Migration and the housing market

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NON-TECHNICAL SUMMARY

Fluctuations in migration have long been recognised as important to understanding movements in the New Zealand housing market. Their importance has surfaced yet again in 2013, as we have seen a large increase in the net inflow of migrants at a time of high house price inflation, particularly in Auckland.

This note includes analysis on the relationship between various forms of permanent and long-term migration and the New Zealand economy and, in particular, the housing market. It uses a small model that is estimated on observed historic data for migration, house prices, residential building consents, the estimated output gap and mortgage interest rates. Readers should keep in mind that migration is likely to be affected by many factors that have not been controlled for.

Net migration changes are consistent with large housing effects. An additional net inflow that adds 1 percent to the population causes an 8 percent increase in house prices over the following three years and an additional house is built for around every six migrants. This is materially more than the existing number of people per household in New Zealand (around 2.5).

When net migration is split into arrivals and departures, arrivals appear to have had bigger house price effects than departures. A 1000-person increase in monthly arrivals raises real house prices by 4 percent, whereas a 1000-person fall in monthly departures raises real house prices by only 2 percent. This is consistent with the additional finding that changes in New Zealand-citizen migration have had smaller effects than changes in foreign-citizen migration.

The origin of foreign arrivals also appears to have mattered. A 1000-person increase in monthly European/UK arrivals raises real house prices by 8 percent after 2 years, whereas a 1000-person increase in monthly Asian arrivals raises real house prices by around 6 percent.

Whether or not the strong relationships are due to migration itself or through some other factor, these relationships provides some useful predictive ability for the housing market. With regards to the 2013 migrant inflow, house prices will almost certainly face upward pressure, some of which will probably already have been seen. The effect, however, might be smaller than implied by net PLT immigration alone because the increased net inflow is mostly due to fewer departures (and mostly due to changes in the behaviour of New Zealand citizens), which are associated with smaller effects. All in all, although there is uncertainty around the estimates the recent migrant inflow could increase house prices by around 7 percent, and increase the number of monthly building permits by around 150 next year.

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INTRODUCTION

Historically, there has been a strong correlation between net immigration and house price inflation. Migrant arrivals need somewhere to live and departures free up houses for others. Based on a simple bivariate relationship, a monthly net inflow of 3000 people or 0.7 people per thousand head of population (as in recent months) has been consistent with annual house price inflation of more than 10 percent (figure 1).

Figure 1: House price inflation and net PLT immigration
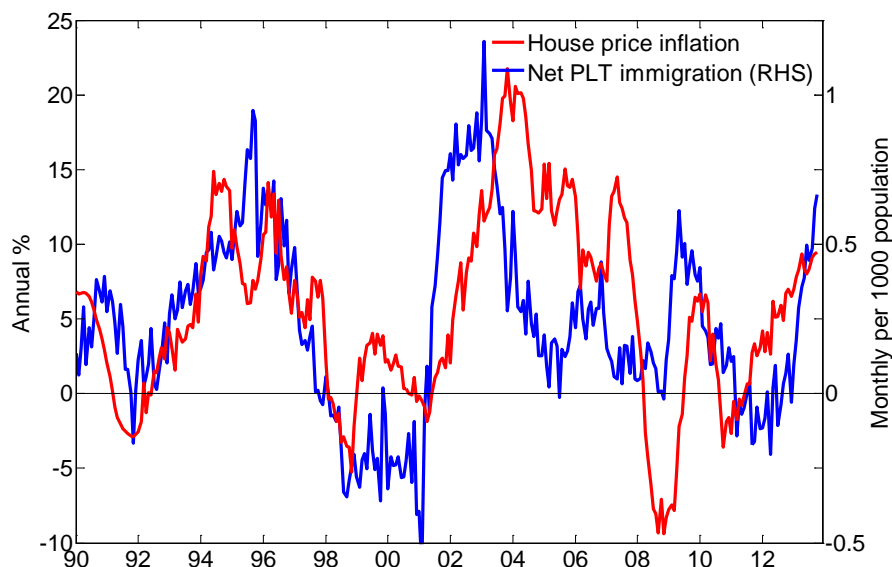
Source: REINZ and Statistics New Zealand. PLT stands for permanent and long-term, as opposed to short-term visitors.

In earlier Reserve Bank research, Coleman and Landon-Lane (2007) developed a model to estimate the impact of immigration on the New Zealand housing market. They found that a migration inflow equal to 1 percent of the population caused around a 10 percent increase in real house prices.[1]

Coleman et al suggest three potential reasons why this relationship is so strong:
- It takes time to construct new houses so that in the meantime extra pressure is put on the existing supply;
- Other factors, not captured in the model, affect both migration and house prices simultaneously. For example, migration to New Zealand was quite low during the global financial crisis and, at the same time, the housing market slowed. It is possible both of these were due to financial or uncertainty shocks and not migration;
- Migration causes households to change their expectations of the fundamental house price, where a small rise in house prices increases expectations of future house price inflation, amplifying the direct effects of migration on housing demand.

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[1] This 10 percent impact is based on the average response across a couple of time periods. They also estimate the impact of migration over 1991 to 2006 and find a stronger effect.

Stillman and Maré (2008) estimated the impact of population changes on house prices at a regional level. Using this framework they found that population changes had small impacts on house prices. A 1 percent increase in a region's population typically increased house prices in that region by only 0.2-0.5 percent.[2] That said, when they separately estimated the effects of returning New Zealanders and foreign immigrants on house prices, they found that migration of foreigners had little correlation with house price inflation. By contrast, a 1 percent population increase from returning New Zealanders raised house prices by 6 to 9 percent.

Migrants probably do not all have the same impact on the housing market. This note considers if separating out different types of migrants is useful for macroeconomic analysis. Specifically, this note considers several macroeconomic models where migration numbers are broken down by arrivals or departures, New Zealand or foreign citizenship and, for foreign citizens, by their country of origin. The results are used to consider what the 2013 migrant inflow might mean for the housing market over the next year or two.

THE MODEL

The model uses the vector autoregression (VAR) framework. VARs are flexible models used to describe the interaction between economic and financial variables. They have been the standard tool of empirical macroeconomic modelling and are widely used to measure the transmission channels of various shocks on the economy. Every equation includes lags of all the variables in the model. As such, VARs capture the correlations between variables very well.

The VAR is estimated on monthly data from January 1990 to October 2013. Each equation includes six lags of the model variables. The model's parameters are estimated using Bayesian estimation with fairly loose priors.[3] The observed data that are included in the baseline model are shown in table 1.

Table 1: Baseline model variables[4]

Residential building consents	Output gap	Net PLT immigration
Real house price inflation	2-year fixed mortgage rate	

Source: REINZ, Statistics NZ, RBNZ.

Net permanent and long-term (PLT) immigration and residential building consents are measured per 1000 head of population.[5] Nominal house prices are deflated using the consumer price index and the resulting real series is expressed as monthly percent

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[2] Hodgson and Poot (2010) summarise previous literature on the impact of migration on housing.

[3] This Bayesian methodology is described in detail by Bloor and Matheson (2010). The priors assume all the variables follow a random walk process.

[4] See appendix A for plots of the data.

[5] All the migration data used in this analysis are categorised as permanent and long term (PLT). Total net immigration measures are considerably more volatile in the short term than PLT and in most periods – although noticeably not in 2002/03 – fluctuate around the same level as PLT.

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changes.[6] The output gap is the Reserve Bank's estimate from the December 2013 *Monetary Policy Statement*.

Four versions of the model are estimated with different measures of migration:
1. Net PLT immigration;
2. Arrivals and departures separately;
3. Net flow of New Zealand citizens and net flow of foreign citizens separately;
4. Net flow of New Zealand citizens and foreign citizens split by country of origin (Europe/UK and Asia separately).

A 'Cholesky' decomposition is used to identify the exogenous changes to migration. The variables are ordered so that shocks to net immigration affect every variable concurrently except the output gap and residential building consents, which can be affected from the following month. The ordering is not critical to the results. This is because the migration residual (portion not explained by past data) is not correlated with the other residuals.[7]

Migration is affected by many economic factors, some of which are not controlled for in this fairly small model. Consequently, the identified migration shocks may not exclusively capture the impact of migration but could reflect other off-model factors like relative economic conditions. This should be kept in mind when looking at the results.

THE IMPACT OF NET PLT IMMIGRATION ON HOUSE PRICES

Figure 2 shows the typical effect of an exogenous increase in net PLT immigration that adds 1 percent to the population over five years (although mostly in the first two years). The initial inflow in this scenario is similar to the increase that has occurred in 2013.

The responses suggest this scenario is consistent with a significant rise in housing demand, peaking typically after 2 years. Real house prices increase by 8 percent, residential building consents increase by 200 a month, the output gap rises by 0.8 percent, and mortgage rates increase by 50 basis points.[8] The average number of residential building consents in a month is around 1900, so an increase of 200 is around 10 percent.

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[6] The REINZ housing price index is backdated to 1990 using changes in the QV house price index.
[7] The largest correlation coefficient between the migration residual and the other residuals is 0.06.
[8] Because house prices are differenced in the model, the house price level does not necessarily return to zero after a migration shock.
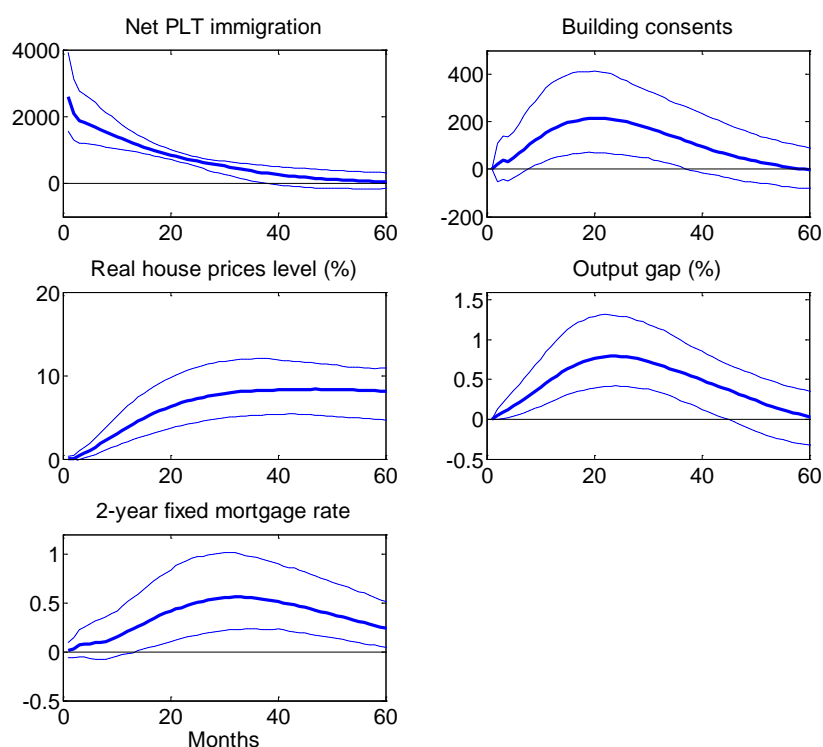
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Figure 2: Responses to a 1 percent population increase from net migration [9]

Table 2 shows that after five years an extra house has been built for one in every six migrants and, as shown above, the real house price has increased by 8.1 percent. These results are slightly smaller than that of Coleman and Landon-Lane (2007), but considerably stronger than those found by Stillman and Maré (2008). In the following sections, migration is disaggregated to help explain why this relationship might be so strong.

Table 2: Responses to a migrant inflow equal to 1 percent of the NZ population

Horizon (years)	Cumulative residential building consents (% of population)	Real house price level (%)
1	0.02	3.8
3	0.13	8.2
5	0.17	8.1

DO MIGRANT ARRIVALS AND DEPARTURES HAVE DIFFERENT EFFECTS?

Modelling only net immigration may result in missing some useful information. This would be the case if, for example, arrivals and departures had different effects on the housing market. To estimate these effects, net immigration is replaced in the model with arrivals and departures separately (figure 3).

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[9] The migration and building consent responses assume the population is 4.2 million. The dashed lines show the 68 percent probability intervals.

Figure 3: PLT arrivals and departures per 1000 head of population
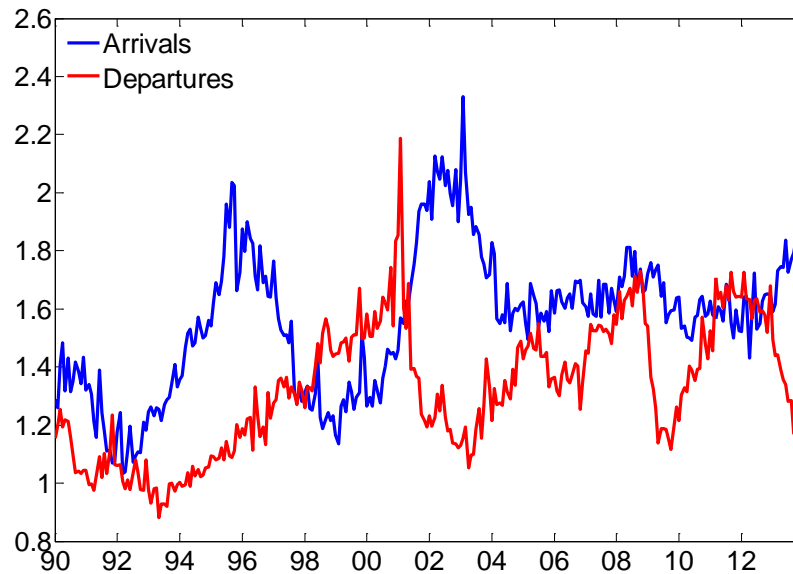

Source: Statistics NZ.

For identification, shocks to arrivals can immediately affect departures but not vice versa. Switching this around barely changes the results because the residuals are not correlated. Figure 4 shows the typical responses to an initial 1000-person increase in monthly arrivals and an initial 1000-person fall in monthly departures. These shocks respectively result in an extra 15,000 arrivals and 12,000 fewer departures over five years. They are equivalent to an extra 0.2 migrants per 1000 head of population each month.

Extra arrivals seem to have had larger effects than fewer departures. The 1000-person increase in monthly arrivals has typically raised house prices by 4 percent over three years, whereas a 1000-person decline in departures only raises house prices by around 2 percent. For consent issuance, both an increase in arrivals and a fall in departures cause an increase by almost 100 each month. Over five years, an additional consent is issued for around one in every five extra arrivals or fewer departures.[10]

Despite arrivals generally having a larger impact, mortgage rates initially increase by more after a fall in departures. It is very difficult to conclusively explain such a difference with this model. One possibility is that arrivals and departures could affect the labour supply differently. If so, they could also have different effects on wages and inflation. Alternatively, it could reflect other factors that affect both migration and interest rates, such as relative economic prospects or the exchange rate. Since departures are mostly New Zealanders, not subject to New Zealand policy restrictions, they are more likely to be endogenous to overall economic performance.

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[10] Migration effects have also been estimated on data from the 1970s and 1980s (appendix B). The key finding from this is that the house price effects were slightly smaller and less persistent in the earlier sample. This might reflect that the supply response (i.e. the increase in consents) is larger.

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Figure 4: Responses to a 1000-person increase in arrivals (left) and a 1000-person fall in departures (right)

Building consents

Output gap

Real house price level (%)

2-year fixed mortgage rate
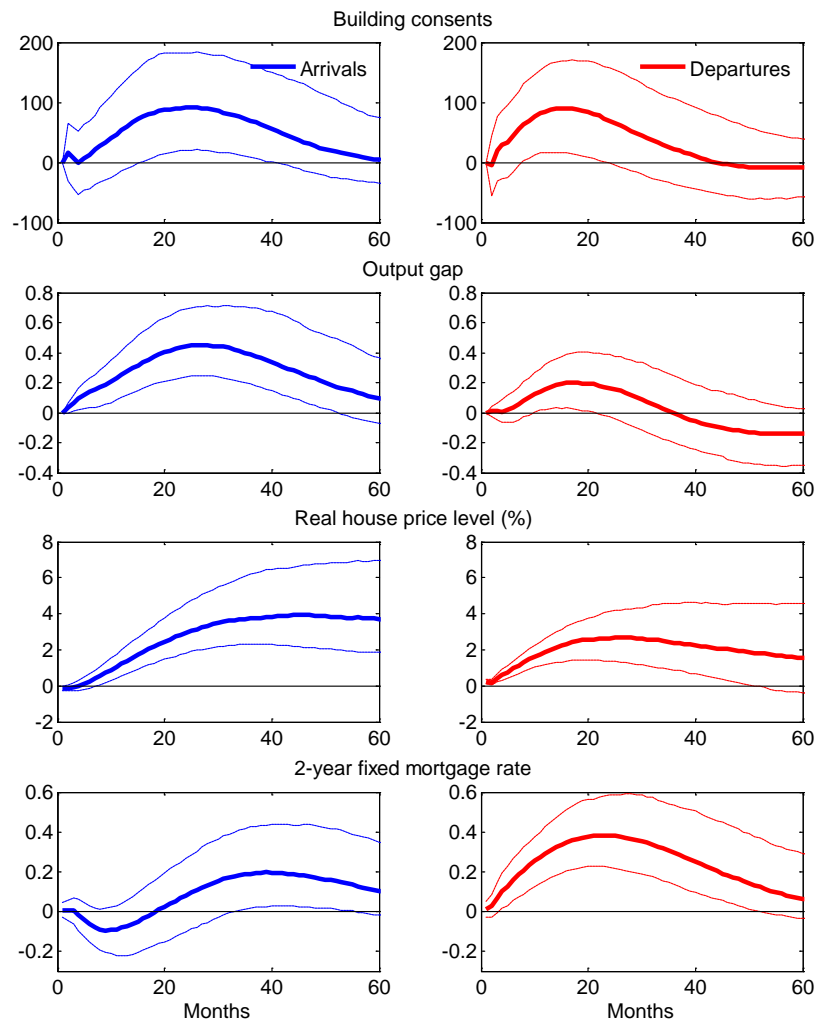
NET PLT MIGRATION BY CITIZENSHIP

To help explain why arrivals have a larger impact than departures, the next version of the model includes net migration of New Zealand citizens and net migration of non-New Zealand citizens rather than arrivals and departures (figure 5). This is a useful comparison because foreign citizens (net) flow into New Zealand, whereas New Zealand citizens (net) leave New Zealand. Also, this might be a better split because arrivals of New Zealanders are negatively correlated with departures of New Zealanders – generating a link between arrivals and departures.

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Figure 5: Net PLT migration by citizenship per 1000 head of population
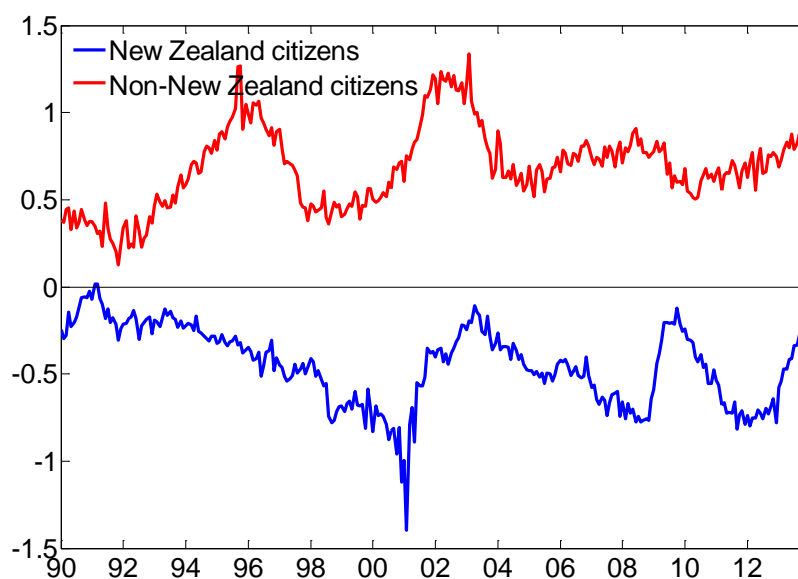

Source: Statistics NZ.

Other than swapping the migration series, the model remains the same as in the baseline. To identify the exogenous movements, net arrivals of non-New Zealanders are able to affect net arrivals of New Zealanders contemporaneously, but not vice versa. Again, swapping this around has little impact on the results. Figure 6 shows responses to an initial 1000-person increase in monthly net arrivals of New Zealanders and of non-New Zealanders. Both shocks result in a net inflow of around 13,000 people over five years.

These responses suggest that New Zealanders have less impact than foreign citizens. In fact, the results are quite similar to the arrivals and departures split. A net inflow of foreigners (like arrivals generally) causes around a 4 percent increase in house prices, an increase in the output gap by around half a percent, and an extra 100 building consents each month. Whereas, a net reduction in the outflow of New Zealanders (like departures generally) raises house prices by around 2 percent and has a smaller impact on the other variables as well.[11]

One possible reason for this difference is that the flow of New Zealand citizens is more endogenous. Perhaps this is because they are less regulated and can come and go when they please. As such, they are likely to move when economic conditions encourage it. This might be when the New Zealand or global economy is stronger, or perhaps it might depend on the value of the NZD.

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[11] While the point estimates are different economically, there is quite a lot of uncertainty around these and the differences are often not statistically significant.

Figure 6: Responses to a net inflow of 1000-persons by citizenship – New Zealanders (left) and Non-New Zealanders (right)
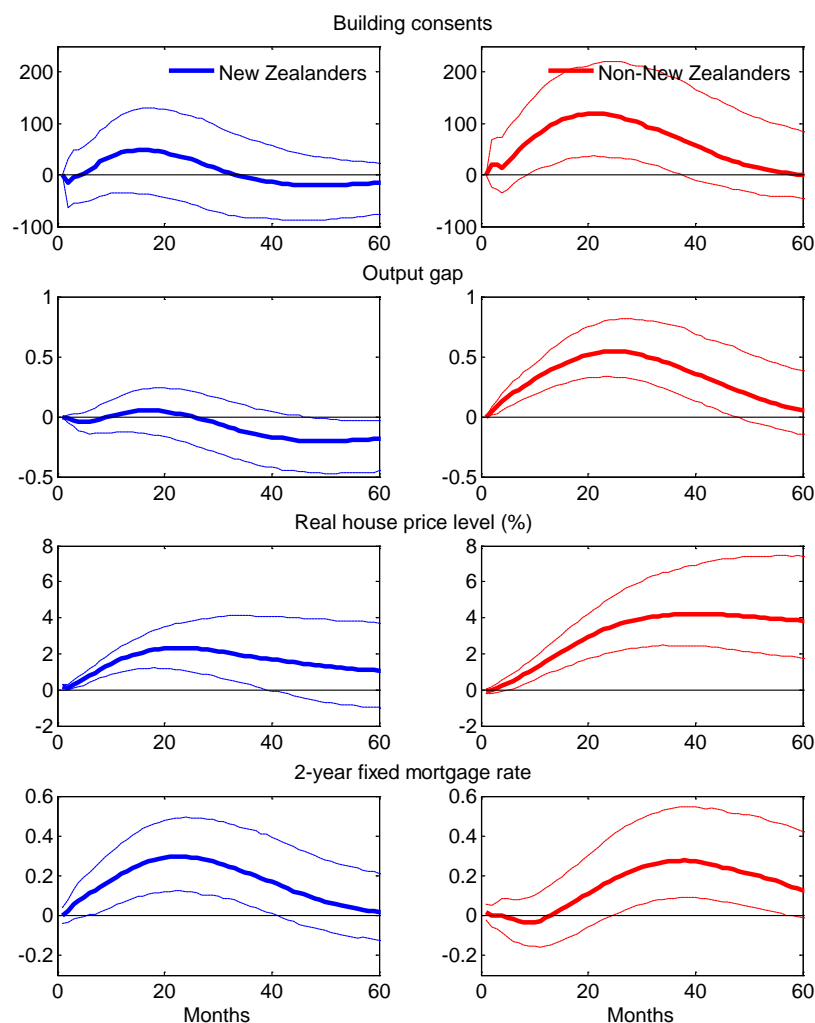
These results contrast those of Stillman and Maré (2008) who found that returning New Zealanders had larger impacts than foreigners. In saying this, the response of returning New Zealanders is similar in this model as it is in their paper. They found that a 1 percent increase in the population from returning New Zealanders was consistent with house prices increasing by 6 to 9 percent. When multiplying the above shock by three, the migrant inflow sums to around 1 percent of the population over 5 years and house prices increase by around 6 percent. It is the response to an inflow of foreigners where the differences are greatest. In their paper, foreign migrants had little impact on house prices, whereas in this model inflows of foreigners cause very large house price effects – a 1 percent population increase due to an inflow of foreign citizens raises house prices by more than 10 percent.

So far, we can conclude that migrant flows are not all the same. Arrivals and departures have different effects, particularly in terms of house prices, and so do New Zealanders and non-New Zealanders. These are not separate issues though. With this in mind, and because the impacts of New Zealand citizens are likely to be difficult

to disentangle, the next section focuses on the impacts of non-New Zealand citizens and splits them by their country of origin.

DOES THE COUNTRY OF ORIGIN MATTER FOR ARRIVALS?

People who come to New Zealand can be diverse. People arriving from Asia (often from countries with much lower incomes than New Zealand) are likely to be quite different in terms of wealth and housing preferences to people coming from Europe. As such, they might have different effects on the housing market. This section discusses the importance of arrivals from Asia and Europe/UK (figure 7).[12] These make up 39 and 29 percent respectively of non-New Zealand citizen arrivals in 2013. Also, they explain the vast majority of movements in net migration of non-New Zealand citizens.

**Figure 7: Foreign arrivals by country of origin per 1000 head of population**
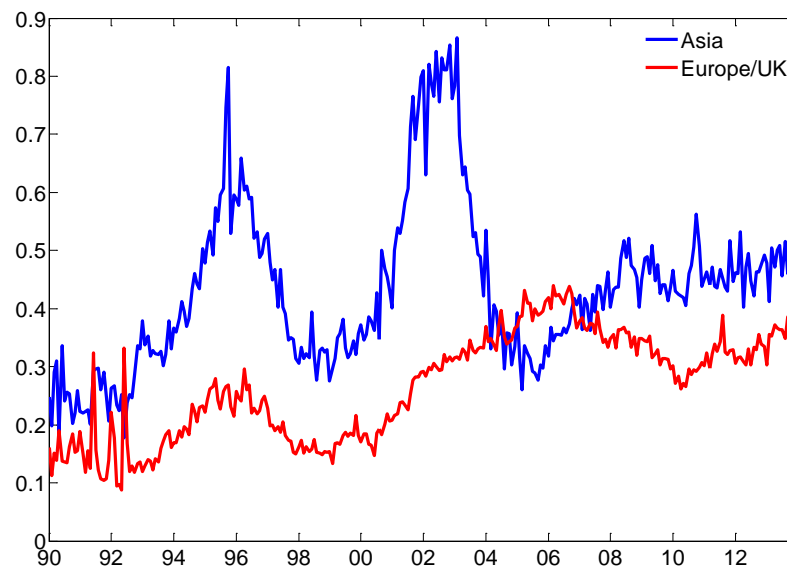
Source: Statistics NZ.

The correlation between arrivals from different countries is accounted for by removing the first principal (or common) component of the 50 most popular countries (see appendix C). The residuals for both Europe/UK and Asia, along with net arrivals of New Zealanders, are observed by the model. It is assumed that there is no contemporaneous interaction between the migration indicators.

The effects of a 1000-person increase in arrivals (or 0.2 per 1000 head of population) from the two regions are shown in figure 8.

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[12] Arrivals from Asia do not include those from Australia. A relatively small number of arrivals from Australia are not New Zealand citizens.

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Figure 8: Response to a 1000-person increase in foreign arrivals by region
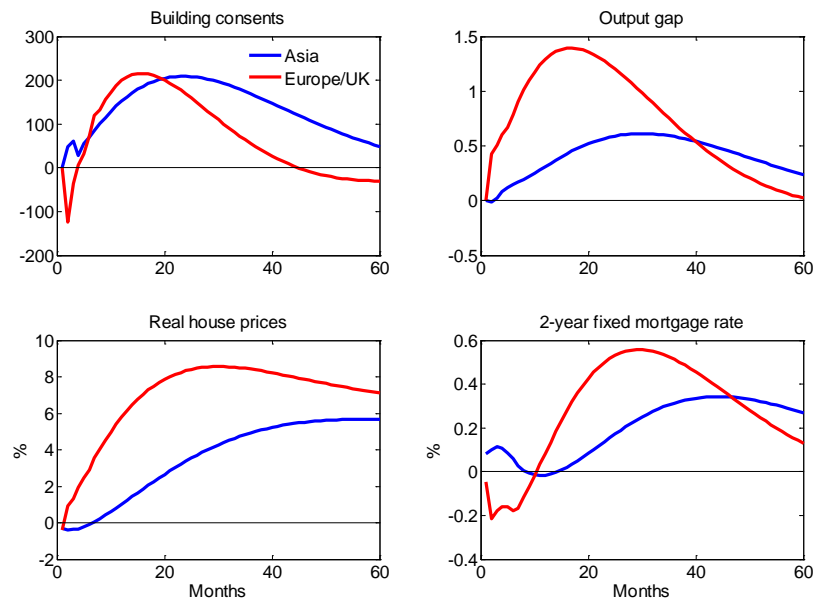
The biggest effects come from an increase in European arrivals. A 1000-person increase in monthly arrivals from Europe increases real house prices by 8 percent. At the peak, it results in over 200 new consents each month and raises the 2-year fixed mortgage rate by more than 50 basis points. A similar-sized increase in arrivals from Asia has more gradual effects. It typically increases house prices by around 6 percent over 5 years and building consents by 200 per month.

Allowing for the different country-of-origin effects provides a better historical explanation of house price movements, particularly over the past decade (figure 9). For instance, the model suggests that a drop off in arrivals from Europe is consistent with part of the fall in house prices in 2008/09. Similarly, the 2010 downturn in house prices can also be partly explained by migration. The increase in house price inflation over the past two years does not seem to be associated with inward migration of people from Asia and Europe/UK.

Figure 9: Migration contribution to real house price inflation
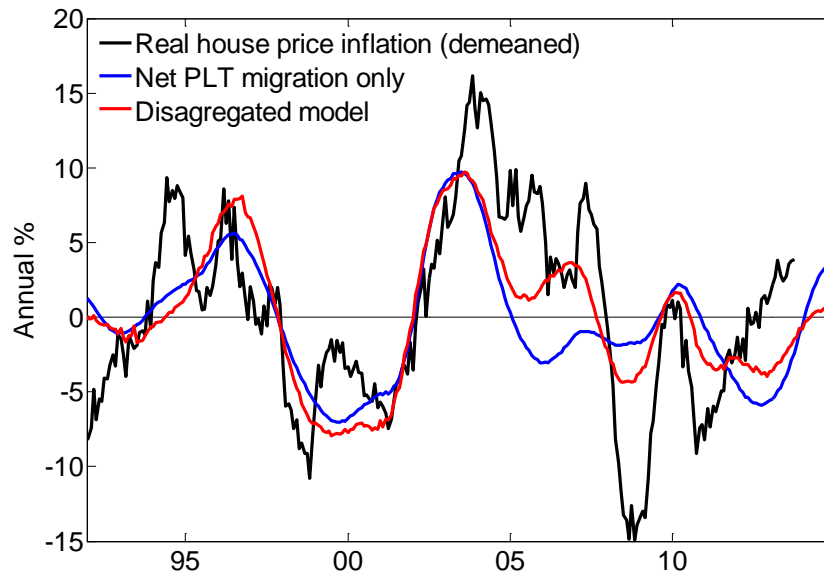
Note: The disaggregated model includes the net flow of New Zealanders and non-New Zealand arrivals by country of origin. The contributions are the cumulative impact of all previous migration shocks on house prices. Shocks that occur up until October 2013 will continue to effect house prices beyond this, as shown by the lines being positive in the forecast.

The strong relationship between migration and the housing market is not necessarily the result of migration itself. Factors that are not included in the model may be causing house prices to increase at the same time as migration. The main thing missing from the models is international factors (for example, the performance of the Australian economy), which at times probably do affect both migration to/from New Zealand and local house prices. As such, the strong association that is identified could be, as least in part, reflecting unexplained international factors.

This strong relationship could also arise because migration shocks affect households' expectations of future house prices. For example, after an inflow of migrants house prices might increase by, say, 1 or 2 percent. Home owners observe higher house prices, feel wealthier and decide to buy another property. Alternatively, other buyers might observe house price inflation and adjust their expectations of how much they are willing to pay. Either way, house prices could rise by more than the direct impact of migration on house prices.

Whatever the reason, migration remains an exceptionally good indicator of future movements in the housing market. With this in mind, the next section considers what the recent migration data suggests for house prices in the future.

THE 2013 EPISODE

So far in 2013, monthly net PLT immigration has unexpectedly increased by more than 3000 people per month. This increase has been two-thirds due to a fall in departures and one-third due to an increase in arrivals, the latter mostly due to an

inflow of New Zealand citizens. As figure 5 illustrates, since the middle of the last decade the biggest PLT swings have been in the net New Zealand-citizen flow rather than non-New Zealand citizens.

The effect of the 2013 migration inflow can be found by comparing a baseline forecast (using all information up until October 2013) to a counterfactual forecast in which the unexpected changes in migration in 2013 have been removed. Any difference between the counterfactual and the baseline forecasts can, therefore, be attributed to these unexpected changes. These forecasts and their difference are shown in figure 10. Initially, this scenario is generated using the baseline model – which only includes net PLT immigration.

Figure 10: Real house price inflation forecasts with and without the 2013 migration effect
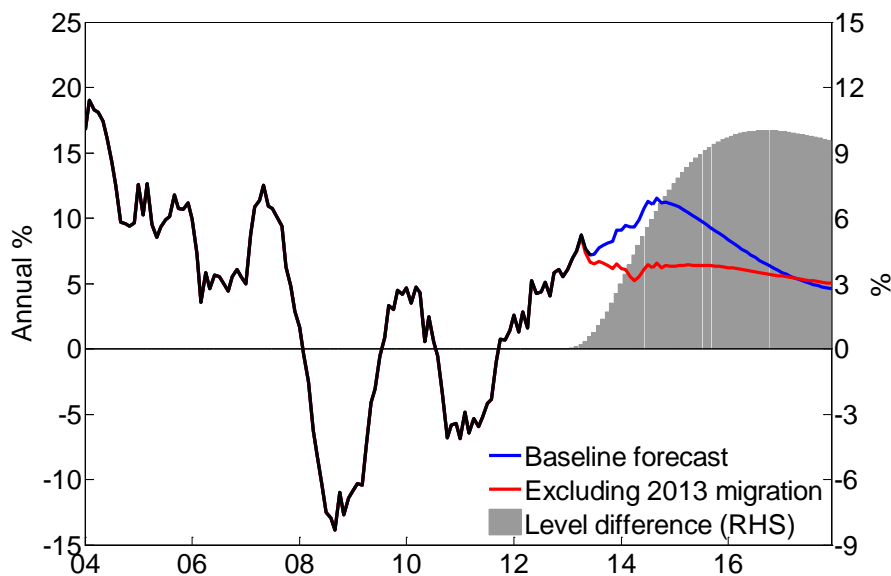
The unexpected increase in net immigration in 2013 is consistent with real house prices increasing by 10 percent. However, much of this increase in net migration was due to a fall in departures, and previous results have shown that departures are associated with smaller effects. Therefore, figure 11 shows the implied impact from the 2013 migrant inflow from the models where migration is disaggregated in different ways. Note that the red line shows the same information as the grey bars in the previous figure.

Once we account for different migration effects, house prices might not increase by as much. When splitting arrivals and departures, the peak house price effect is around 8 percent and when splitting net arrivals by citizenship the peak house price effect is around 7 percent.

The most disaggregated model (net New Zealand arrivals and non-New Zealand arrivals by country) is not included in these charts because it excludes the common component of arrivals and non-New Zealand departures. These were left out to help

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identify exogenous movements in arrivals from Europe and Asia. When this scenario was run with this model it suggested the migration effect could be even smaller.

Overall, the impact from the recent inflow of migrants is likely to be less than implied by net PLT immigration alone. A reasonable approximation for the effect of the recent migrant inflow on house prices seems to be around 7 percent.
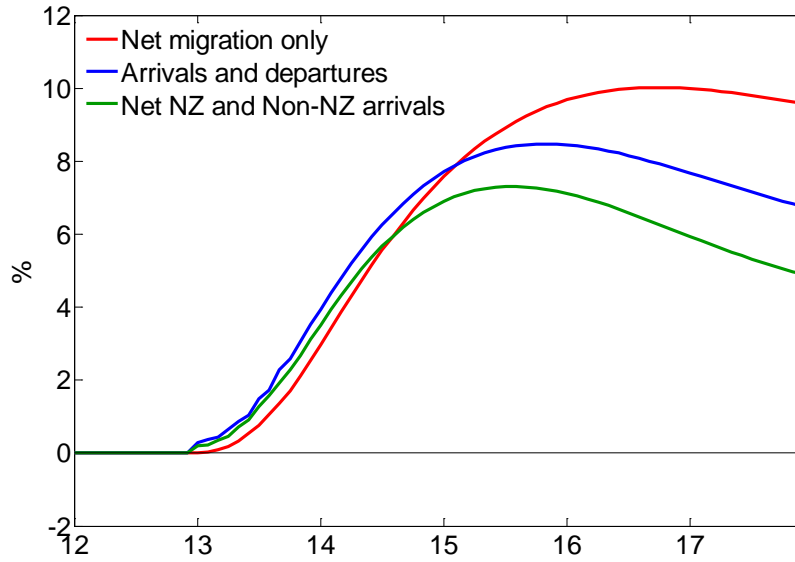
Figure 11: 2013 migration effects on real house prices

Figure 12 shows the impact of the unexpected changes in migration in 2013 on monthly residential building consents. The baseline model with only net PLT immigration suggests consents could increase by as much as 250 a month in 2014 and 2015. When disaggregated into New Zealanders and non-New Zealanders the effect is quite a bit less, reaching only 150 extra consents each month.

Figure 12: 2013 migration effects on building consents

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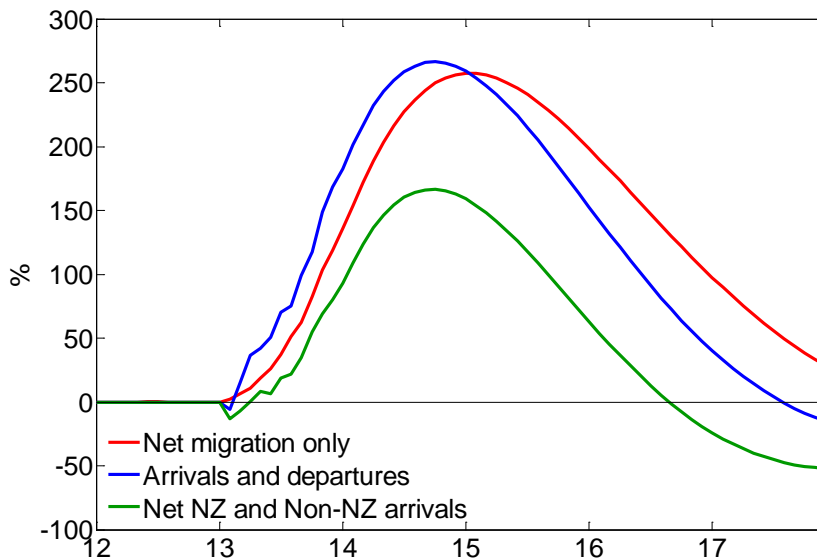
CONCLUSION

This note considers the effects of migration on the New Zealand housing market, according to a small macroeconomic model. The results appear to confirm that migration flows have large impacts on the New Zealand housing market. An additional inflow of migrants equal to 1 percent of the population over five years causes a 7 percent increase in house prices and a new house is built for around every six migrants.

The model suggests that migrant flows can have quite different effects. Arrivals tend to have larger effects than departures. A 1000-person increase in monthly arrivals raises real house prices by 4 percent, whereas a 1000-person fall in monthly departures raises real house prices by only 2 percent. This is consistent with New Zealand-citizen migrants having smaller effects than foreign migrants. The other interesting finding was that the origins of foreign arrivals also matter. Arrivals from Europe/UK tend to have slightly bigger effects than those from Asia.

This analysis has assumed the identified migration effects have been due to exogenous changes in migration. Regional studies on the impacts of migration on house prices point to much smaller effects from migration inflows. This suggests that off-model factors could well be influencing the results in this paper and, therefore, they should be treated cautiously.

Whether or not the strong relationship between migration and house prices is due to migration itself or through some other factor, the relationship is useful for forecasting. The increased 2013 migrant inflow will almost certainly put some upward pressure on both house prices and building activity over the next year or two. Based on past experiences, those effects could be smaller than otherwise because most of the change in net migration is resulting from the choices of New Zealand citizens rather than from an additional inflow of foreign citizens.

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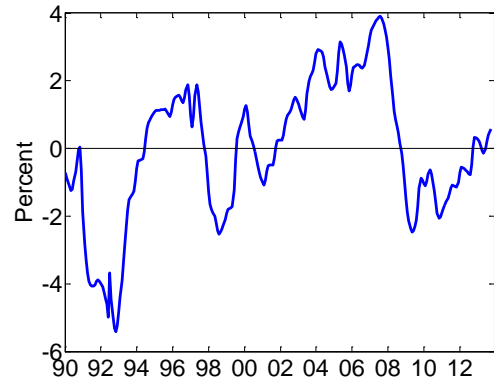
Stillman, S. and D. Maré (2008) 'Housing Markets and Migration: Evidence from New Zealand' Motu Working Paper 08-06, Motu Economic and Public Policy Research.

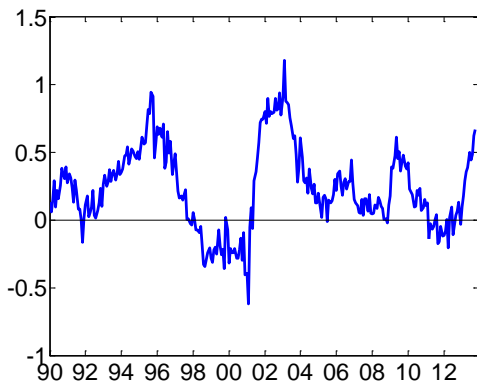_____

APPENDIX A - MODEL VARIABLES [13]
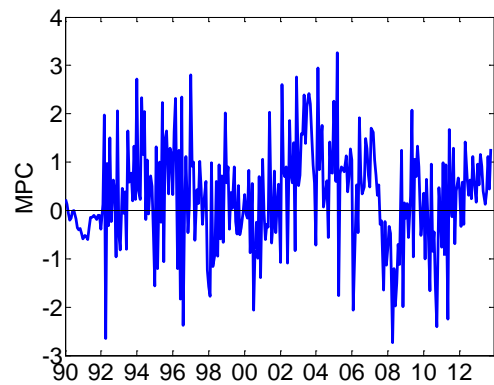
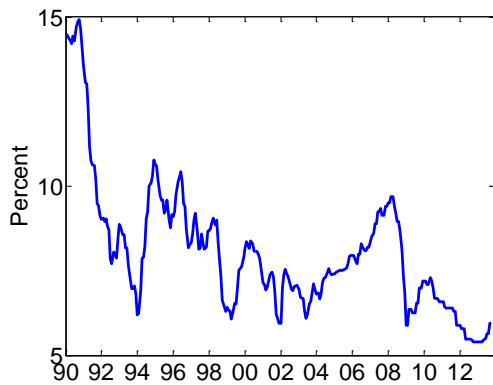### Residential building consents per 1000 population
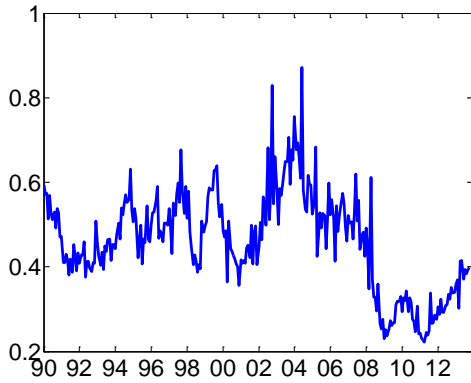
Output gap

Net PLT immigration per 1000 population

Real house prices (deflated by CPI)

### 2-year fixed mortgage rate

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[13] The house price measure is the REINZ housing price index.

APPENDIX B - MIGRATION EFFECTS IN THE 1970S AND 1980S

This version of the model has been estimated using data over the period from July 1971 to December 1989. The only change to the model is that it includes the real floating mortgage rate, as a two-year fixed rate was not then offered in the market.[14] The other variables and the model's structure are the same as the baseline. The effects of a 1000-person increase in the net inflow of migrants are displayed in figure B1.

Figure B1: Effects from a net inflow of 1000 people
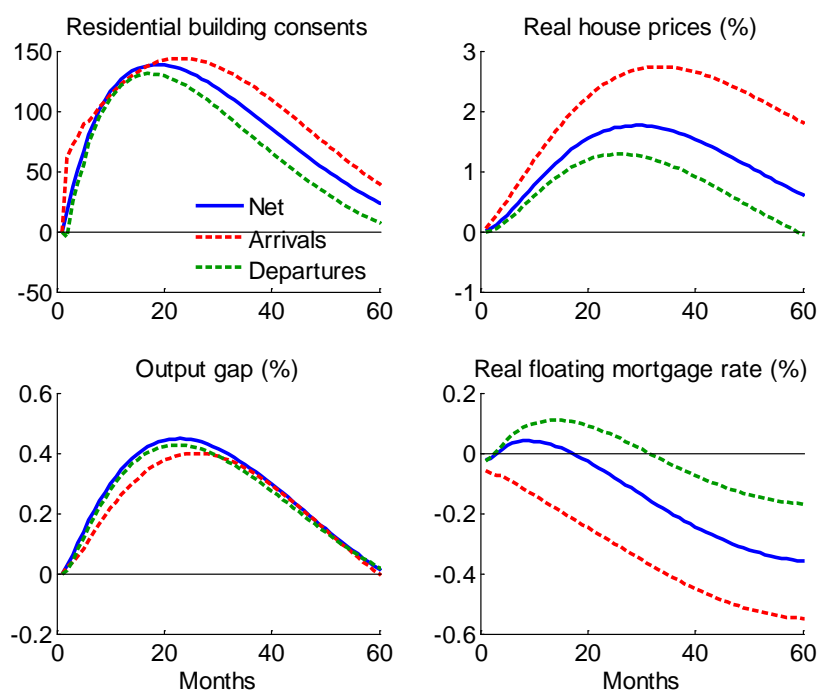
Again, arrivals had a larger house price effect than departures. A 1000-person increase in arrivals was typically associated with house prices increasing by 2.5 percent, whereas 1000-person fall in departures was associated with house prices rising by 1 percent.

Residential building consents and the output gap responded to departures and arrivals similarly, increasing by around 130 and 0.4 percent respectively. Interestingly, the number of additional consents was greater following migration shocks in this earlier sample than in the baseline estimates. That is, there is an additional consent for around every two extra arrivals and every three fewer departures. Also during this period, house prices tended to revert back to zero much sooner. The larger supply response may have been a reason for the smaller and less persistent house price effect.

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[14] The post-1992 output gap is the RBNZ staff estimate from the September 2013 *MPS*. This is backdated with an output gap constructed by de-trending real production GDP using the Hodrick Prescott filter, where lambda or "the smoothing parameter" is set to match the RBNZ output gap estimate as closely as possible. GDP was backdated using the series constructed by Hall and McDermott (2011).

APPENDIX C - DEALING WITH CORRELATED ARRIVALS

The correlation between arrivals from various countries is accounted for by removing the common movements from the country-of-origin indicators. This common component is estimated on the post-1990 sample.

The left panel of figure C1 shows this common movement compared to non-New Zealand citizen arrivals. The right-hand panel shows the residual movements in arrivals for each group of countries. Figure 8 shows the responses to an unexpected increase in the residual for each group of countries.

Figure C1: Foreign arrivals per 1000 population by region