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# The Canterbury rebuild five years on from the Christchurch earthquake

Amy Wood,[1] Ilan Noy[2] and Miles Parker[1]

At 12:51pm on 22 February 2011, an earthquake of magnitude 6.3 occurred in Christchurch, causing widespread devastation and loss of life. It was the second major earthquake to affect Canterbury in six months, and was followed by thousands of aftershocks. Five years on, this article provides an update on how economic activity and prices in the Canterbury region have been affected, and the progress made to date in the rebuild.[3]

The damage to property in Canterbury was substantial; the total value of construction work to be completed over the period of the rebuild is estimated to be about $40 billion (in 2015 dollars). The Reserve Bank estimates that the rate of rebuild activity under way in Canterbury is around 1.5 percent of potential GDP per annum, and that the rebuild will extend beyond 2020.

Christchurch has recovered its initial loss in population, boosted by the influx of workers for the rebuild. Construction sector activity has increased markedly over the past five years. Most other sectors appear resilient, with notable exceptions being tourism and education, where activity is down sharply.

## 1 Scale of the rebuild

The Canterbury earthquakes caused sizeable and widespread damage in Christchurch and nearby districts. The Reserve Bank currently estimates the total construction cost of the rebuild to be about $40 billion (in 2015 dollars), comprised of slightly more than $16 billion each for residential and commercial construction and around $7 billion for infrastructure. Public reports and conversations with those involved in the rebuild suggest that while the infrastructure work has been largely completed and the rebuild of residential properties is well under way, the bulk of commercial building reconstruction has yet to start (figure 1). The Bank estimates that rebuild activity peaked at just below 2 percent of potential GDP in 2014, and that the profile of rebuild activity will be prolonged.

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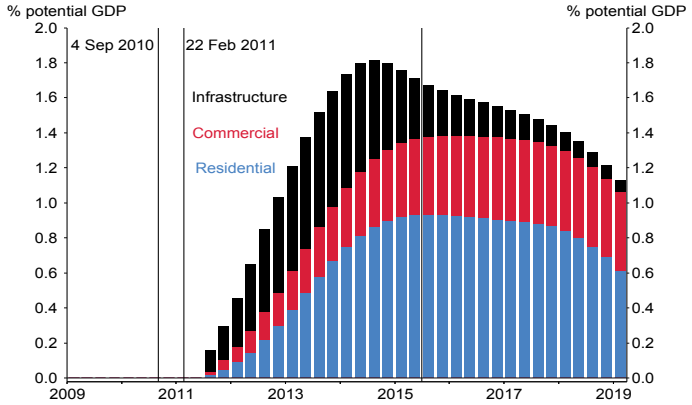
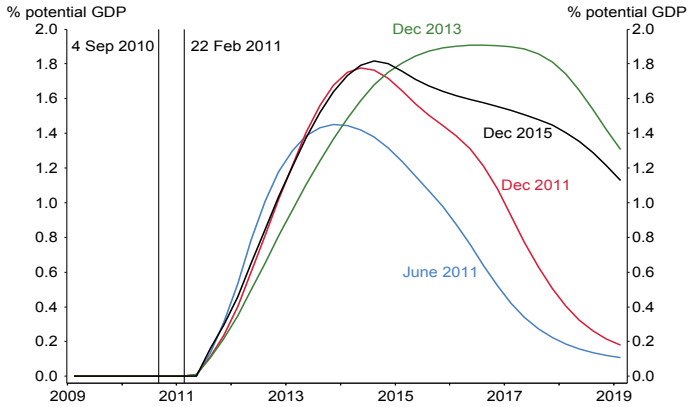
3 For a discussion of the immediate impact of the earthquakes on Canterbury, see Parker and Steenkamp (2012). Doyle and Noy (2015) consider the initial macroeconomic impact.

**Figure 1**
**Estimated profile of the Canterbury rebuild**




Source: Statistics New Zealand and RBNZ estimates.

**Figure 2**
**Evolution of RBNZ forecast rebuild profile**

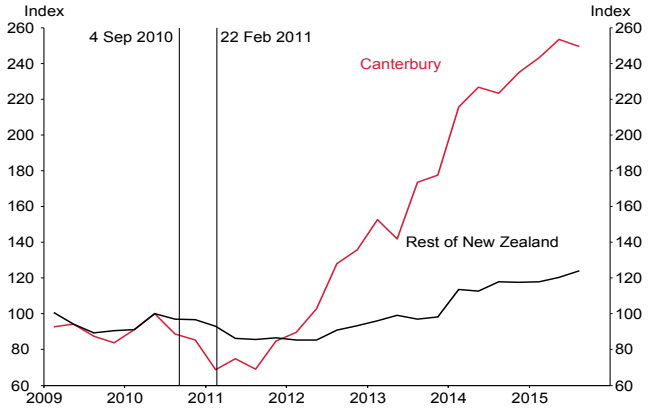



Source: RBNZ estimates.

Over time, the Bank's initial estimates of the profile of the rebuild have been revised (figure 2). The overall size of the rebuild has been revised up as the Bank's understanding of the total cost of construction has become clearer based on publicly available data and information from those involved in the rebuild. The timing of when activity was expected to occur has also been pushed out.

Initially, building activity was constrained by aftershocks and delays in insurance payments. Building activity eventually accelerated from the start of 2012 and is currently 150 percent greater than its pre-quake level in Canterbury, compared with an increase of about 20 percent in the rest of New Zealand (figure 3). The Bank estimates that building activity in Canterbury will remain around current levels for some time before declining slowly.

**Figure 3**
**Building activity**
***(Index 2010Q2 = 100)***




Source: Statistics New Zealand.

# 2 Insurance

The rate of insurance coverage for the Canterbury earthquakes was markedly higher than the typical coverage for earthquakes in high-income economies (table 1). This is likely a result of the government-backed Earthquake Commission (EQC), which insures the first tranche of damage. Damage beyond the legislated threshold (the EQC 'cap') is covered by private insurers. Of the 170,000 building insurance claims for the Canterbury earthquakes, 16 percent were seriously damaged and exceeded the EQC cap.

**Table 1**
**Insurance coverage of major earthquakes in high-income economies**

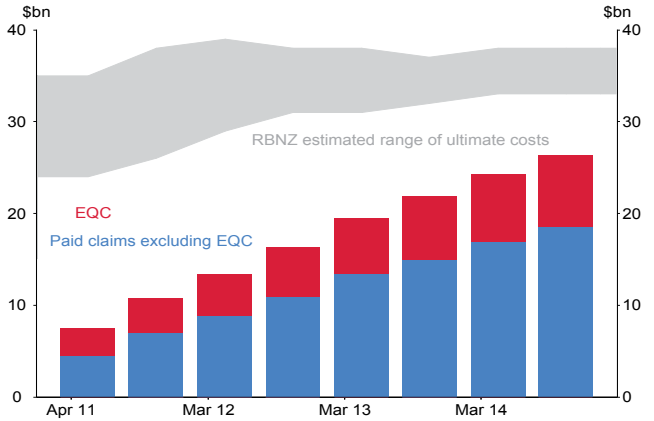
| Location | Date | Losses, original values | | Insurance coverage (percent) |
|---|---|---|---|---|
| | | Overall (USD m) | Insured (USD m) | |
| Darfield, NZ | 4.9.2010 | 10,000 | 7,400 | 74 |
| Christchurch, NZ | 22.2.2011 | 24,000 | 16,500 | 69 |
| Northridge, USA | 17.1.1994 | 44,000 | 15,300 | 35 |
| Concepción, Chile | 27.2.2010 | 30,000 | 8,000 | 27 |
| Tōhoku, Japan | 11.3.2011 | 210,000 | 40,000 | 19 |
| Kobe, Japan | 17.1.1995 | 100,000 | 3,000 | 3 |

Source: MunichRe.

Note: The Reserve Bank's estimate of the insured cost of the Canterbury earthquakes is higher.

Five years after the damaging February 2011 earthquake, insurance claims have yet to be fully settled. As at 30 September 2015, insurers had paid out $26 billion, with the median insurer having paid out around 80 percent of estimated final payout (figure 4). There is a wide dispersion between insurers, with some having already completed nearly all payments and others materially less. Estimates of the final payout have been revised higher over time. If that trend continues, the estimated proportion of claims settled would be revised downwards. The final payout remains uncertain as future settlements will be affected by higher construction costs. It is also unknown what the future liability will be for fixing possibly deficient repairs and reconstruction.

**Figure 4**
**Canterbury earthquake paid claims**




Source: EQC, RBNZ.

The rate of insurance settlement following the Canterbury earthquakes has been slower on average than that for the major earthquakes in Japan and Chile that occurred at similar times (Marsh Risk Management Research, 2014). In part this delay may reflect the much greater number of claims and differences in contracts. New Zealand residential insurance contracts typically covered replacement of damaged property, whereas

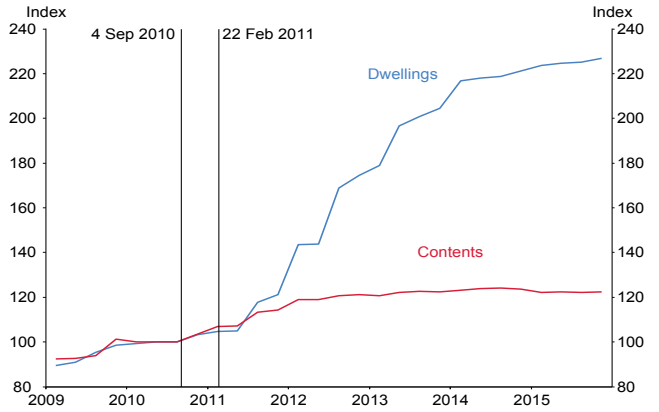
overseas insurance contracts typically pay out pre-approved sums in cash. Assessing the cost of replacement for a damaged property is administratively more complex than a cash settlement. Uncertainty regarding the final cost of replacement as both private insurers and EQC conduct their own claim assessments have also delayed the settlement of some claims. Given these assessments, some properties have switched between being defined as 'over' and 'under' cap, with implications for the entity responsible for payment and rebuild.

Initially, commercial insurance claims were settled more quickly than residential claims. However, the overall rate of settlement is currently similar to residential property. Current outstanding commercial claims are typically complex in nature (such as multi-unit commercial buildings with multiple insurers), and as such it is unlikely that all claims will be settled before 2017.

A review is under way on the structure and parameters for future EQC cover, aiming to build on the experiences of the Canterbury earthquakes. The cost of the Canterbury earthquakes to EQC almost exhausted the $5.6 billion in the Natural Disaster Fund and the cost to EQC of any future major disaster is likely to be borne to a much greater extent by the government until the fund is replenished.

After the Canterbury earthquakes, most insurers changed their residential building policies nationwide, typically tightening terms and now offering insurance on a sum insured rather than replacement basis. The overall cost of dwelling insurance is now more than double its 2010 level (figure 5), in part due to the tripling of EQC premiums in 2012 and initially higher reinsurance costs, although reinsurance premiums have recently declined from their post-quake peaks.

**Figure 5**
**CPI insurance components inflation**
*(Index 2010Q2 = 100)*

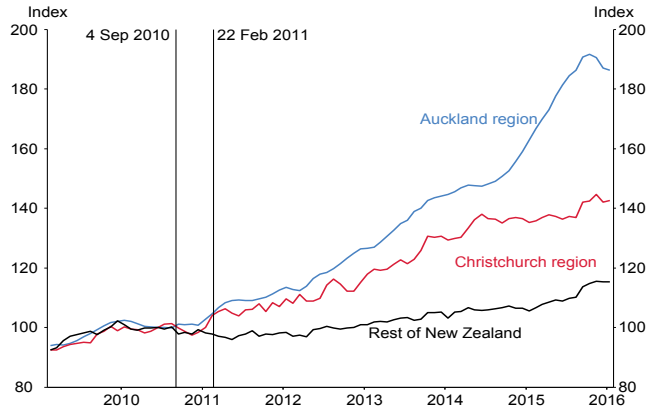



Source: Statistics New Zealand.

# 3 Housing

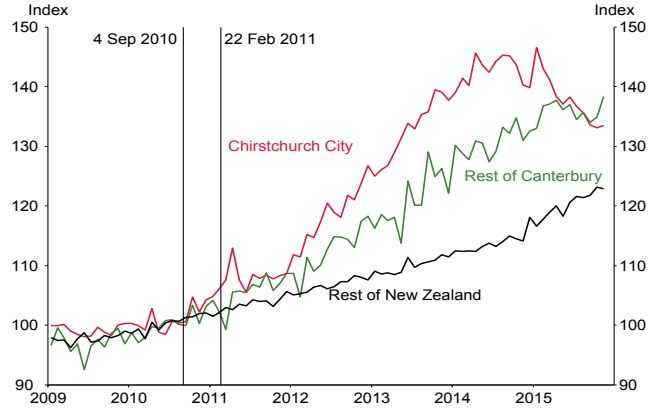
Nearly 170,000 properties were damaged in the earthquakes, about three quarters of Canterbury's housing stock; the proportion was even higher within Christchurch City. The consequent shortage in housing has resulted in a sharp increase in house prices in Christchurch. House prices in the city are more than 40 percent higher than their pre-quake levels (figure 6). While this increase in house prices is smaller than the increase that has occurred in Auckland, where there is also a shortage of housing, it is more than double the increase that has occurred in the rest of New Zealand.

**Figure 6**
**House price index**
*(Index 2010Q2 = 100, seasonally adjusted, 3-month moving average)*




Source: REINZ, RBNZ estimates.

**Figure 7**
**Mean weekly rents**
*(Index 2010Q2 =100, seasonally adjusted)*




Source: Ministry of Business, Innovation and Employment.

The shortage of housing has contributed to a sharp increase in rents, which had increased by almost 50 percent in Christchurch City by the start of 2015, compared with a nationwide increase of about 15 percent during that time (figure 7). The increase in rents has been concentrated in the relatively unaffected suburbs to the west and south of Christchurch as people have moved away from harder hit areas. Rental increases in the more heavily affected coastal and riverside suburbs are in line with the nationwide increase. More recently, rents have started to decline in Christchurch – by about 9 percent in the first 11 months of 2015.

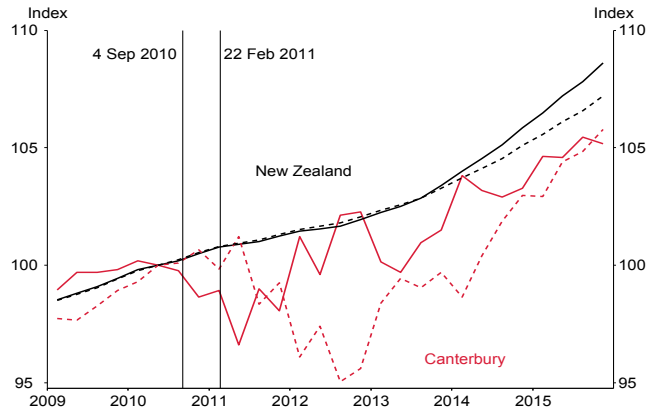
In part, the decline in rents reflects the increase in residential construction under way. The number of residential consents has increased from about 500 consents per month before the quake to a peak of more than 1200 consents per month at the end of 2014, around the time the Bank estimates residential construction activity peaked as a percent of potential GDP. On the commercial side, progress has been slower, in part reflecting a slow move back to the CBD.

# 4 Population and the labour market

Population estimates based on the 2013 census suggest that in the first two years after the first Canterbury earthquake, the population of Canterbury fell by almost 12,000 people, or around 2 percent. The majority of that fall reflects a decline in the Christchurch City population, which fell by about 6 percent over the same period. Nearby districts in Canterbury experienced population increases, partly due to movement out of the city. Selwyn and Waimakariri had the largest population increases, up 8 and 6 percent respectively.

Within the working age population change, there is a marked difference by gender (figure 8). In the initial aftermath, the male population fell more sharply than the female population. However, that initial impact reversed as the rebuild gathered pace. The Canterbury population recovered to its pre-quake level in the year to June 2014, four years after the initial shock. The gender gap has closed more recently, with the working age population in Canterbury up around 5 percent since the first earthquake, whereas the working age population in the rest of New Zealand is up around 7 percent. It remains to be seen where the population will settle once the rebuild is complete and migrant construction workers decide whether to remain in Canterbury or to leave.

**Figure 8**
**Working age population by gender**
*(Index 2010Q2 = 100)*



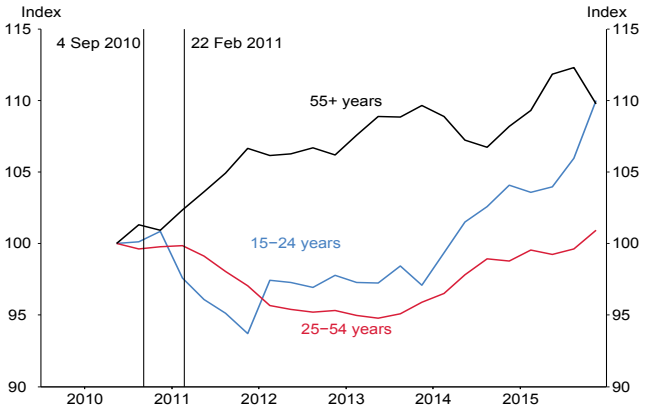

Source: Statistics New Zealand.

Note: Solid lines represent males and broken lines represent females.

Reliable data on where people went in the short term are difficult to obtain. International migration statistics suggest that the net outflow of permanent and long-term migrants from Christchurch City increased from an average of about 1400 a quarter in the five years before the quakes to a peak of 2200 per quarter in the first year after the quakes.

Most of those who relocated after the quakes were in the 15-24 and 25-54 years age groups (figure 9). The large outflow in the 15-24 years age group largely reflects a reduction in student numbers, particularly international students. The number of individuals in these two age groups only started to increase again from the start of 2014, once the rebuild was well under way and natural ageing brought more people into the lower age bracket.

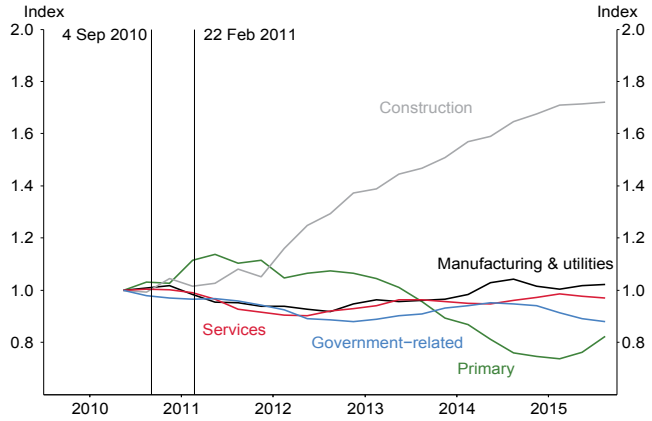
**Figure 9**
**Working age population by age group**
*(Index 2010Q2 = 100, 4-month moving average)*




Source: Statistics New Zealand.

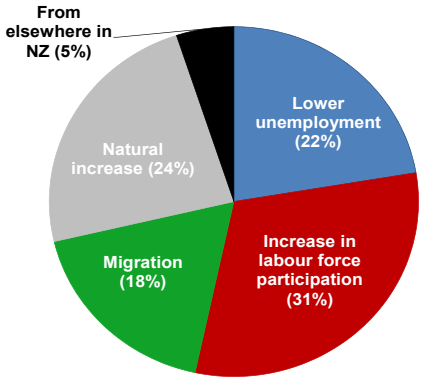
Employment in Canterbury initially declined by 5 percent after the earthquakes, reaching a trough in June 2012. Employment has since risen by about 16 percent, almost exclusively accounted for by the construction industry. The ratio of construction employment in Canterbury to nationwide construction employment has doubled, while corresponding ratios in other industries have fallen or remained flat since the quakes (figure 10). More recently, construction employment in Canterbury relative to nationwide levels has plateaued and there has been some recovery in employment levels in other industries.

**Figure 10**
**Canterbury employment by industry as a ratio to New Zealand employment by industry**
*(Index 2010Q2 = 100, seasonally adjusted, 4-quarter moving average)*




Source: Statistics New Zealand.

**Figure 11**
**Sources of increased employment in Canterbury**
*(2010Q2 until 2014Q2)*

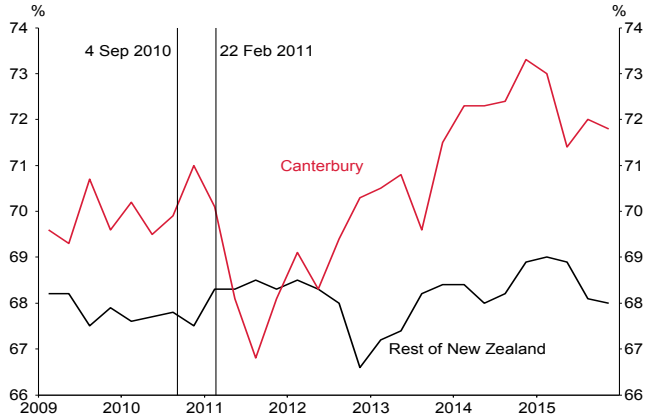



Source: Statistics New Zealand, Ministry for Business, Innovation and Employment, RBNZ estimates.

The additional workers in Canterbury are estimated to have come from several sources (figure 11). Most came from within the Canterbury region. About a quarter of the additional workers migrated from other regions in New Zealand (5 percent) and from other countries (18 percent).

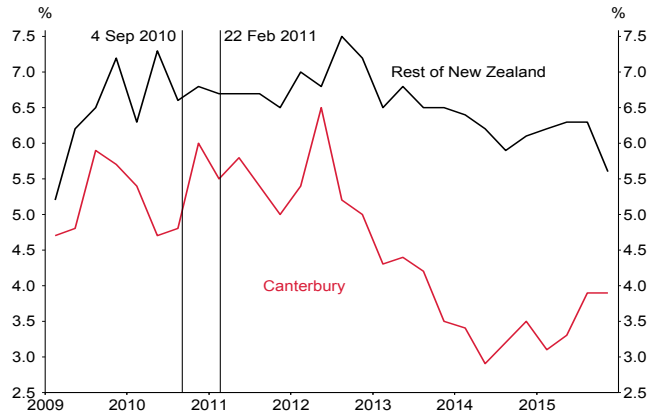
Of those workers who came from within Canterbury, about a third of the increase in employment can be attributed to a rise in labour force participation. Canterbury's labour force participation rate rose from about 70 percent before the earthquakes to peak about 73 percent, while the participation rate in the rest of New Zealand remained broadly unchanged (figure 12). A further quarter of the increase can be attributed to natural increase as those in Canterbury reached working age and joined the labour force.

**Figure 12**
**Participation rate**



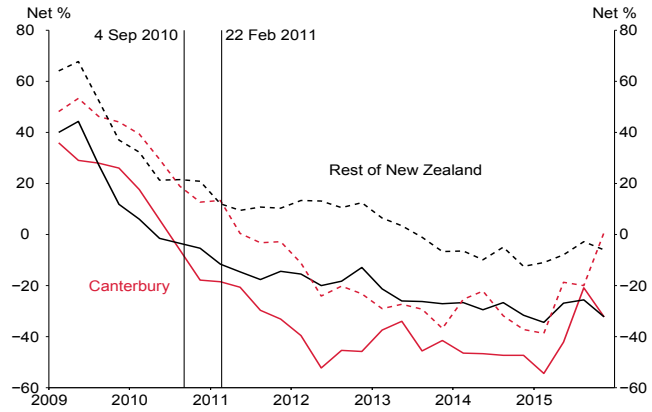

Source: Statistics New Zealand.

**Figure 13**
**Unemployment rate**




Source: Statistics New Zealand.

**Figure 14**
**Ease of finding skilled and unskilled labour** ***(seasonally adjusted)***



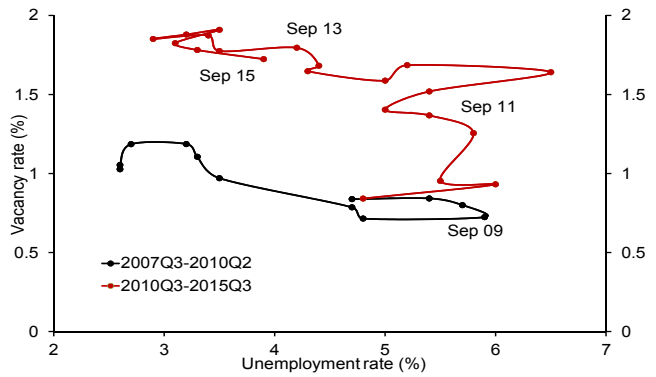

Source: NZIER.

Note: Solid lines represent ease of finding skilled labour and broken lines represent ease of finding unskilled labour. Net response: number of firms finding recruiting labour easy less those finding it difficult. Negative numbers imply it is relatively more difficult to find labour.

Workers who were previously unemployed also contributed to increased employment. The unemployment rate in Canterbury fell from 4.7 percent to about 3 percent by 2014 (figure 13). The gap in unemployment rates between Canterbury and the rest of New Zealand widened by more than historically witnessed. Consistent with the decline in the unemployment rate, employers finding it difficult to find skilled and unskilled labour in Canterbury have been more pronounced than in the rest of New Zealand (figure 14).

In part, the relative difficulty in finding labour might reflect some degree of 'matching inefficiency' between vacancies and workers. Since the earthquakes, there has been a large upward shift in the Beveridge Curve for Canterbury (figure 15).[4] The Beveridge Curve measures the relationship between unemployment and vacancies. This curve is traditionally downward sloping – a lower rate of unemployment should be

**Figure 15**
**Canterbury Beveridge Curve** ***(seasonally adjusted)***




Source: Ministry of Business, Innovation and Employment, Statistics New Zealand, RBNZ estimates.

4 See Craigie et al (2012) for a more detailed description of the Beveridge Curve and labour market matching in New Zealand.

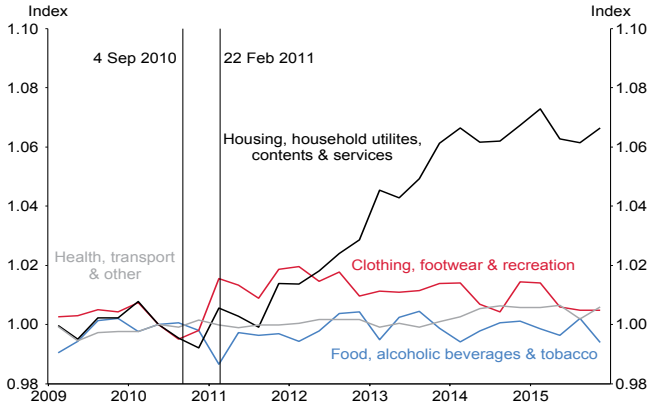
associated with a greater rate of vacancies. The upward shift witnessed in Canterbury suggests that the matching between unemployed workers and vacancies is not as efficient, resulting in a higher rate of vacancies for a given rate of unemployment. The vacancy rate in Canterbury is now similar to that of the national rate.

As employment increased and the labour market tightened in Canterbury wages have increased relative to nationwide levels. In real terms, wages in Canterbury have increased by about 8 percent since the earthquakes, whereas wages outside of Canterbury have increased about 6 percent in real terms.

## 5 Consumer prices

Consumer price inflation for housing-related items has been higher in Canterbury compared to the rest of New Zealand (figure 16). As noted above, rents have increased in Canterbury relative to the national average. A proxy for construction cost inflation – the purchase of housing CPI – increased substantially relative to the rest of New Zealand, peaking at above 12 percent at the start of 2013 in Canterbury, while remaining below 2 percent in the rest of New Zealand. While some other components of the CPI (such as clothing, footwear and recreation) were initially higher in Canterbury in the immediate aftermath of the earthquakes, the relative price differentials have disappeared in recent years.

**Figure 16**
**Canterbury CPI as a ratio to rest of New Zealand CPI**
***(Index 2010Q2=1)***

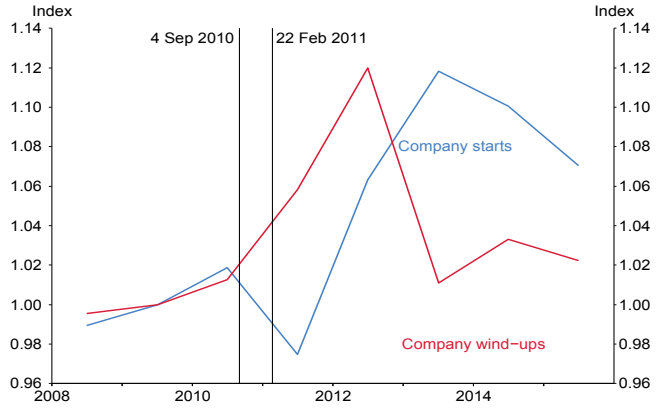



Source: Statistics New Zealand.

## 6 Economic activity

After an initial period of post-earthquake disruption, aggregate indicators suggest that aggregate business activity in Canterbury has been strong. There was a sharp increase in company wind-ups relative to the national rate in the first couple of years after the earthquakes. As the rebuild gathered pace, the rate of wind-ups fell closer to the national rate, and business start-ups picked up to more than 10 percent greater than the national rate by 2013, and remain relatively strong (figure 17).

**Figure 17**
**Company starts and wind-ups relative to nationwide**
*(Index 2009=100)*



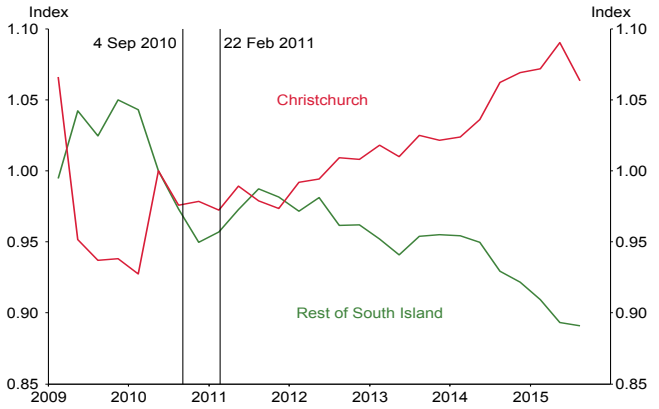

Source: Statistics New Zealand.

There are notable differences by industry, with company starts increasing markedly in construction in Canterbury relative to the rest of New Zealand, and wind-ups higher in the accommodation and food and education industries for much of the past five years. In the most recent data, there is a partial reversal, with wind-ups in accommodation and food now lower than in the rest of New Zealand, and an increased rate of construction sector wind-ups.

Activity in the manufacturing and services sector in Canterbury, as indicated by the performance of manufacturing and services indices, appears to have kept pace with the rest of New Zealand. Investment intentions suggest that businesses in Canterbury have expected to do more investment in buildings and plant and machinery than those in the rest of the country for most of the period post-earthquakes.

Retail sales in Christchurch held up well relative to nationwide sales in the initial period post-quakes (figure 18). From around 2012, there is a noticeable pick up in retail sales in Christchurch, which recovered to pre-earthquake levels by 2014. At the same time, retail sales in the rest of the South Island have reduced relative to nationwide retail sales.

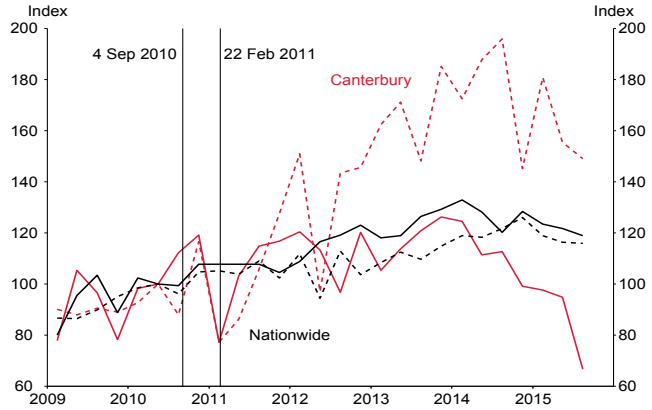
**Figure 18**
**Retail sales relative to nationwide**
*(Index 2010Q2=100, seasonally adjusted)*




Source: Statistics New Zealand.

Export volumes from Canterbury seaports and airports were not materially affected by the quakes. The volume of exports going through ports recovered soon after the quakes (figure 19). Exports from Canterbury have declined since 2014. On the other hand, import volumes into Canterbury have increased by more than nationwide imports as rebuild-related materials and replacement goods have been brought in.

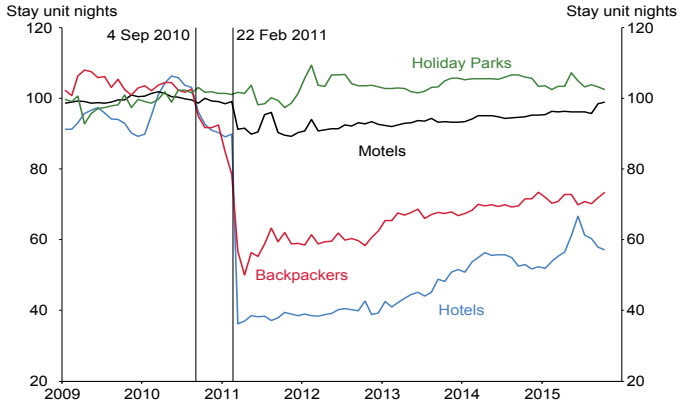
**Figure 19**
**Trade from sea and air**
*(Index 2010Q2=100, seasonally adjusted)*




Source: Statistics New Zealand.

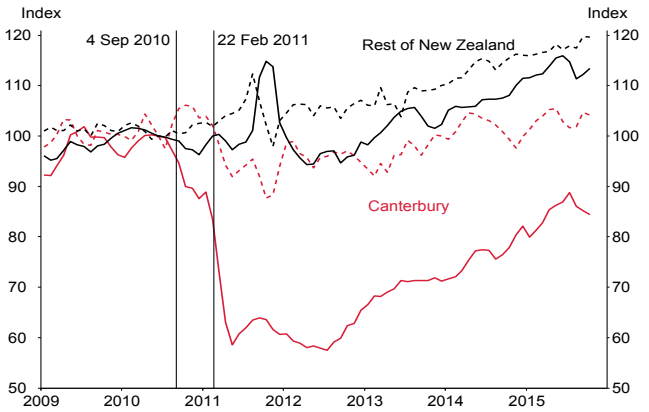
Note: Solid lines represent exports and broken lines represent imports.

**Figure 20**
**Accommodation capacity in Canterbury**
*(seasonally adjusted)*




Source: Statistics New Zealand.

**Figure 21**
**Guest nights**
*(Index 2010Q2=100, seasonally adjusted, 3-month moving average)*



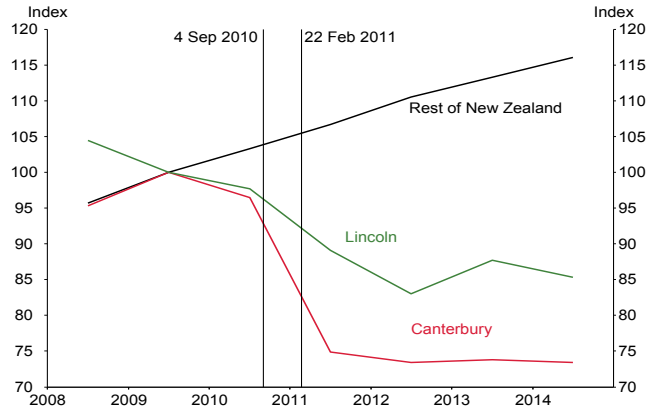

Source: Statistics New Zealand. Note: solid lines represent international guest nights and broken lines represent domestic guest nights.

Despite the resilience of much of the Canterbury economy, two sectors have notably suffered in the period following the earthquakes – tourism and tertiary education. The earthquakes severely reduced available accommodation in Canterbury, halving the capacity of backpacker accommodation and destroying more than half of hotel capacity (figure 20). Much of this lost capacity has yet to be rebuilt. Business contacts suggest that any such rebuild is unlikely to occur ahead of relevant 'anchor' projects such as the convention centre.

The lack of available tourist accommodation, the destruction of tourist sites within Christchurch City, and risks associated with aftershocks led to a sharp decline in guest nights in the immediate aftermath of the earthquakes (figure 21). International guest nights in Canterbury have yet to recover to pre-quake levels. Domestic guest nights were also negatively affected. Discussions through our business liaison programme suggest that tourism in the greater South Island was also affected by the earthquakes, largely because Christchurch acts as an international hub into the South Island.

In 2009, Canterbury University made up about 10 percent of nationwide international university student numbers. That proportion fell to about 7 percent after the earthquakes and has yet to recover (figure 22). Lincoln University international student numbers also fell after the quakes, from about 4 percent of nationwide international student numbers to about 3 percent. While international student numbers in these two universities have fallen by about 570 students since the earthquakes, the number of international students at universities in the rest of New Zealand is about 12 percent higher than in 2010, an increase of about 2350 students.

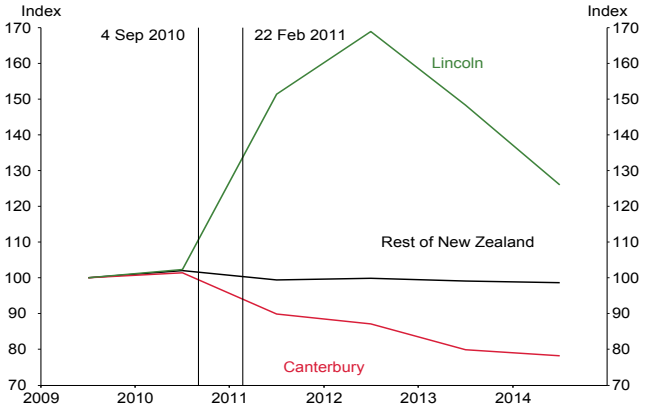
**Figure 22 International university student numbers** *(FTEs, index 2009 = 100)*




Source: Ministry of Education.

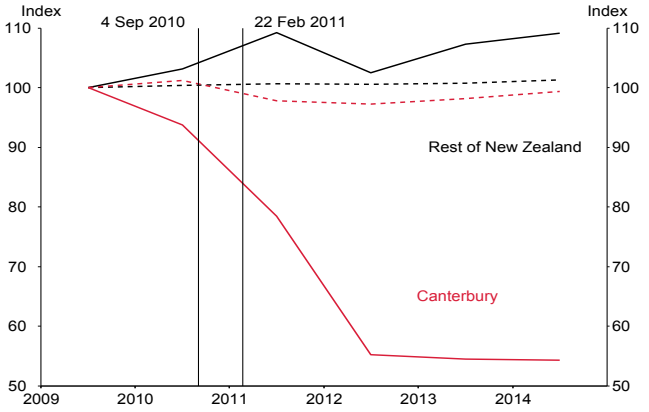
Domestic university student numbers also fell in Canterbury after the quakes (figure 23). In 2009, Canterbury University made up almost 12 percent of domestic university student numbers – that proportion fell to about 9 percent after the earthquakes and has remained around that level, a loss of about 3000 students. On the other hand, domestic student numbers rose at Lincoln, and have remained relatively flat across the rest of New Zealand. Lincoln University domestic student numbers have increased by about 450 students since the start of 2010, and currently make up about 2 percent of total domestic student numbers in New Zealand.

**Figure 23 Domestic university student numbers** *(FTEs, index 2009 = 100)*




Source: Ministry of Education.

**Figure 24 School numbers (Year 1-15)** *(Index 2009=100)*




Source: Ministry of Education. Note: Solid lines represent international students, broken lines represent domestic students.

International student numbers in Canterbury primary and secondary schools fell substantially after the quakes, declining more than 40 percent, and have yet to recover (figure 24). However, international students make up only 1-2 percent of total student numbers in funding years 1-15 in Canterbury. Domestic student numbers in primary and secondary school also fell, but to a much lesser extent.

## Conclusion

The damage to residential and commercial property and public infrastructure caused by the Canterbury earthquakes in 2010 and 2011 was substantial. Nonetheless, the Canterbury economy has been largely resilient to the disruption. The rebuild was initially delayed as building activity was constrained by aftershocks and delays in insurance payments. Since 2012, business activity has recovered and construction sector activity has encouraged strong labour force participation and kept unemployment low. Nominal GDP growth in Canterbury has increased from 3 percent in the year to March 2010 to 10.5 percent four years later.

New Zealand is prone to earthquakes; Christchurch is not the first city to be devastated by an earthquake and in all likelihood will not be the last. It is important to learn from the successes and difficulties encountered in the Canterbury rebuild to improve future resilience in New Zealand to such events.

Discussions with Bank contacts in the region during the past five years have highlighted above all the need to reduce uncertainty around the rebuild. More than five years on from the first major earthquake, the rebuild is still many years from completion. The reconstruction of commercial property has yet to begin in earnest, many of the anchor projects in the CBD remain uncertain, and many insurance claims have yet to be settled.

Several insurance-related legal issues have been clarified as Canterbury has recovered from the earthquakes, but the process of resolving disputes has been a factor delaying the settlement of insurance claims, hindering the pace of the rebuild. Increasing the speed of resolution of insurance claims will provide greater certainty for households and businesses following future disasters, aiding recovery.

When faced with uncertainty about the future, businesses are reluctant to invest and employ. Reducing uncertainty is important since other sectors will need to expand activity in the region to absorb the productive resources released by the construction sector as the insurance-funded rebuild winds down. In particular, activity in the tourism and education sectors remains markedly below pre-quake levels. Without increased activity in other sectors, the labour market in the region could see a reversal of the improvement that has occurred in recent years, leading to reduced participation, higher unemployment and outward migration.

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