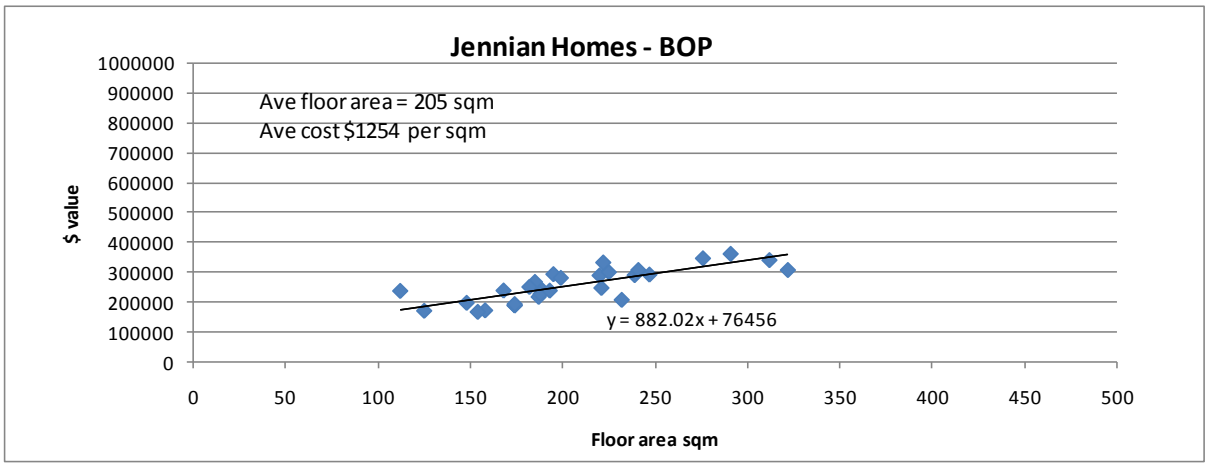

Generation Developments Ltd - BOP
Ave floor area = 178 sqm
Ave cost $1152 per sqm
y = 1115.5x + 6477.1
$ value
Floor area sqm
0
100000
200000
300000
400000
500000
600000
700000
800000
900000
1000000
0
50
100
150
200
250
300
350
400
450
500


Classic Builders - BOP
Ave floor area = 191 sqm
Ave cost $1046 per sqm
y = 930.94x + 22023
$ value
Floor area sqm
0
100000
200000
300000
400000
500000
600000
700000
800000
900000
1000000
0
50
100
150
200
250
300
350
400
450
500


Baywide Construction - BOP
Ave floor area = 221 sqm
Ave cost $1080 per sqm
y = 1015.7x + 14273
$ value
Floor area sqm
0
100000
200000
300000
400000
500000
600000
700000
800000
900000
1000000
0
50
100
150
200
250
300
350
400
450
500

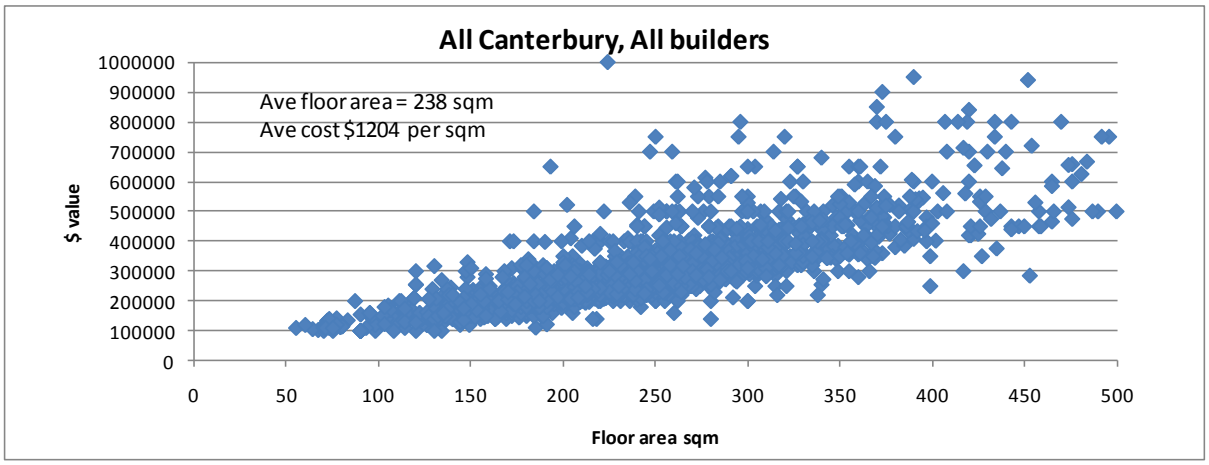

Jag Construction - BOP
Ave floor area = 229 sqm
Ave cost $1125 per sqm
y = 1087.7x + 8597.3
$ value
Floor area sqm
0
100000
200000
300000
400000
500000
600000
700000
800000
900000
1000000
0
50
100
150
200
250
300
350
400
450
500

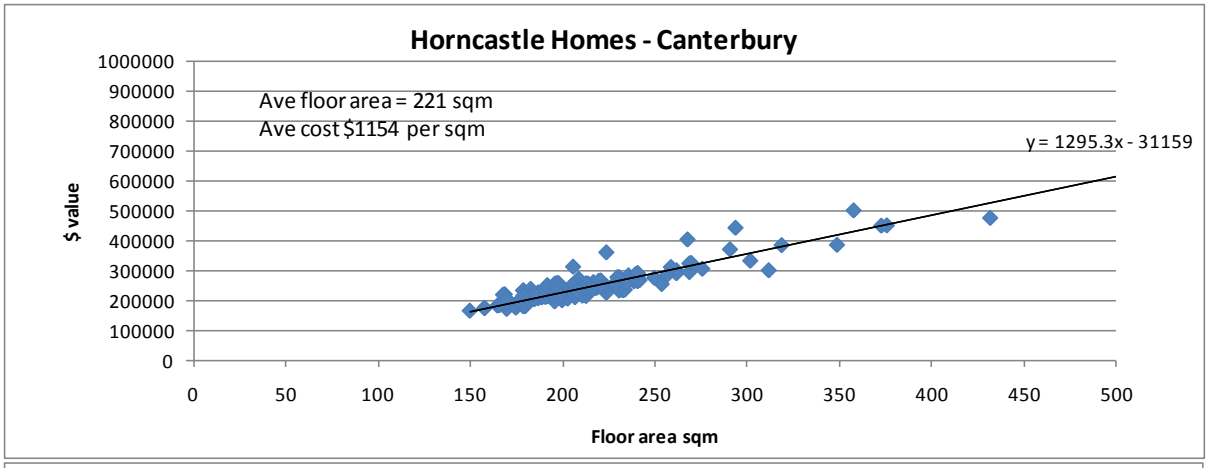


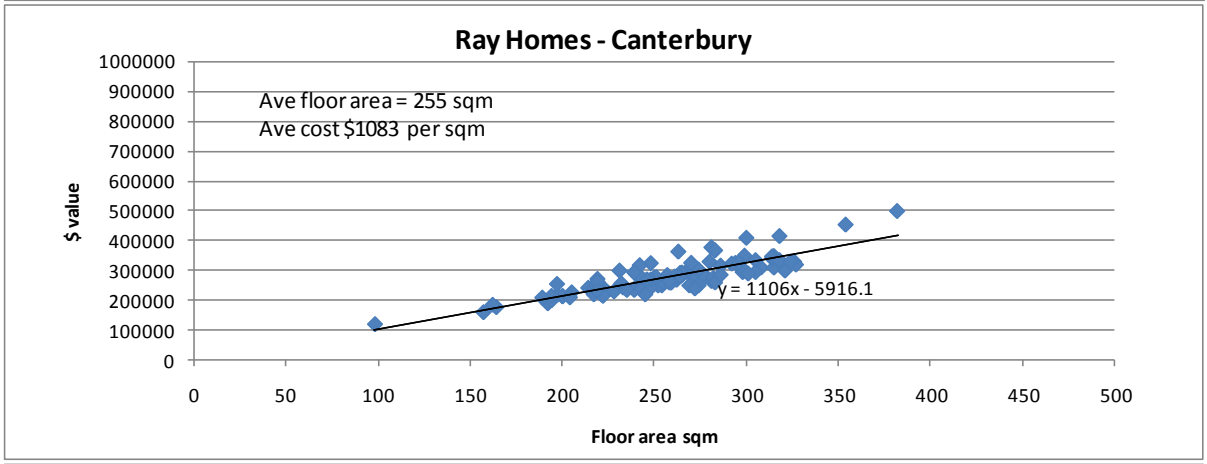


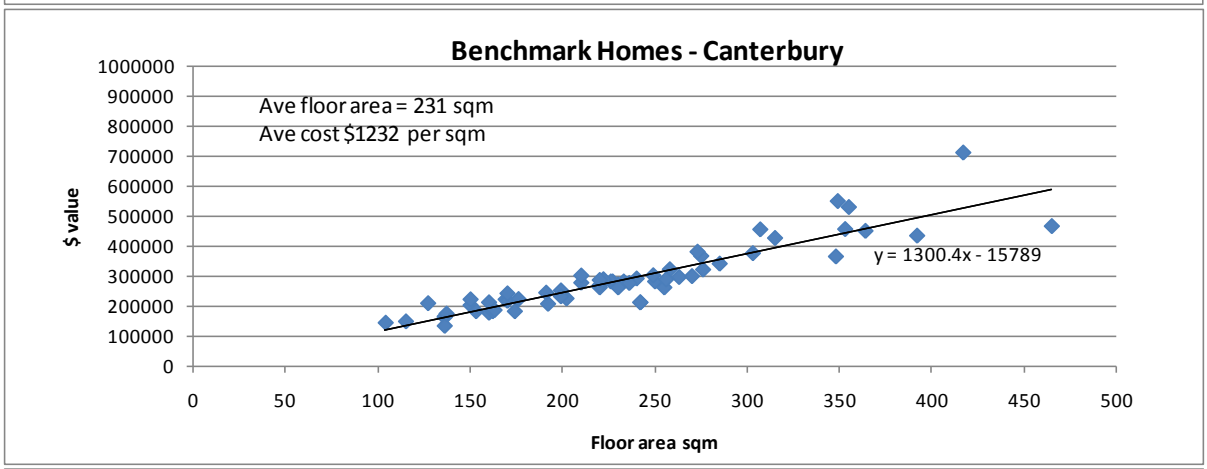
In the Canterbury region four of the five major builders shown (Horncastle, Ray Homes, Enterprise Homes and Today Homes) produce houses for between $1,154/sqm and $1,000/sqm compared to the all builder average in the region of $1,204/sqm, a difference of 4% to 17%. The Enterprise Homes chart indicates a quite narrow range of houses, and this firm is among the lowest priced builders in the region.

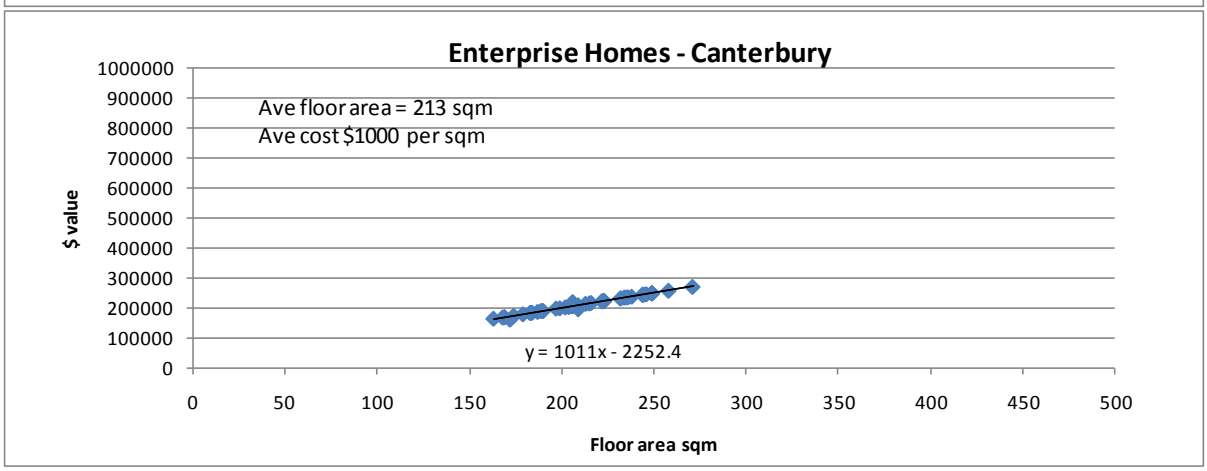
Figure 34. Canterbury – major builders floor size distribution

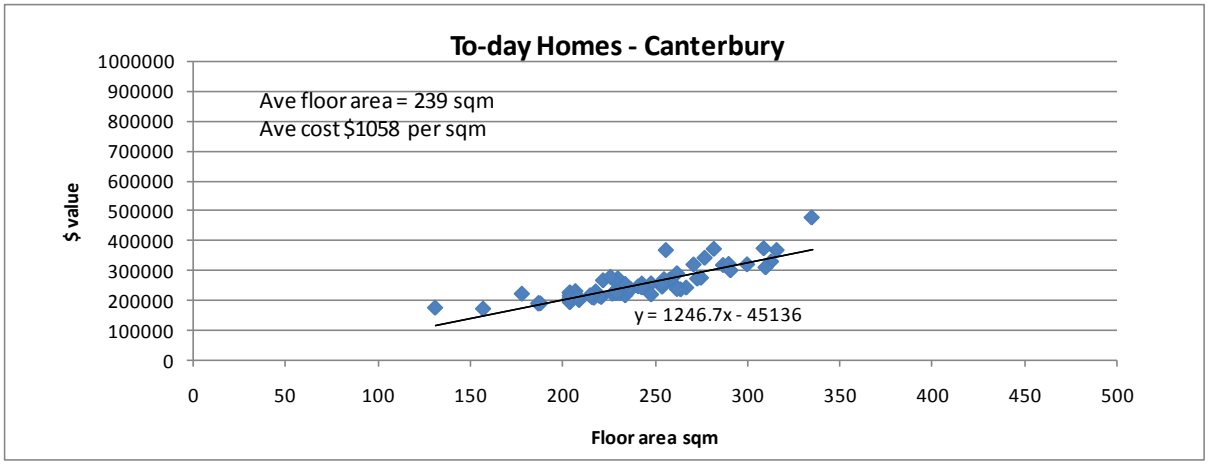



Horncastle Homes - Canterbury
Ave floor area = 221 sqm
Ave cost $1154 per sqm
y = 1295.3x - 31159
$ value
Floor area sqm


Ray Homes - Canterbury
Ave floor area = 255 sqm
Ave cost $1083 per sqm
y = 1106x - 5916.1
$ value
Floor area sqm


Benchmark Homes - Canterbury
Ave floor area = 231 sqm
Ave cost $1232 per sqm
y = 1300.4x - 15789
$ value
Floor area sqm


Enterprise Homes - Canterbury
Ave floor area = 213 sqm
Ave cost $1000 per sqm
y = 1011x - 2252.4
$ value
Floor area sqm



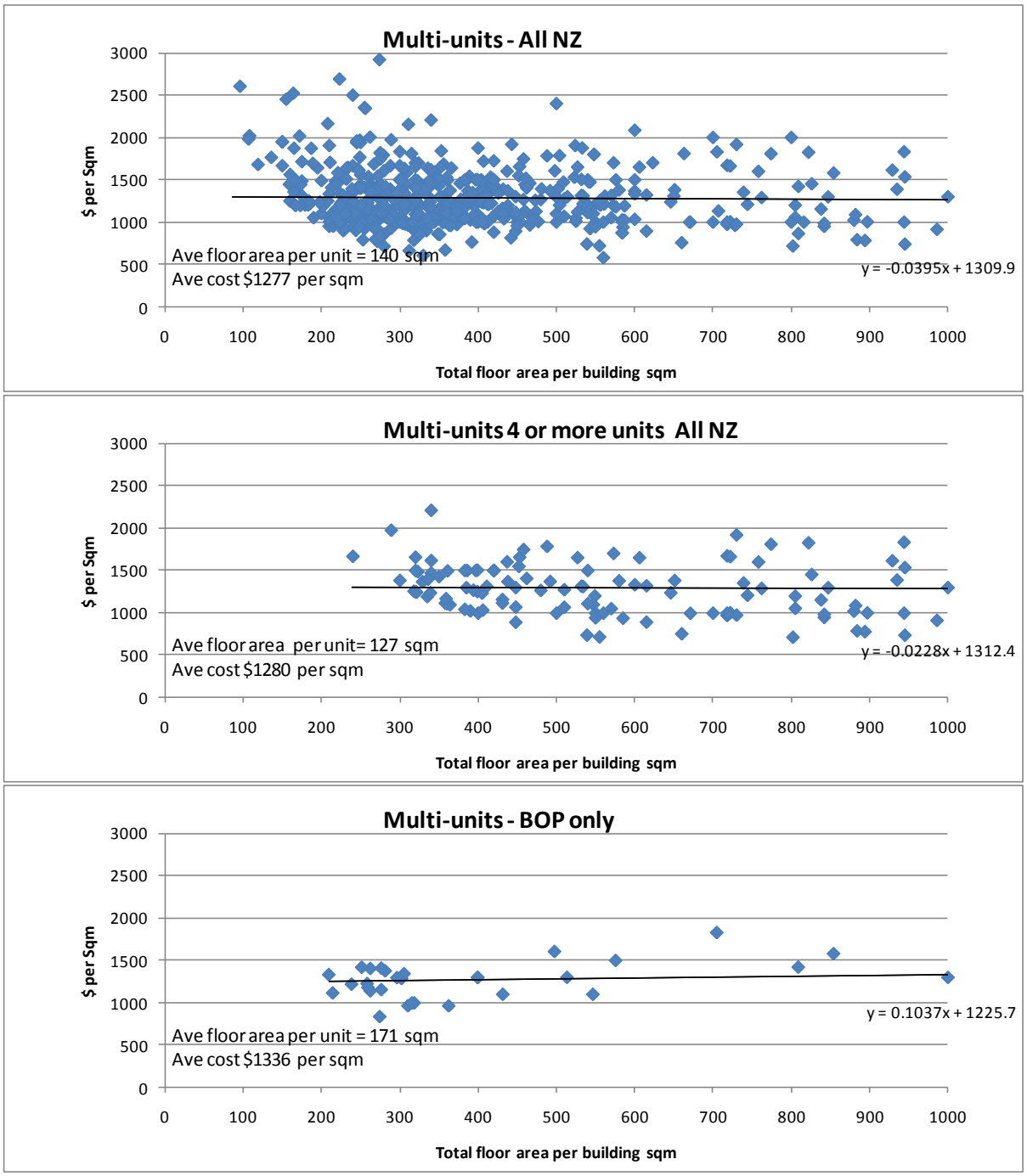
In summary, the analysis of the major builders in the two regions leads to the following conclusions:

- The major builders targeting the lower cost end of the market provide housing at between 4% and 20% cheaper than the other general builders in their regions and they average around 15% cheaper.
- Some national builders target higher cost segments and achieve regional average or above average prices for their houses.
- The lowest cost major builders have thought to offer only a limited range of homes, based on the narrow range of floor areas they provide, and their unit cost ($/sqm) is fairly constant across the floor area range.

9.4.4 Multi-unit consents distribution

The scatter chart of What's On data for multi-unit housing for the December 2007 year is shown in Figure 35. The average price of $1,277/sqm is slightly higher than for detached housing ($1,255/sqm). Average floor areas are smaller, at 140 sqm compared to detached housing (221 sqm).

Figure 35. Multi-units floor area distribution



Most multi-units are single unit additions to existing buildings and the small-scale multi-units have been omitted in the second panel above (only buildings with four or more units are included). This indicates a similar $/sqm to all multi-units. In the third panel for BOP multi-units their unit cost at $1,336/sqm is higher than for stand-alone houses in BOP ($1,269/sqm). So we conclude multi-units do not appear to have economies of scale based on the What's On data.

SNZ provide a breakdown between vertically attached multi-units (i.e. medium to high-rise apartments) and horizontally attached units (i.e. terraced housing, townhouses, duplexes) – see Table 11. We are interested in the horizontally attached units because their construction type is similar to detached housing i.e. mainly timber framing. Most multi-units consents are

for one to six units at a time (one unit is where a unit is added to an existing housing). At this scale the unit costs are not much different from the detached housing costs. Some consents are for larger numbers of units, typically seven to nine units at a time, and these show a mixed picture over time. In 2007 the seven to nine units per building horizontally attached group were cheaper than detached housing, but more expensive in earlier years.

Table 11. Vertically and horizontally attached multi-units

Multi-unit building consents from SNZ				
	Number of consents		**$ per sqm**	
# units per consent	Horizonal attach	Vertical attach	Horizonal attach	Vertical attach
			Year end Dec2007	
1 to 6 units	1,057	129	1230	1423
7 to 9 units	27	10	1140	1056
10 to 15 units	0	43	na	1388
16 to 25 units	0	33	na	1437
More than 25 units	0	22	na	1762
Total	1,084	237	1222	1521
Detached house only			1245	
			Year end Dec2006	
1 to 6 units	1,016	100	1171	1346
7 to 9 units	31	15	1458	1529
10 to 15 units	0	38	na	1341
16 to 25 units	0	40	na	1301
More than 25 units	0	35	na	1315
Total	1,047	228	1204	1330
Detached house only			1171	
			Year end Dec2005	
1 to 6 units	980	175	1105	2983
7 to 9 units	38	16	1265	1322
10 to 15 units	0	41	na	1173
16 to 25 units	0	35	na	1242
More than 25 units	0	39	na	1320
Total	1,018	306	1126	1644
Detached house only			1072	
Horizontally attached are units with at least one wall in common.				
Vertically attached are units with at least one ceiling/ floor in common.				
Where both occur in a unit, the unit is classified as vertically attached.				

So there is no consistent evidence from the above table that multi-unit construction is cheaper than detached housing.

9.4.5 Single versus two-storey houses

The vertically attached units in Table 11 give an indication of whether multi-storey construction is cheaper than detached housing. The 7–15 unit range of vertically attached dwellings are likely to be in low-rise housing, say two or three storeys in comparison to the over 15 units per consent. In most cases the unit cost is higher than detached housing by about 20%.

The BRANZ Materials Survey was used to ascertain the differences in unit costs ($/sqm) between single and two-storey houses. The results are shown in Table 12. For the whole sample the cost difference was that two-storey houses are about 11% more expensive than single-storey. However, there was some variation between the TAs surveyed and the ratio

was below 1.0 in some cases. If we consider only those TAs where the sample size is at least five houses for both one and two-storeys, then the cost ratio is about 1.13 i.e. two-storey houses are approximately 13% more expensive in $/sqm terms than single-storey.

Table 12. Single versus two-storey house costs

Unit costs for single and two storey houses 2007 **BRANZ Materials Survey**							
	Sample size		Average area		Unit cost		Cost Ratio
Storeys	1	2	1	2	1	2	2 to 1 storey
TAs surveyed:	Numb	Numb	Sqm	Sqm	$/sqm	$/sqm	
Far North	18	6	194	301	1423	1228	0.86
Whangarei	33	10	190	273	1299	1338	1.03
Rodney	22	11	206	309	1360	1162	0.85
North Shore	30	7	222	257	1218	1395	1.15
Waitakere	10	8	170	212	977	1209	1.24
Auckland	11	23	148	269	1654	1584	0.96
Manukau	11	23	181	266	1311	1341	1.02
Franklin	40	2	207	266	1194	1199	1.00
Hamilton	70	4	205	295	1227	1068	0.87
Waipa	34	7	204	316	1333	1552	1.16
Thames-Coro	18	9	199	238	1364	1715	1.26
Rotorua	11	1	183	224	1371	826	0.60
Tauranga	64	11	197	233	1297	1322	1.02
West BOP	30	7	222	257	1218	1395	1.15
Napier	8	22	235	277	1559	1472	0.94
GIsborne	7	1	190	230	1297	1152	0.89
New Plymouth	28	3	187	259	1442	1421	0.99
Palmerston North	22	7	213	351	1189	1736	1.46
Kapiti	23	5	199	308	1563	2337	1.50
Porirua	3	5	179	306	1639	1326	0.81
Hutt	5	2	211	310	1177	2106	1.79
Wellington	4	15	172	246	1361	1566	1.15
Tasman	64	11	197	233	1297	1322	1.02
Marlborough	33	6	186	253	1272	1949	1.53
Christchurch	49	14	207	251	1290	1231	0.95
Waimakariri	29	2	271	277	1190	1472	1.24
Queenstown Lakes	24	9	247	343	1554	2407	1.55
Dunedin	23	10	205	247	1337	1140	0.85
Southland	10	4	230	235	1515	1333	0.88
Invercargill	14	0	210		1482		
Total sample	724	239	205.9	288	1323	1472	1.11
Ratio = $/sqm 2 storey/1 storey							

So we conclude, based on the houses in the BRANZ Materials Survey, multi-storey construction is significantly more expensive than single-storey. This result is somewhat surprising as we would expect there to be savings in low-rise multi-storey with less sub-structure cost and less roof area per unit total floor area. An explanation could be that low-rise multi-units are more likely in the inner city suburbs and attract a customer who wants a higher specification than a standard detached house, hence the higher $/sqm rate.

9.5 DBH building costs data

Table 13. DBH $/sqm building cost data

Costs from DBH		$/ sq metre							Retiremt	
Auckland	Small hse	indx	Large Hse	indx	Indust	indx	Retail	indx	home	indx
Jul-99	$969	916	$868	899	$710	935	$749	975	$1,282	959
Jan-00	$984	930	$885	917	$729	960	$759	988	$1,292	966
Jul-00	$1,023	967	$926	959	$745	981	$766	997	$1,305	976
Jan-01	$1,058	1000	$966	1000	$759	999	$768	999	$1,337	1000
Jul-01	$1,054	996	$965	999	$776	1022	$771	1003	$1,323	990
Jan-02	$1,080	1021	$987	1022	$778	1025	$771	1003	$1,344	1006
Jul-02	$1,105	1045	$1,014	1050	$808	1065	$791	1029	$1,372	1027
Jan-03	$1,136	1074	$1,040	1077	$820	1081	$807	1050	$1,399	1047
Jul-03	$1,178	1113	$1,069	1107	$858	1129	$849	1105	$1,454	1088
Jan-04	$1,261	1191	$1,145	1186	$914	1203	$915	1190	$1,534	1147
Jul-04	$1,308	1236	$1,174	1216	$967	1273	$981	1276	$1,595	1193
Jan-05	$1,359	1284	$1,204	1247	$1,004	1322	$1,014	1319	$1,632	1221
Jul-05	$1,449	1369	$1,274	1319	$1,074	1414	$1,087	1414	$1,717	1284
Jan-06	$1,493	1411	$1,305	1352	$1,085	1428	$1,095	1425	$1,738	1300
Jul-06	$1,588	1,501	$1,363	1,412	$1,146	1,509	$1,167	1,518	$1,823	1,364
Jan-07	$1,683	1591	$1,421	1471	$1,207	1590	$1,238	1612	$1,908	1427
Jul-07	$1,750	1654	$1,477	1529	$1,252	1650	$1,290	1680	$1,999	1495
Waikato-BOP										
Jul-99	$969	926	$868	911	$695	926	$735	971	$1,260	963
Jan-00	$977	934	$877	920	$708	943	$736	972	$1,265	967
Jul-00	$1,006	961	$909	953	$722	962	$740	977	$1,275	975
Jan-01	$1,046	1000	$953	1000	$751	1000	$757	1000	$1,308	1000
Jul-01	$1,043	997	$946	993	$737	981	$748	988	$1,291	987
Jan-02	$1,080	1032	$977	1026	$758	1009	$764	1009	$1,331	1018
Jul-02	$1,085	1037	$999	1049	$751	1000	$764	1009	$1,343	1027
Jan-03	$1,123	1073	$1,028	1079	$762	1015	$780	1030	$1,373	1050
Jul-03	$1,164	1113	$1,055	1107	$797	1061	$819	1082	$1,417	1083
Jan-04	$1,244	1189	$1,129	1185	$859	1144	$886	1170	$1,513	1157
Jul-04	$1,288	1231	$1,157	1214	$924	1230	$962	1271	$1,570	1200
Jan-05	$1,332	1273	$1,186	1244	$951	1266	$982	1297	$1,607	1229
Jul-05	$1,426	1363	$1,257	1319	$1,007	1341	$1,050	1387	$1,697	1297
Jan-06	$1,476	1411	$1,292	1356	$1,032	1374	$1,073	1417	$1,718	1313
Jul-06	$1,551	1,483	$1,336	1,402	$1,085	1,445	$1,124	1,485	$1,786	1,365
Jan-07	$1,626	1554	$1,379	1447	$1,138	1515	$1,175	1552	$1,853	1417
Jul-07	$1,675	1601	$1,425	1495	$1,187	1581	$1,229	1624	$1,932	1477
Wellington										
Jul-99	$972	934	$872	917	$693	930	$733	987	$1,260	966
Jan-00	$987	948	$889	935	$715	960	$738	994	$1,280	981
Jul-00	$1,021	981	$927	976	$733	984	$741	998	$1,295	992
Jan-01	$1,041	1000	$951	1000	$745	1000	$743	1000	$1,305	1000
Jul-01	$1,038	997	$955	1005	$758	1018	$756	1018	$1,289	988
Jan-02	$1,061	1019	$978	1029	$759	1019	$757	1019	$1,310	1004
Jul-02	$1,086	1043	$1,004	1056	$777	1043	$778	1047	$1,346	1032
Jan-03	$1,118	1074	$1,029	1082	$786	1055	$790	1063	$1,368	1049
Jul-03	$1,164	1118	$1,062	1117	$818	1099	$832	1120	$1,417	1086
Jan-04	$1,245	1196	$1,136	1195	$882	1184	$899	1210	$1,516	1162
Jul-04	$1,291	1240	$1,164	1224	$937	1258	$967	1302	$1,577	1208
Jan-05	$1,342	1289	$1,197	1259	$980	1316	$1,004	1352	$1,618	1240
Jul-05	$1,432	1375	$1,264	1330	$1,037	1393	$1,068	1438	$1,702	1304
Jan-06	$1,486	1427	$1,300	1368	$1,043	1401	$1,082	1457	$1,733	1328
Jul-06	$1,571	1,508	$1,351	1,421	$1,106	1,485	$1,144	1,540	$1,804	1,382
Jan-07	$1,655	1590	$1,401	1473	$1,169	1569	$1,206	1623	$1,875	1437
Jul-07	$1,704	1637	$1,445	1519	$1,219	1636	$1,255	1689	$1,950	1494

$/sqm	Small hse		Large Hse		Indust		Retail		Retiremt hm	
Rest of North Island		indx		indx		indx		indx		indx
Jul-99	$944	916	$856	904	$689	942	$730	997	$1,264	971
Jan-00	$960	932	$871	920	$706	965	$729	996	$1,272	977
Jul-00	$995	966	$909	960	$719	983	$729	996	$1,281	984
Jan-01	$1,030	1000	$947	1000	$731	1000	$732	1000	$1,302	1000
Jul-01	$1,025	995	$945	998	$737	1008	$744	1016	$1,287	988
Jan-02	$1,041	1011	$970	1024	$748	1023	$750	1024	$1,306	1003
Jul-02	$1,080	1049	$995	1050	$762	1042	$763	1042	$1,337	1027
Jan-03	$1,113	1081	$1,023	1080	$774	1058	$778	1062	$1,360	1045
Jul-03	$1,149	1116	$1,047	1106	$794	1086	$803	1097	$1,402	1077
Jan-04	$1,236	1200	$1,125	1188	$849	1161	$871	1190	$1,504	1155
Jul-04	$1,278	1241	$1,153	1218	$902	1234	$940	1284	$1,562	1200
Jan-05	$1,327	1288	$1,183	1249	$945	1293	$966	1320	$1,603	1231
Jul-05	$1,427	1385	$1,261	1332	$1,005	1375	$1,046	1429	$1,696	1303
Jan-06	$1,489	1446	$1,299	1372	$1,021	1397	$1,056	1443	$1,722	1323
Jul-06	$1,574	1,528	$1,354	1,429	$1,085	1,484	$1,124	1,535	$1,802	1,384
Jan-07	$1,659	1611	$1,408	1487	$1,148	1570	$1,191	1627	$1,882	1445
Jul-07	$1,729	1679	$1,472	1554	$1,215	1662	$1,257	1717	$1,995	1532
Canterbury										
Jul-99	$946	922	$869	930	$666	915	$707	971	$1,249	964
Jan-00	$958	934	$883	944	$686	942	$710	975	$1,259	972
Jul-00	$991	966	$914	977	$704	967	$715	982	$1,271	981
Jan-01	$1,026	1000	$935	1000	$727	1000	$727	1000	$1,296	1000
Jul-01	$1,027	1001	$950	1016	$732	1007	$729	1002	$1,281	988
Jan-02	$1,076	1049	$973	1041	$750	1032	$735	1010	$1,327	1023
Jul-02	$1,083	1056	$1,000	1070	$758	1043	$748	1028	$1,337	1031
Jan-03	$1,113	1085	$1,024	1096	$769	1058	$767	1054	$1,362	1050
Jul-03	$1,157	1128	$1,054	1127	$810	1114	$814	1122	$1,413	1090
Jan-04	$1,239	1208	$1,130	1208	$874	1202	$887	1219	$1,504	1160
Jul-04	$1,287	1255	$1,154	1234	$932	1282	$958	1317	$1,569	1211
Jan-05	$1,344	1310	$1,187	1269	$972	1337	$995	1368	$1,612	1244
Jul-05	$1,449	1412	$1,269	1357	$1,030	1416	$1,068	1468	$1,716	1324
Jan-06	$1,483	1446	$1,300	1390	$1,043	1434	$1,080	1485	$1,732	1336
Jul-06	$1,563	1,523	$1,344	1,437	$1,093	1,503	$1,135	1,561	$1,801	1,389
Jan-07	$1,642	1600	$1,387	1483	$1,143	1572	$1,190	1637	$1,870	1443
Jul-07	$1,711	1668	$1,448	1549	$1,205	1657	$1,253	1724	$1,959	1512
Rest of South Island										
Jul-99	$969	928	$878	918	$703	944	$739	990	$1,266	967
Jan-00	$978	935	$886	927	$715	960	$737	987	$1,272	972
Jul-00	$1,005	962	$915	957	$727	976	$737	987	$1,281	979
Jan-01	$1,045	1000	$956	1000	$745	1000	$747	1000	$1,309	1000
Jul-01	$1,045	1000	$963	1008	$752	1010	$762	1021	$1,288	984
Jan-02	$1,072	1026	$984	1030	$755	1014	$760	1018	$1,322	1010
Jul-02	$1,094	1047	$1,009	1056	$768	1031	$772	1034	$1,348	1030
Jan-03	$1,122	1074	$1,033	1081	$782	1050	$786	1053	$1,364	1042
Jul-03	$1,155	1105	$1,053	1102	$804	1079	$814	1090	$1,411	1078
Jan-04	$1,240	1187	$1,131	1183	$870	1168	$882	1181	$1,509	1153
Jul-04	$1,286	1231	$1,162	1216	$926	1243	$950	1272	$1,568	1198
Jan-05	$1,335	1277	$1,191	1246	$960	1289	$982	1315	$1,605	1226
Jul-05	$1,425	1364	$1,262	1320	$1,027	1379	$1,048	1404	$1,691	1292
Jan-06	$1,481	1417	$1,293	1353	$1,040	1396	$1,066	1428	$1,719	1313
Jul-06	$1,555	1,488	$1,335	1,396	$1,089	1,462	$1,125	1,506	$1,788	1,365
Jan-07	$1,629	1559	$1,376	1439	$1,138	1528	$1,183	1584	$1,856	1418
Jul-07	$1,678	1606	$1,425	1491	$1,185	1591	$1,228	1644	$1,935	1478

Table 14. Calculation of NZ composite $/sqm rate from DBH regional costs

New dwelling consents

Year ending	Dec 2000	Dec 2001	Dec 2002	Dec 2003	Dec 2004	Dec 2005	Dec 2006	Jun 2007
Northland	992	879	977	1266	1441	1320	1356	1373
Auckland	7743	8117	12222	11194	11771	7558	7099	6781
Waikato	2170	2102	2416	3297	3375	3169	3477	3775
Bay of Plenty	1563	1485	1868	2198	2325	2143	1886	1896
Gisborne	87	91	104	91	125	143	156	166
Hawkes. Bay	442	456	534	696	714	894	850	902
Taranaki	180	171	288	327	435	525	648	599
Manawatu	552	609	612	776	879	996	1049	1126
Wellington	2228	2107	2278	2435	2292	2084	1963	2032
Nelson/ Tasman	804	825	1113	1369	1177	943	997	1160
West. Coast	87	118	119	173	197	212	250	302
Canterbury	2374	2439	3233	4189	4452	4103	4231	4471
Otago	687	972	1204	1461	1506	1430	1486	1566
Southland	108	165	276	306	341	335	374	389
NZ	20017	20536	27244	29778	31030	25855	25822	26538

Note: Numbers are as first published, and may be revised.

Percentage shares		Northland/ Auckland	Waikato /BOP	Well	Rest NI	Cant	Rest SI	
from above consents	Jul-99	43.6%	18.6%	11.1%	6.3%	11.9%	8.4%	100.0%
	Jan-00	43.6%	18.6%	11.1%	6.3%	11.9%	8.4%	100.0%
	Jul-00	43.6%	18.6%	11.1%	6.3%	11.9%	8.4%	100.0%
	Jan-01	43.6%	18.6%	11.1%	6.3%	11.9%	8.4%	100.0%
	Jul-01	43.8%	17.5%	10.3%	6.5%	11.9%	10.1%	100.0%
	Jan-02	43.8%	17.5%	10.3%	6.5%	11.9%	10.1%	100.0%
	Jul-02	48.4%	15.7%	8.4%	5.6%	11.9%	10.0%	100.0%
	Jan-03	48.4%	15.7%	8.4%	5.6%	11.9%	10.0%	100.0%
	Jul-03	41.8%	18.5%	8.2%	6.3%	14.1%	11.1%	100.0%
	Jan-04	41.8%	18.5%	8.2%	6.3%	14.1%	11.1%	100.0%
	Jul-04	42.6%	18.4%	7.4%	6.9%	14.3%	10.4%	100.0%
	Jan-05	42.6%	18.4%	7.4%	6.9%	14.3%	10.4%	100.0%
	Jul-05	34.3%	20.5%	8.1%	9.9%	15.9%	11.3%	100.0%
	Jan-06	34.3%	20.5%	8.1%	9.9%	15.9%	11.3%	100.0%
	Jul-06	32.7%	20.8%	7.6%	10.5%	16.4%	12.0%	100.0%
	Jan-07	32.7%	20.8%	7.6%	10.5%	16.4%	12.0%	100.0%
	Jul-07	30.7%	21.4%	7.7%	10.5%	16.8%	12.9%	100.0%

Composite NZ Index (using above weights)				
	Small hse	**Large Hse**	**Retirement home**	**CGPI**
Jul-99	922	909	963	964
Jan-00	934	924	970	969
Jul-00	967	962	979	984
Jan-01	1000	1000	1000	996
Jul-01	997	1001	988	1009
Jan-02	1026	1027	1010	1015
Jul-02	1045	1053	1028	1035
Jan-03	1076	1081	1047	1053
Jul-03	1115	1110	1085	1085
Jan-04	1194	1189	1153	1130
Jul-04	1238	1219	1199	1186
Jan-05	1286	1251	1228	1235
Jul-05	1376	1327	1297	1278
Jan-06	1422	1362	1314	1314
Jul-06	1503	1414	1372	1347
Jan-07	1583	1466	1429	1386
Jul-07	1640	1522	1496	1415

Table 15. Land development costs – case studies – Maltby's

Area	WELLINGTN	HAWKES BAY	WELLINGTON	HAWKES BAY	CENTRAL OTAGO	QUEENS - TOWN	QUEENS - TOWN	NORTH SHORE	NORTHLAND	QUEENS - TOWN	QUEENS - TOWN	SOUTHLAND	QUEENS - TOWN	QUEENS - TOWN	QUEENS - TOWN
Type	Rural	Mixed use	Mixed use (villas and apts)	Mix (villas, townhse & apts)	Rural	Rural	Rural - Greenfield	Urban - Greenfield	Rural - Greenfield	Rural - Greenfield	Urban	Urban	Rural	Rural	Rural
Base date	4Q07	CURRENT	CURRENT	CURRENT	Apr-06	Nov-04	Jul-06	1/05/2007	Feb-05	Aug-05	Aug-05	Jan-06	Sep-06	Nov-06	Feb-06
No of units (Housing)	73	149	170	128	22	89	15	24	56	15	95	70	18	23	10
Average lot area (m2)	6,849	500	500	500	40,000	900	1400	2,152	761	8000	800	800	2500	80000	1200
Siteworks/ Infrastructure															
						$ 302,988									
Civil Works															
Earthworks/ stormwater	$ 942,500			$ 1,010,640	$ 1,184,745			$ 437,370	$ 1,317,332	incl	$ 200,000	$ 1,778,468		$ 1,157,127	$ 547,620
Sewerage/ waste treatme	$ 1,003,500			$ 472,455		$ 739,661		$ 172,600	$ 167,000	$ 15,000				incl above	$ 791,345
Roading	$ 1,137,760			$ 664,018		$ 4,523,306	$ 147,121	$ 103,645				$ 20,000		incl above	
Utilities															
Electricity	$ 368,333				$ 218,378	$ 320,175	$ 366,695	$ 241,720	$ 229,095	incl below	$ 390,000	$ 280,000		$ 138,536	$ 228,536
Telecoms	$ 15,000				$ 47,600	$ 188,325	incl above	incl above	$ 62,247	incl below	$ 102,000	$ 78,000		$ 41,400	$ 17,903
Water	$ -			$ 248,551	$ 491,516		$ 2,155	incl above						$ 129,726	
Utilities Generally							$ 1,055,055								
Site works															
Landscaping	$ 375,000				$ 191,534	$ 136,377	$ 230,000	$ 544,665	$ 788	incl below	$ 257,000	$ 45,000		$ 20,000	$ 255,105
Site fencing	$ 375,000				$ 220,945	$ 71,779				incl below		$ 20,000			$ 23,000
Street lighting	$ -					$ 66,995	$ 5,819		$ 38,156	incl below	$ 250,000	$ 120,000			
Other/ maintenance	$ 100,000				$ 20,485				$ 2,896	$ 1,813,000	$ 3,534,717	$ 17,500		$ 8,122	$ 64,752
INFRASTRUCTURE	**4,317,093**	**3,777,733**	**2,891,582**	**2,395,664**	**2,375,202**	**6,349,606**	**1,806,845**	**1,500,000**	**1,817,514**	**1,828,000**	**4,733,717**	**2,358,968**	**2,789,912**	**1,494,911**	**1,928,261**
Professional Consultants Fees															
Landscape Architect	$ 12,000				$ 10,000	$ 20,000	$ 62,833								$ 37,028
Traffic Engineer	$ 17,000										$ 22,992		$ 11,431		
Civil engineer	$ 86,000					$ 223,948	$ 27,186	$ 100,000	$ 85,500		$ 95,281			$ 23,000	$ 119,716
Project management	$ 150,000				$ 50,000	$ 137,025			$ 132,519				$ 150,000	$ 70,000	$ 122,000
Surveyor	$ 255,000				$ 204,304	$ 199,436	$ 340,000		incl in PM fee	$ 105,000	$ 513,412	$ 201,006	$ 127,900	$ 130,000	$ 58,000
Bank QS	$ 24,500				$ 18,000	$ 23,500	$ 28,425	$ 10,000	$ 13,500	$ 7,850	$ 13,400	$ 12,700	$ 16,400	$ 12,500	$ 3,600
Development manageme	$ 40,000				$ 60,000	$ 227,376	$ 292,720			$ 25,000	$ 75,000		$ 170,400		$ 215,000
Legal	$ 80,000				$ 77,368	$ 201,888	$ 147,859	$ 30,000	$ 25,000	$ 110,000	$ 75,000	$ 49,000	$ 95,040	$ 40,000	$ 60,000
Accounting	$ 10,000				$ 8,000	$ 63,832	incl above	$ 7,500		$ 10,000	$ 25,000		$ 53,444	$ 12,772	$ 25,000
Valuation	$ 65,000				$ 14,400	$ 12,992		$ 4,000	incl in legal	$ 6,300		$ 5,000		$ 650	$ 12,150
Geotech					$ 21,342		$ 21,025			$ 11,542	$ 9,000			$ 13,555	
Architect					$ 85,000		$ 68,082				$ 10,000		$ 72,000		
Planning													$ 93,000		$ 54,526
Other consultants	$ 30,000				$ 15,350	$ 6,600	$ 61,770	$ 61,500	$ 33,982	$ 9,367		$ 14,000	$ 7,864		$ 89,153
PROFESSIONAL FEES	**$ 769,500**	**$ -**	**$ -**	**$ -**	**$ 563,764**	**$ 1,116,597**	**$ 1,049,901**	**$ 213,000**	**$ 290,501**	**$ 285,059**	**$ 839,085**	**$ 281,706**	**$ 797,480**	**$ 302,476**	**$ 796,173**
Development costs															
Council/ planning fees	$ 40,000				$ 29,164	$ 610,218	$ 40,827	incl in Pro Fe	$ 25,000	$ 12,841	$ 38,220	$ 20,000	$ 39,000	$ 24,000	$ 41,000
Development contribution	$ 355,437			$ 807,100	$ 14,371	$ 554,346	$ 43,036	incl in Pro Fe	$ 299,000	$ 1,300	$ 383,690	$ 645,534	$ 115,146	$ 9,500	$ 49,938
Regional council	$ 8,500					$ 40,000		incl in Pro Fe	$ 9,518		$ 5,000				
STATUTORY FEES	**$ 403,937**			**$ 807,100**	**$ 43,535**	**$ 1,204,564**	**$ 83,863**	**$ -**	**$ 333,518**	**$ 14,141**	**$ 426,910**	**$ 665,534**	**$ 154,146**	**$ 33,500**	**$ 90,938**
Maintenance/ time related costs															
Rates	$ 25,000				$ 12,215	$ 18,200				$ 12,000	$ 5,000	$ 35,000		$ 6,000	$ 13,000
Insurance	$ 25,000				$ 2,000						$ 5,000	$ 25,000	$ 10,000	$ 5,000	$ 5,000
TIME RELATED COSTS	**$ 50,000**				**$ 14,215**	**$ 18,200**	**$ -**	**$ -**	**$ -**	**$ 12,000**	**$ 10,000**	**$ 60,000**	**$ 10,000**	**$ 11,000**	**$ 18,000**
CONTINGENCIES	**$ 538,470**				**$ -**	**$ 420,253**	**$ -**	**$ 200,000**	**$ -**				**$ 93,202**		
TOTAL	**$6,079,000**	**$3,777,733**	**$2,891,582**	**$3,202,764**	**$2,996,715**	**$9,109,220**	**$2,940,609**	**$1,913,000**	**$2,441,533**	**$2,139,200**	**$6,424,712**	**$3,366,208**	**$3,844,740**	**$1,841,887**	**$2,833,372**

NOTES:
Excludes finances, interest and marketing costs as these are highly variable depending on individual arrangements
Excludes land purchase cost
Excludes GST

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