Reserve Bank of New Zealand
Te Pūtea Matua

Debt serviceability restrictions

Consultation Paper

23 November 2021

Submission contact details

The Reserve Bank - Te Pūtea Matua invites submissions on this consultation paper by 5:00pm on 28 February 2022.

Please note the disclosure on the publications of submissions below.

Address submissions and enquiries to:

(E-mail)

macroprudential@rbnz.govt.nz

Subject line: Debt Serviceability Restrictions Consultation 2021

(Hard copy)

Cavan O'Connor-Close
Financial System Policy and Analysis Department
Reserve Bank of New Zealand
PO Box 2498
Wellington 6140

Publication of submissions

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We may also publish an anonymised summary of the responses received in respect of this Consultation Paper.

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Executive Summary

1. The Reserve Bank - Te Pūtea Matua is consulting on debt serviceability restrictions (DSRs) on residential mortgage lending. We are seeking feedback on the merits and potential design of two types of DSRs: restrictions on debt-to-income (DTI) ratios, and a floor on the test interest rates used by banks in their serviceability assessments.

2. DSRs are macroprudential policy tools. We use macroprudential policy to reduce systemic risk associated with 'boom-bust' cycles in which the financial system amplifies a severe downturn in the real economy. This in turn helps us to meet our statutory purpose of "promoting the maintenance of a sound and efficient financial system", as set out in section 1A and Part 5 of the Reserve Bank Act.

3. Earlier in 2021 the Government issued a direction under section 68B of the Reserve Bank Act (the S68B) requiring us to have regard to the following policy objective when exercising our financial stability powers:

   "…support more sustainable house prices, including by dampening investor demand for existing housing stock which would improve affordability for first home buyers".

4. We reported to the Minister of Finance in May 2021 on policy options to support sustainable house prices[1], and advised that DSRs were likely to be the most effective additional tool available to us to support house price sustainability and financial stability. Following our report, the Minister agreed to add DSRs to the Memorandum of Understanding (MoU) on macroprudential policy, on the condition that in designing and implementing such tools, we would have regard to avoiding negative impacts, as much as possible, on first-home buyers, to the extent consistent with the Bank's purposes and functions under Part 5 of the Act.

5. The level and trajectory of house prices over the past year is unsustainable on a number of metrics, and the risks of a sharp correction are elevated. Alongside the recent growth in house prices, new borrowers have been taking on increasingly large debts relative to their incomes. Borrowers who are more indebted are more likely to experience serviceability stress in response to a rise in debt servicing costs or a fall in income, meaning they would need to cut their regular consumption to continue to service their mortgage, and in a worst-case scenario either sell their property or default on the loan.

6. Although the financial system remains strong and banks are well-capitalised, we are concerned that the combination of very high debt levels and unsustainable house prices poses financial stability risks, particularly if current high-risk lending flows remain unchecked. To reduce financial stability risks associated with the housing market, we reinstated loan-to-value ratio (LVR) restrictions on mortgage lending earlier this year, and tightened them further in May (on investors) and November (for owner-occupiers). However, LVR restrictions mainly relate to one dimension of lending risk – the loss given default or LGD. The other key dimension relates to the borrower's capacity to service a loan, which in turn affects the probability of default (PD). DSRs are the main

[1] https://www.rbnz.govt.nz/-/media/ReserveBank/Files/News/2021/Policy-options-to-support-sustainable-house-prices.pdf?revision=83f6f0f5-42ff-436c-86ea-865c986690d7&la=en

macroprudential instrument used internationally to address this second dimension of housing-related systemic risk.

7. The first tool we are consulting on is a restriction on DTI ratios. DTI restrictions impose a cap on mortgage debt (or total debt of a borrower including mortgage debt) as a multiple of income. We are seeking feedback on the potential impacts of a DTI, along with provisional views on design issues that would need to be decided before a DTI could be implemented. These issues include the treatment of different types of income and debt; whether exemptions and speed limits should apply to DTI restrictions; and the potential calibration of a DTI cap.

8. The second tool we are consulting on is a floor on the test interest rates that banks can use in their serviceability assessments. In carrying out their debt serviceability assessments, banks stress test the ability of borrowers to continue repaying their loans if interest rates rise to a certain level (the 'test rate'). By placing a floor on the test rate we set a minimum buffer that all borrowers must meet regardless of bank, providing additional protection for the financial system should interest rates rise.

9. These two options are not mutually exclusive, but a regulated DTI limit would take considerably longer to implement – feedback from the industry suggests six to nine months, once key design issues are agreed. Test rate floors could be implemented more quickly, and hence could potentially be used as a provisional tool while DTI limits are operationalised.

10. Our initial assessment of the impacts of the two tools indicates that DTI restrictions are likely to be more effective than test rate floors in supporting financial stability and sustainable house prices. DTI limits link credit availability to income growth and hence can be more effective in constraining debt levels over a longer period than other macroprudential tools. DTI restrictions can also be calibrated so that there are minimal impacts on first-home buyers, since first-home buyers borrower at lower DTI multiples on average while investors borrow at the highest DTI multiples. This aligns with the Government's housing policy objectives as set out in the S68B direction and the updated macroprudential MoU.

11. DTI limits can create efficiency costs by impeding credit access for otherwise creditworthy borrowers. They may also create a modest drag on economic activity in the short term by constraining credit growth and consumption. However, our analysis suggests these costs would be outweighed by benefits to financial stability over the longer term, in terms of moderating housing cycles and strengthening borrower resilience. Efficiency costs can also be mitigated via the use of exemptions and speed limits, as with the current LVR restrictions.

12. A regulated test rate floor would have some similar effects to a DTI limit, but is likely to be less effective in supporting financial stability. Test rate floors can reduce the amount of debt that borrowers can take on as they require repayments to be 'stressed' at a higher interest rate than banks might otherwise use. However, as the test rate is only one input into banks' affordability assessments, it is possible that a rate floor could be offset via

adjustments to other inputs such as the calculation of expenses or loan terms. Also, depending on the design, a rate floor may have less impact on moderating credit cycles. Most overseas jurisdictions set regulated test rates in the form of a margin above a benchmark rate (e.g., three percent above the origination rate of the mortgage). This approach means that test rates would vary over the cycle, allowing more lending to occur during low interest rate periods.

13. Our analysis also indicates that, by comparison with a DTI limit, a test rate floor would have greater impacts on access to credit for first-home buyers. These impacts would need to be considered carefully before implementing a test rate floor, particularly in light of the Government's housing policy objectives. It may be possible to mitigate impacts on first-home buyers by applying a less stringent test rate to this group or via exemptions. However, this would add complexity and could take longer to implement, offsetting some of the benefits of a test rate floor in managing short-term financial stability risks.

14. This consultation will inform decisions on the type and broad design of DSRs. This is important so that we and the industry can be ready to implement them if needed. A further consultation will be undertaken on detailed policy settings and calibration if we determine a need to implement DSRs.

15. Banks will need to prepare their systems so that we can introduce DSRs in the future, if and when market risks justify it. If we decide to proceed with implementing DTIs, we expect banks to be ready to implement a regulated DTI limit no later than the end of 2022.

Background

16. As set out in our macroprudential policy framework document[2], the purpose of macroprudential policy is to reduce systemic risk associated with 'boom-bust' cycles in which the financial system amplifies a severe downturn in the real economy. This in turn helps us to meet our statutory purpose of "promoting the maintenance of a sound and efficient financial system", as set out in section 1A and Part 5 of the Reserve Bank Act.

17. The Reserve Bank's macroprudential tools are set out in a Memorandum of Understanding (MoU) between the Minister of Finance and the Governor of the Reserve Bank[3]. The tools comprise:

    - Capital/liquidity instruments: core funding ratios (CFR), the counter-cyclical capital buffer (CCyB), and sectoral capital requirements (SCR); and
    - Borrower-based instruments: loan-to-value ratio (LVR) restrictions and debt serviceability restrictions (DSRs), which were added to the MoU in August 2021.

18. To date, LVR restrictions are the main tool we have used to address systemic risks related to the housing market. An LVR is a measure of how much a bank lends against mortgaged property, compared to the value of that property. We first introduced LVR restrictions in 2013 and have adjusted the settings several times since then in response to housing market-related risks.[4]

19. LVR restrictions have been effective in improving financial stability by reducing the risks associated with a build-up of highly-leveraged housing loans in the financial system.[5] However, LVRs relate mainly to one dimension of housing loan risk – namely, the losses faced by banks and borrowers in case of a default (Loss Given Default (LGD). The other key component of risk relates to the borrower's capacity to service a loan, which in turn affects the probability of default (PD). DSRs are the main macroprudential instrument used internationally to address this second dimension of housing-related systemic risk.

20. As set out in the macroprudential MoU, DSRs are macroprudential instruments that place limits on debt levels relative to a borrower's ability to service debt from their income. Common types of DSRs include:

    - Debt-to-income (DTI) restrictions – caps on mortgage debt (or total debt of a borrower including mortgage debt) as a multiple of income;
    - Debt-servicing-to-income (DSTI) restrictions – caps on the percentage of a borrower's income that can be allocated to servicing debt payments; and,

[2] https://www.rbnz.govt.nz/-/media/ReserveBank/Files/Publications/Background%20papers/Macroprudential-policy-framework.pdf
[3] https://www.rbnz.govt.nz/regulation-and-supervision/banks/macro-prudential-policy/mou-between-minister-of-finance-and-governor-of-rbnz
[4] More detail on past LVR decisions can be found on the Reserve Bank's website at https://www.rbnz.govt.nz/regulation-and-supervision/banks/macro-prudential-policy/loan-to-valuation-ratio-restrictions.
[5] https://www.rbnz.govt.nz/-/media/ReserveBank/Files/Publications/Analytical%20notes/2019/an2019-07.pdf?revision=37bd70e8-aed6-4457-be16-fcbb95bf3727

- Interest rate floors – floors on the test interest rates used by banks in their mortgage serviceability assessments, which can be set as a fixed number (e.g. six percent) or as a buffer margin above a benchmark rate (e.g. 2.5 percent above the initial fixed rate).

21. Particularly since the global financial crisis (GFC), regulators in a number of countries have determined that the serviceability assessments imposed by banks may not always be sufficiently strict, especially when interest rates are very low, and imposed additional rules to enhance financial stability. Table 1 summarises current approaches to debt serviceability in some comparator countries.

Table 1: DSRs in comparator countries

	Owner-Occupiers	Investors
Australia	Test interest rate 3% above loan's interest rate at origination	As for owner-occupiers
UK	Loan-to-income (LTI) limit of 4.5 with speed limit of 15% Test interest rate +3% above standard variable rate	Interest coverage ratio (minimum 125%) Test interest rate +3% above standard variable rate
Ireland	LTI limit of 3.5, with speed limit of 20% for FHBs, and 10% for other OOs	None – LVR restrictions only
Norway	Total DTI of 5 with speed limit of 10% (Recently proposed reducing cap to 4.5 and speed limit to 4.5%) Test interest rate +5% above market rates	Appears to be same rules as owner-occupiers
Singapore	DSTI limit – max 30% of gross income on mortgage repayments, max 60% of gross income on all debt repayments	As for owner-occupiers

Consultation on DSRs in 2017

22. We first consulted on the potential introduction of DSRs in 2017.[6] The main focus of the 2017 consultation was on DTI limits, which restrict the amount of debt that borrowers can take on as a ratio of their gross income. We presented evidence to indicate that a DTI limit would improve financial stability by reducing credit growth during an upswing ('boom') in the housing market cycle, and reducing the risk of a significant rise in mortgage defaults during a subsequent severe downturn ('bust'). A DTI limit could also reduce the severity of the decline in house prices and economic growth in that severe downturn, since fewer households would be forced to sharply constrain their consumption or sell their house,

[6] https://www.rbnz.govt.nz/-/media/ReserveBank/Files/Publications/Policy-development/Banks/DTI/Consultation-paper-DTIs-June-2017.pdf?la=en&revision=9a3d883b-9b22-4661-bad8-0cc63b5de448

even if they avoided actual default – thus reducing the feedback effect between the financial system and the economy.

23. The 2017 consultation found that DTI limits can create efficiency costs by impeding credit access for otherwise creditworthy borrowers, and could create a modest drag on economic activity by constraining house prices and consumption. However, our analysis indicated that these costs would be more than offset by the benefits of a reduction in the likelihood and/or severity of a housing-related financial crisis.

24. Based on the findings in the 2017 consultation, we supported adding DSRs to the macroprudential MoU, but stated that we did not see an urgent need to introduce DSRs given that risks in the housing market appeared to be moderating. The Minister of Finance decided not to add DSRs to the MoU at that time. Subsequently, the housing market went through a period of relatively subdued activity with low house price inflation and stable levels of high-LVR and high-DTI lending. However, from around late-2019 onwards, house prices began to rise again, along with lending at higher LVR and DTI ratios.

25. This trend accelerated significantly after we (along with other central banks around the world) provided unprecedented monetary stimulus and financial support to the economy in response to the COVID-19 pandemic. As part of this suite of measures, we also suspended the LVR restrictions in May 2020. From around July 2020 onwards, lending at higher DTI ratios began to increase across all borrower groups, while lending at high LVRs increased significantly for investors and to a small extent for owner-occupiers. In response to these rising risks, we reinstated LVR restrictions in March 2021 and tightened them further on investors in May 2021. We have also recently tightened restrictions on owner-occupiers from 1 November 2021. While these interventions have been effective in reducing the share of high-LVR lending, particularly to investors, the housing market has continued to show strong momentum. This exposes recent borrowers, who have had to borrow large amounts in order to purchase a property, to servicing stress if interest rates increase.

Section 68B direction

26. In February 2021, the Government issued a direction under section 68B of the Reserve Bank Act (the S68B)[7] requiring us to have regard to the following policy objective when exercising our financial stability powers:

    "…support more sustainable house prices, including by dampening investor demand for existing housing stock which would improve affordability for first home buyers".

    Having regard to house price sustainability generally aligns well with our objective to promote the maintenance of a sound and efficient financial system.

27. In response to the S68B, we launched two work streams – an analytical stream, focused on developing a suite of metrics for assessing house price sustainability, and a policy stream, focused on identifying and assessing policy options available to us to support sustainable

[7] https://www.rbnz.govt.nz/research-and-publications/information-releases/2021/ir-2021-01

house prices. We reported to the Minister of Finance on policy options in May 2021.[8] Our overall assessment was that DSRs would be the most effective additional tool available to us for supporting financial stability and the Government's housing policy objective in the medium term. Following consideration of this analysis, the Minister agreed to add DSRs to the macroprudential MoU in August 2021, on the condition that in the design and implementation of such tools, we would have regard to avoiding negative impacts, as much as possible, on first-home buyers, to the extent consistent with our purposes and functions under Part 5 of the Act.

Wider policy context

28. In addition to issuing the S68B Direction to the Reserve Bank, the Government has recently introduced (or is in the process of introducing) a range of other policy measures related to the housing market. These measures include:

    - Eliminating tax deductibility of mortgage interest for residential investment properties (other than new builds), and extending the 'bright line' test;
    - Additional funding for the infrastructure needed to support new housing developments;
    - Loosening planning restrictions to allow greater housing intensification; and
    - Introducing new lending regulations under the Credit Contracts and Consumer Finance Act (CCCFA), which will require lenders (among other things) to undertake more rigorous affordability assessments for new lending, rather than relying on information provided by borrowers.

29. The main objectives of these policy measures are to expand housing supply, dampen investor demand for existing property, and protect consumers from taking on debt that they may not be able to afford. As such, they differ from our main statutory objective, which is to support the maintenance of a sound and efficient financial system. Nevertheless, we acknowledge that there are likely to be interactions between Government housing policy measures and macroprudential policies imposed by the Reserve Bank. For example, the new CCCFA regulations are likely to lead to some tightening in credit availability, while increased housing supply will affect the sustainable level of house prices. We will take these interactions into account in our decision on whether to implement DSRs, as well as the design/calibration of DSRs and timing of implementation, should we decide to proceed.

Q1: Do you have any comments on the potential interaction between debt serviceability restrictions and other policy measures related to the housing market?

[8] https://www.rbnz.govt.nz/-/media/ReserveBank/Files/News/2021/Policy-options-to-support-sustainable-house-prices.pdf?revision=83f6f0f5-42ff-436c-86ea-865c986690d7&la=en

Problem Definition

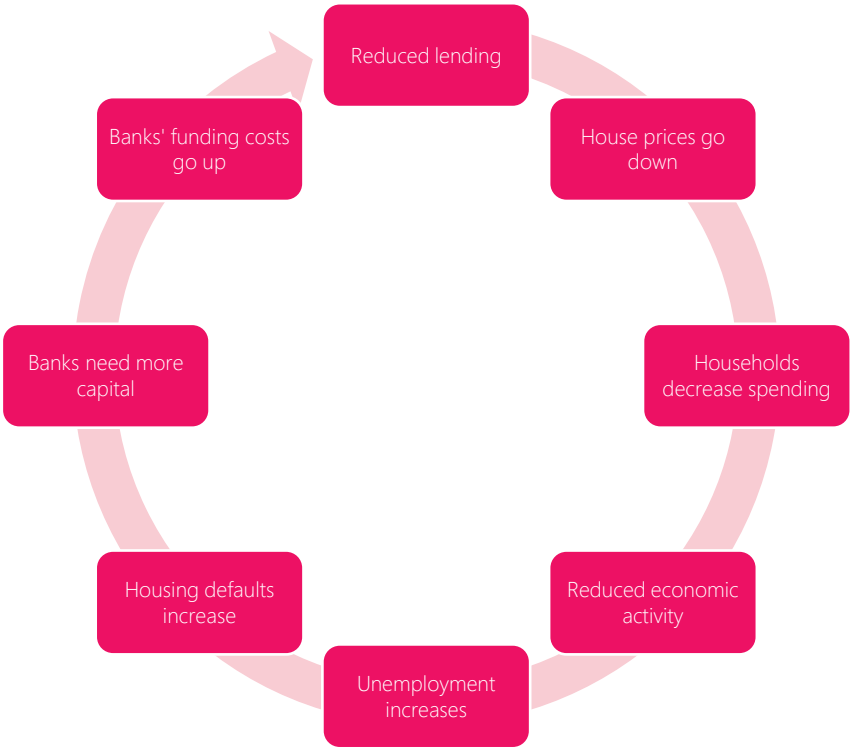
Conceptual framework

30. In general, we seek to apply regulatory discipline in areas where there are significant externalities or information asymmetries, which mean that banks' incentives may lead them to take decisions that result in outcomes that are not aligned with the interests of wider society.

31. Banks already have an incentive to maintain good underwriting standards and assess credit risks when granting individual loans, as they need to balance their expected returns on their lending against the prospect of losses on those loans in the event of a default. Similarly, borrowers have an incentive to limit their borrowing to levels that they can reasonably afford. However, at times not all of the risks may be fully internalised by individual banks and borrowers, for example during periods of housing market exuberance.

32. As set out in our macroprudential framework document, the financial system is inherently pro-cyclical. During a 'boom' phase, rising asset prices and reduced perceptions of risk encourage banks and borrowers to take on more leverage. This process can continue until a downturn occurs, whether due to a specific shock or a general economic slowdown that causes investors and borrowers to reconsider the serviceability of their debt and the returns on investment. As defaults rise, asset values fall and investors sell off assets, banks are incentivised to raise the cost of lending and/or tighten lending standards – reducing their lending to the economy. Demand for credit may also fall as borrowers become more risk averse and seek to pay down debt rather than taking on new loans. This results in a further contraction in lending and asset prices, leading to negative feedback effects. Figure 1 below shows the dynamics of the 'bust' phase of the cycle in the case of housing markets.

Figure 1: Feedback effects in housing market corrections



33. An increase in the volume of lending relative to borrowers' ability to service debt may contribute to the build-up of systemic risk, amplifying the effects of the housing market cycle on the wider economy. A bank may have limited reason to assess or internalise the marginal increase in system-wide risk it creates when deciding to grant a high-DTI loan in such an environment, ahead of more direct concerns such as maintenance of market share and profitability. Several years of low interest rates also may lead borrowers to conclude interest rates will remain low for the lifetime of the mortgage.

34. Macroprudential tools such as LVR restrictions and debt serviceability restrictions can help to address these externalities, thereby enhancing financial system stability. Specifically, LVR restrictions reduce the likelihood that borrowers will enter negative equity in case of a housing correction, which in turn reduces the potential size of bank losses in case of defaults. Debt serviceability restrictions lower debt levels and hence reduce the likelihood that borrowers will face serviceability stress and/or default in response to an economic shock. LVR restrictions may also have an impact on reducing debt levels, particularly for property investors, as they reduce the equity available for use as deposits on additional property. Finally, both LVR restrictions and debt serviceability restrictions can potentially help to moderate house price inflation during the 'boom' phase of the housing cycle, so that prices do not deviate as far from their fundamental value (i.e. become less sustainable). Although the international evidence is mixed regarding the impact of macroprudential tools on house prices, the majority of studies that do find an effect find that DSRs are more effective than LVR restrictions in moderating house price inflation. This is likely to be because DSRs link credit growth to income growth, which is more stable over time than housing equity. A summary of relevant literature can be found in Annex One.

35. There is limited empirical evidence available in the New Zealand context regarding the impact of higher debt levels on probability of default, given we have only been collecting statistics on loan DTIs at origination since 2016. However, international evidence supports the view that debt serviceability metrics such as DTI ratios are important indicators of default risk, and that debt serviceability restrictions can help to mitigate these risks.

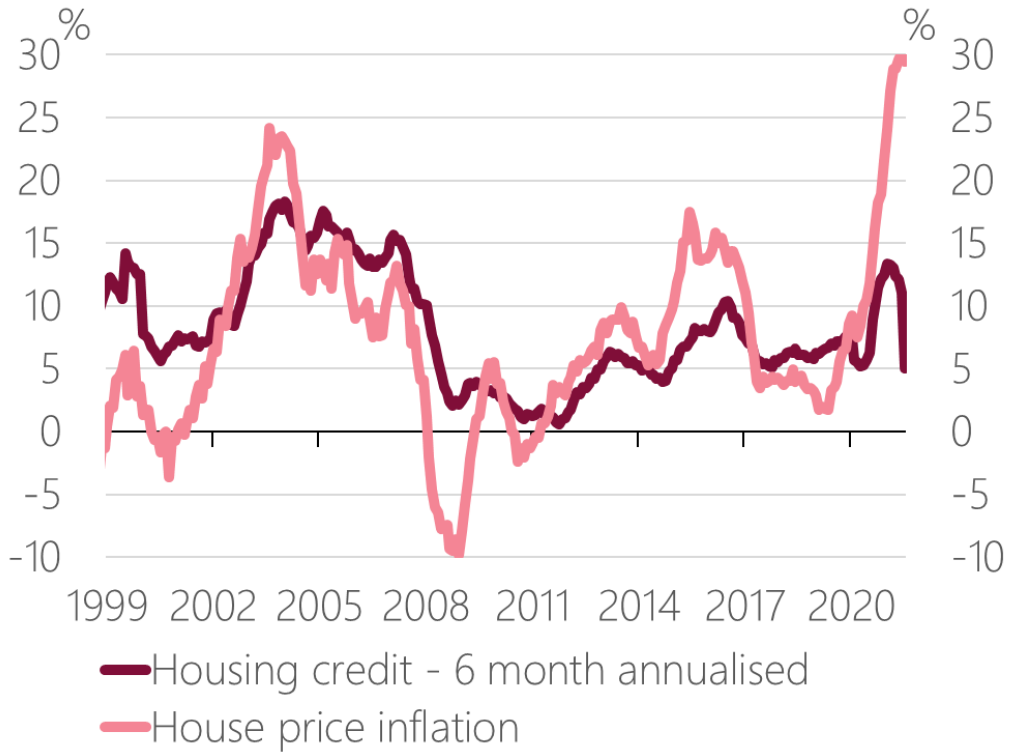
Sustainability of house prices

36. House prices continue to increase with the national year-on-year (y/y) house price inflation rate running at around 30 percent, as shown in Figure 2. This is above the peaks seen in the last two housing cycles. Housing credit is also growing strongly, although remains below growth rates in the period leading up to the 2007 Global Financial Crisis.

37. The recent lockdown in response to the COVID-19 Delta variant has led to a sharp fall in credit growth, but we anticipate that this effect will be temporary. House price inflation flattened in Auckland in September, with a month-on-month (m/m) increase of just 0.3 percent. However, prices rebounded in October, increasing by 4.4 percent m/m in Auckland and 2.5 percent m/m in the rest of New Zealand, according to REINZ data.[9]

38. House prices are also at unprecedented levels relative to incomes. Figure 3 shows that nationally, the median house price is more than 11 times the median disposable income. House prices relative to rents and income are also high compared to historic averages and comparator countries. These trends have accelerated over the past 6-12 months.

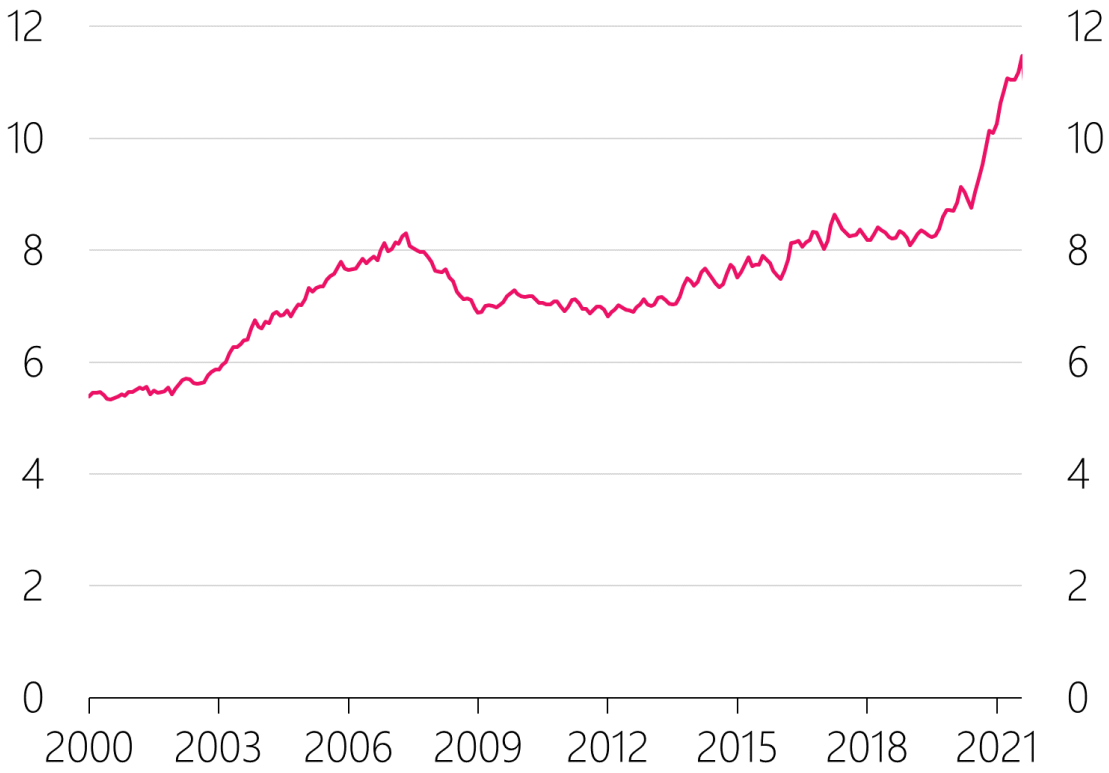
Figure 2: Annualised house price inflation and housing credit growth



Source: REINZ, Reserve Bank Balance Sheet Survey

[9] REINZ Monthly HPI Report - October 2021.pdf

Figure 3: Median house price to median disposable household income, New Zealand



Source: REINZ, Stats NZ, Reserve Bank estimates

39. To assess the likelihood of a housing market correction, it is important to consider not just the level and growth rate of house prices, but whether these prices are sustainable. Our working definition of a sustainable house price is the level that the price would be expected to move towards over several years, given the outlook for fundamental drivers. Taking a long-term view, prices are sustainable if the following conditions hold:

    - for investors, the expected risk-adjusted returns of investing in housing should be comparable to other long-term investments;
    - for renters and prospective owner-occupiers, the expected costs of owning should be comparable to the expected benefits of owning – i.e. any difference between the cost of owning and renting should be explainable by fundamental drivers; and
    - current demand for housing services should be consistent with the future supply and demand outlook, and the implications for future rents and house prices.

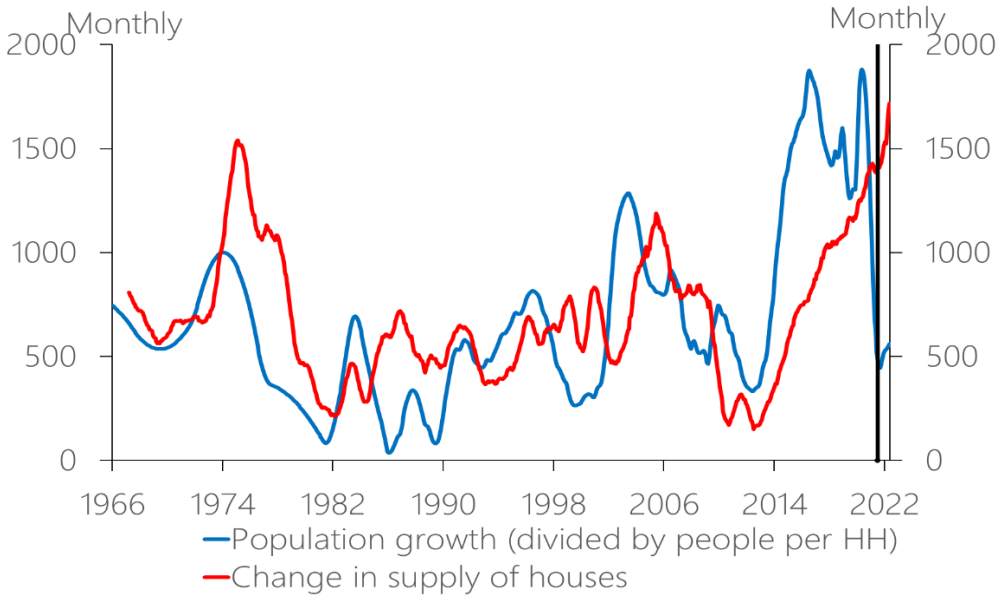
Population growth and housing supply

40. Population growth and the supply of new houses are fundamental drivers when thinking about the sustainability of house prices. These drivers influence current and future rents which are key determinants of the value that households and investors derive from house ownership.

41. Net migration caused strong population growth prior to the onset of COVID-19, with the population growing two percent per annum on average between 2015 and 2019, faster than the 0.9 percent average over the preceding five years. In addition, restrictive land

zoning, lack of public infrastructure for new developments and capacity constraints in the building sector have limited the supply of housing during recent years. These factors meant that the number of dwellings built since 2014 has not kept up with population growth (Figure 4).

Figure 4: Housing new supply relative to population growth



Source: Stats NZ, Reserve Bank estimates

42. Border restrictions were enacted early last year in response to COVID-19 and these have reduced net migration to near zero. Meanwhile, strong growth in house prices has come with a further step up in construction activity. Residential building consents were above 43,000 in the year to May, which is the highest level since the 1970s on a per capita basis. There is significant variation across regions with Auckland at particularly high levels on a per capita basis. As a result of these developments, the construction of new houses is starting to reduce the previous supply imbalances rather than just keeping up with population growth.

43. Government initiatives to support construction and ease land use constraints may further add to supply over time. The National Policy Statement on Urban Development outlines plans to increase intensification in urban areas from 2022. The degree that this increases the supply of houses depends on infrastructure and the capacity of the construction sector.

44. Overall, the growing supply of new housing combined with lower population growth is expected to bring supply and demand back into balance. In addition, recent increases in mortgage rates will reduce the amount of debt borrowers can take on in future, while changes to the tax treatment of mortgage interest have reduced the risk-adjusted returns to investors. These factors are expected to lead to an easing of house price inflation and possibly a fall in prices in coming years, although the timing of any adjustment is highly

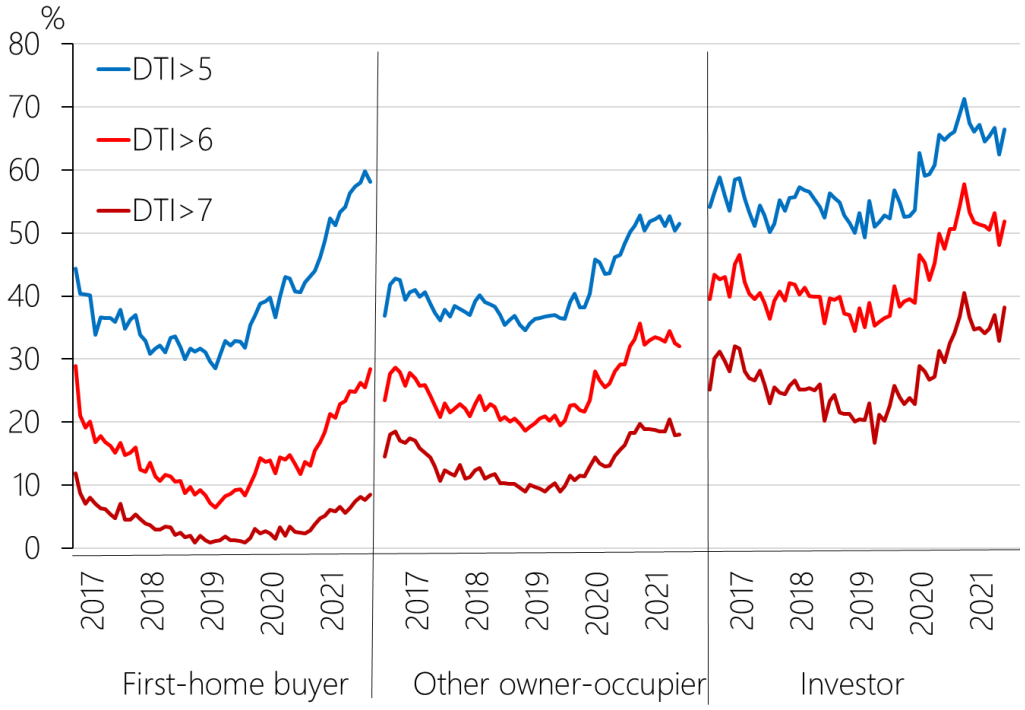
uncertain. Further information regarding our assessment of house price sustainability can be found in the August Monetary Policy Statement (MPS).[10]

Debt serviceability risks and borrower resilience

45. Alongside the recent growth in house prices, new borrowers have been taking on increasingly large debts relative to their incomes. Figure 5 shows that DTI ratios for all borrower groups have increased significantly since 2019. Investors consistently borrow at the highest DTI ratios, followed by other owner-occupiers (OOOs) and then first-home buyers (FHBs). 'Other owner-occupiers' refers to existing homeowners who are purchasing a new owner-occupied home, and either selling their existing home or converting it to a rental property.

46. The share of investor borrowing at high DTIs has fallen slightly in recent months, which is likely to reflect the impacts of tighter LVR restrictions along with changes to the tax treatment of investment property. However, it remains at very high levels by historic standards. Meanwhile, the share of high-DTI lending to OOOs appears to have flattened (at very high levels) while high-DTI lending to FHBs is continuing to rise.

Figure 5: DTI ratios by borrower type (as a percentage of lending by borrower type)



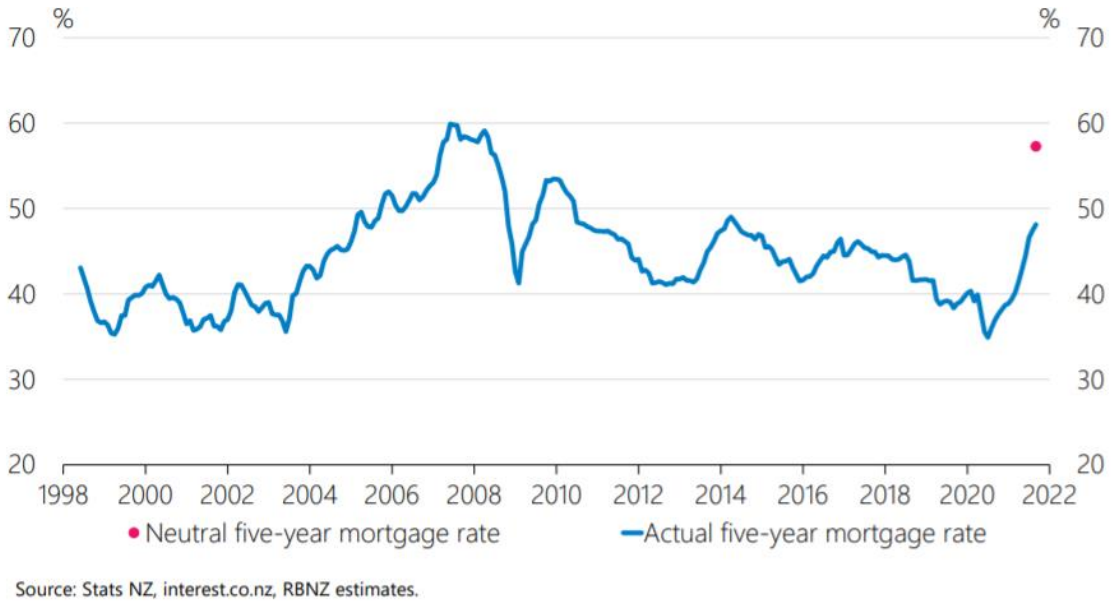
47. Holding other factors equal, borrowers with high incomes also tend to borrow at higher DTI ratios on average than borrowers with lower incomes– this is particularly evident for investors. This is because banks typically calculate debt serviceability on a surplus income

[10] https://www.rbnz.govt.nz/-/media/ReserveBank/Files/Publications/Monetary%20policy%20statements/2021/mpsaug21.pdf?revision=3627c6fa-6462-453a-af85-06e62f47705c

basis, and higher income households have proportionally more surplus income once core expenses are accounted for.

48. Households are borrowing more in part because of historically low mortgage interest rates, which have helped to keep debt servicing costs at manageable levels. Figure 6 shows that in mid-2020, estimated debt servicing costs for new buyers (based on five-year mortgage rates) were at their lowest levels since the early 2000s. However, rates have recently begun to rise, and the combination of rate increases and higher house prices means that debt servicing costs for new buyers are now well above the levels seen immediately prior to the onset of COVID-19. If mortgage rates were to continue rising to long-term neutral levels – which we currently estimate to be around 5 percent – debt servicing costs for new borrowers would be around 58 percent of disposable income. This is close to the peak seen in the lead up to the GFC in 2007-2008. Moreover, the majority of New Zealand mortgages are on short term fixed interest rates, putting a large share of borrowers at risk of sharp increases in mortgage costs when they next reset their fixed term.

Figure 6: Estimated debt servicing cost for new buyers as a share of disposable income[11]



Source: RBNZ estimates.

49. Heavily indebted borrowers are more likely to experience serviceability stress in response to a rise in debt servcing costs or a fall in income, meaning they would need to cut their regular consumption to continue to service their mortgage.[12] The realisation of substantial serviceability stress among borrowers would lead to lower household spending and business profits, reduced economic activity and risking the emergence of a feedback loop

[11] Note: debt servicing costs includes both interest and principal repayments, with the principal being paid off over 30 years. Assumes buyers purchase a house at the median selling price, with a 20 percent deposit.

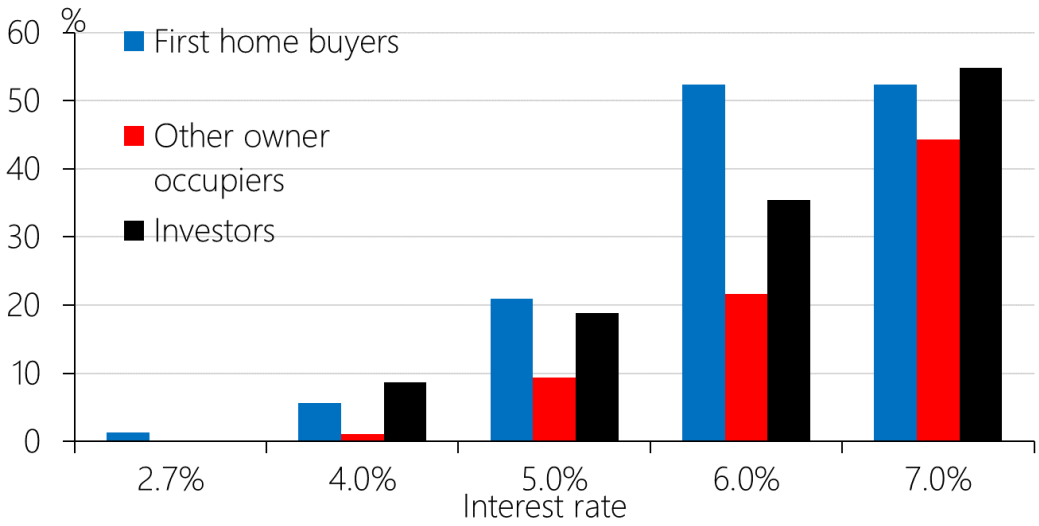
[12] This differs from concepts of borrower stress that are tested by the origination process that banks apply to mortgage applications, which are generally designed to test for borrowers' ability to continue to service a loan, rather than testing for externalities in the form of feedback effects on the economy from reduced consumption.

between the housing market and the wider economy. Figure 7 shows the proportion of recent lending that would experience serviceability stress under various scenarios for interest rates. It can be seen that at higher rates (five percent or six percent) a significant share of lending would potentially be stressed, particularly for first-home buyers, followed by investors.

50. At higher levels of stress, some borrowers may be forced to sell their property or default on their mortgage, further exacerbating negative feedback loops to the wider economy. Furthermore, if many borrowers face serviceability stress at the same time and cannot meet their mortgage repayments, then this is a risk to financial stability.

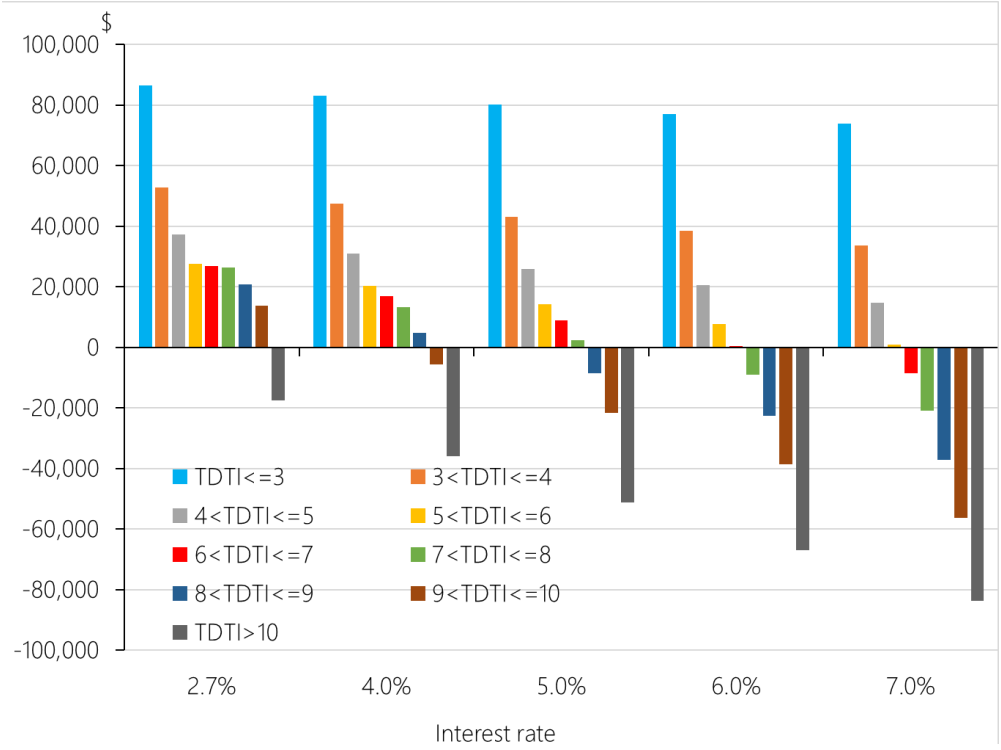
51. Furthermore, recent borrowers that have borrowed at high DTIs are likely to to face higher levels of serviceability stress as interest rates rise. Figure 8 shows that the net income (i.e. after tax, living expenses, and mortgage repayment) for the median borrower in each DTI bucket decreases as interest rise. Net income also becomes negative for borrowers in very high DTI buckets (DTI >7) at interest rates of 6 percent or above. This indicates that these borrowers may not be able to meet their mortgage payments, unless they are able to sharply reduce living expenses.

Figure 7: Estimated proportion of recent lending (year to September 2021) that would experience serviceability stress if facing various interest rates, by buyer type



Source: Reserve Bank estimates

Figure 8: Estimated net income of median borrower, by DTI bucket



Source: Reserve Bank estimates

52. On the other hand, lower mortgage rates have reduced the debt servicing burden for earlier borrowers who purchased property at lower prices and are also likely to have paid down some of their principal. These borrowers have smaller loans, making them less vulnerable to serviceability stress. They have also experienced strong equity gains over the past 12 months, and this increase in housing wealth is helping to support consumption.

53. However, as Figure 5 shows, high-DTI lending for all borrower groups has increased significantly over the previous 12 months. Further to this, Figure 8 shows, high-DTI borrowers are likely to face more serviceability stress than low-DTI borrrowers. Although high-DTI lending has flattened off over the last few months, it remains at very high levels. If there continues to be a significant amount of lending at high DTIs then the stock of loans at high DTIs will grow - posing increasing risks to financial stability over time.

Financial sector resilience

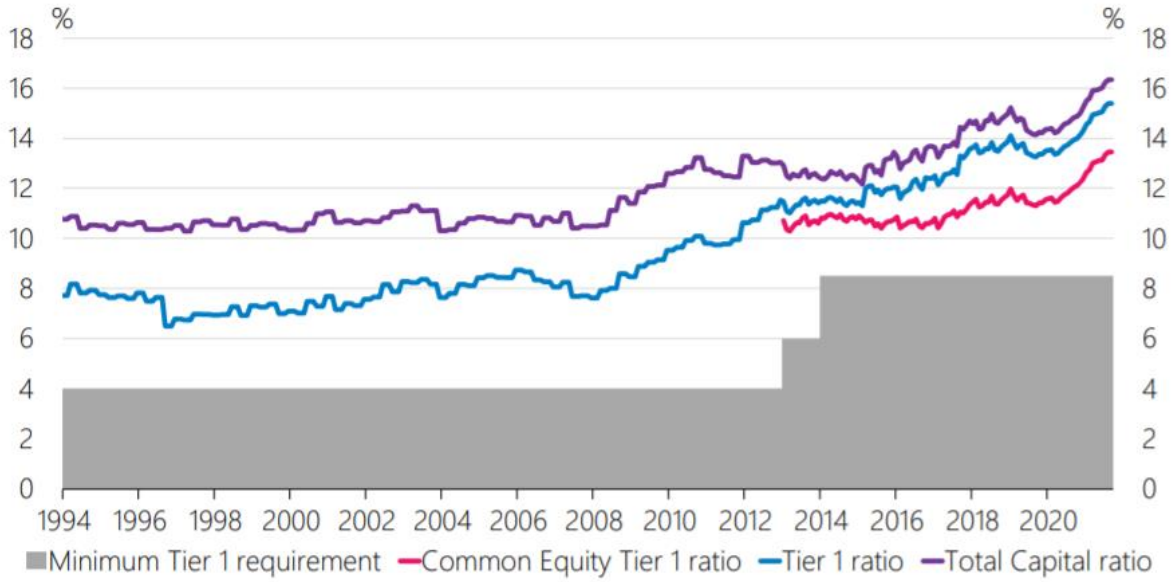
54. The financial system remains strong, and the resilience of financial institutions has generally strengthened over the past six months. Bank capital buffers have continued to increase, aided by stable underlying profits and dividend restrictions, as shown in Figure 9. Regulatory capital requirements for banks will progressively increase from 1 July 2022, and banks are well positioned to meet these at present. These increased capital requirements will build additional resilience into the financial system.

55. Our 2021 solvency stress test assessed the resilience of the five largest locally incorporated banks to a scenario involving a resurgence of COVID-19 globally, with governments having to respond with repeated lockdowns similar to those seen in early 2020, and

unemployment reaching 11.8 percent. In addition, the exercise assumed a prolonged drought strikes the North Island for two years, curtailing agricultural production. The improved starting position of banks saw them able to maintain capital ratios well above their minimum requirements, and continue lending to the economy. Full results from the 2021 bank stress test will be published in a forthcoming *Bulletin* article.

56. In addition, banks' asset quality remains high, with non-performing loans returning to the low levels seen before the onset of COVID-19 in 2020.[13] Further, almost all residential mortgage borrowers who accessed the mortgage deferral scheme to temporarily defer payments, or switched to interest-only terms, have returned to making principal repayments.

Figure 9: Capital ratios of locally incorporated banks



Source: Registered banks' *Disclosure Statements*, RBNZ *Capital adequacy survey*.

Summary

57. Overall, New Zealand's financial system has weathered the pandemic well, aided by a strong economic recovery. Banks are well-capitalised and stress tests suggest they would be resilient to a severe economic shock. However, house prices are above their sustainable levels on a number of metrics, and the market continues to show strong momentum, further heightening the risks of a price correction. Recent borrowers have taken on very large debts relative to their incomes, which puts them at risk of significant serviceability stress when current fixed rates expire.

58. Although recent actions by both us and the Government are likely to have reduced housing-market related financial stability risks to some extent, we consider there is still a case for macroprudential policies specifically targeted at debt serviceability risks. Policy options are discussed further in the next section.

[13] Further information on asset quality can be found on our Bank Dashboard: https://bankdashboard.rbnz.govt.nz/asset-quality.

Q2: Do you have any comments on the problem definition for debt serviceability restrictions?

Policy options

59. As discussed in the Background section, the main types of DSRs include:

    - DTI restrictions – caps on mortgage debt (or total debt of a borrower including mortgage debt) as a multiple of income;
    - Debt-servicing-to-income (DSTI) restrictions – caps on the percentage of a borrower's income that can be allocated to servicing debt payments; and
    - Interest rate floors – floors on the test interest rates used by banks in their serviceability assessments.

60. For the purposes of this consultation our analysis focuses on two main options:

    - a DTI restriction based on a measure of total debt; and
    - a test interest rate floor.

61. We also considered the option of a DSTI tool. Our initial view is that a DSTI would be more complex to implement and administer, and is likely to be less effective than a DTI cap in addressing systemic financial stability risks. Although a DSTI cap could have lower allocative efficiency costs than a DTI cap, we consider that the efficiency costs of a DTI cap can be mitigated through careful design and calibration, including the use of speed limits and targeted exemptions. Therefore, we are not formally consulting on a DSTI at this stage.

62. We note that the above options are not mutually exclusive. However, we do not currently envisage implementing more than one DSR at the same time. A more likely approach would be to put in place an interest rate floor in the short term, given that this option is more straightforward to implement, and move to DTI restrictions in the longer term.

Q3: Are there any other policy options we should consider to address the issues set out in the problem definition?

DTI limits – design and calibration

63. DTI limits are conceptually straightforward, as they are calculated based on a simple ratio of borrower debt versus income. However, there are a number of design issues that would need to be decided before a DTI limit could be implemented, such as:

    - The treatment of different types of income (e.g. wage/salary vs rental income), and whether income should be measured as gross or net;
    - Whether all types of debt should be included, or only a subset;
    - Whether exemptions or speed limits should apply, in a similar way to the current LVR restrictions; and
    - The level of the cap and the process for adjusting it.

64. Below, we set out our provisional views on these issues for consultation feedback.

Treatment of income

Gross income versus net income

65. Net income is a more accurate measure than gross income of the amount that is available for debt servicing. However, basing the ratio on gross income has the advantage of simplicity and independence from any future taxation changes – such as the recent changes to the tax treatment of rental property. The DTI data we currently collect is based on gross income, and hence our survey and bank systems would need to be updated if we were to move to net income. This would also make comparability with previous gross income data difficult (although we could continue to collect both gross and net income, even if compliance is based on net income). On balance we favour a gross income measure, but would welcome feedback on this point.

Treatment of different types of income

66. Wage and salary income is the most common type of income and is straightforward to include within a DTI calculation. For rental income, banks generally apply a 'haircut' to their income assumptions to reflect the greater uncertainty over rental income streams (for example, due to vacancy periods). At present, there is some variation between banks with the size of the haircut applied to rental income in their loan origination standards, but in the reporting of DTI data all banks apply a standardised haircut of 25 percent.

67. In addition to wage/salary and rental income there are other types of income that may be more complex to standardise and assess, such as variable salary income (e.g. bonuses and commissions), business and self-employment income, or investment income (e.g. dividends). Data from our DTI survey indicates that these 'non-standard' income sources currently account for around 0.3 percent of income for first-home buyers, four percent for other owner-occupiers, and five percent for investors.

68. It should be possible to develop a set of rules for standardising the treatment of these other income sources across the industry. However, our initial view is that this would be a resource-intensive exercise and may not be necessary, given that 'other' income sources account for a small proportion of total income. Instead, banks could be allowed some flexibility regarding the treatment of these other income sources; for example, via a speed limit – provided the amount of income declared for DTI reporting and compliance purposes is no greater than that used for internal serviceability assessment purposes.

Q4: How should different types of income be treated in DTI calculations?

Treatment of different types of debt

69. The macroprudential MoU specifies that debt serviceability restrictions, if introduced, would be only for loans to the residential property sector. This is also the case with the current LVR restrictions. As such, lending to businesses for purely commercial purposes would not be covered by DTI regulations.

70. However, a question remains as to whether other types of debt held by a residential mortgage borrower should be included within the DTI calculation. Our provisional view is that total household debt would be the most appropriate measure (rather than only mortgage debt) since other types of debt also represent a liability for the borrower.

71. We note that consumer debt (such as credit cards and personal loans) normally attracts higher interest rates than mortgage debt. Hence, if a total debt measure is used there could be a case for giving such debt a higher weighting than mortgage debt in the calculation. However, given that mortgage debt accounts for the vast majority of household debt in New Zealand, we believe that making adjustments for other types of debt could add unnecessary complexity to the DTI calculation. We therefore favour using a total unweighted measure of household debt. Banks would still be free to differentiate between mortgage and other debts when undertaking their internal serviceability calculations.

72. Another question is whether DTI caps should apply to all residential property in a borrower's portfolio, or only to owner-occupied property. We note that some countries, such as the UK and Ireland, apply DTI restrictions on owner-occupied lending but regulate investment property lending in a different way. Our current view is that a broad DTI cap makes sense in the New Zealand context, since investors with multiple properties often cross-collateralise their properties (including cross-collateralising between owner-occupied and investment property), and use both rental and personal income to service mortgage debts.

73. Two possible exceptions to the approach of weighting all household debt equally could be student loans and small business loans with residential property as security. Student loans are not currently subject to interest for borrowers based in New Zealand, and hence there is no additional serviceability risk as interest rates rise. In addition, if borrowers lose income temporarily (e.g. become unemployed) they do not need to continue payments on the loan during this period. Therefore, the risk of student loans contributing to a negative feedback loop in a downturn are much less than for other types of lending.

74. Our current treatment of student loans within the DTI survey allows banks to either:

    - Exclude student loans from total debt, but deduct student loan payments from income (given that the repayment depends on income rather than debt); or
    - Report the student loan as part of total debt.

75. We favour the first approach (deducting loan payments from income), which is already used by the majority of banks in their DTI reporting.

76. The treatment of loans taken out for business purposes with residential property as security could also add complexity for DTI calculations, given that the additional lending may not be covered by increased income in the short term, but could yield income in the longer term if the business is successful. However, we note that such lending is a very small proportion of total mortgage lending (around one percent according to data from the LVR

survey). As such, it could make sense to exclude this debt from the DTI calculations and rely on banks to make their own serviceability assessments with respect to small business lending. We are still working through this and would welcome feedback.

Q5: How should different types of household debt be treated in DTI calculations?

Exemptions and speed limits

77. Under the current LVR framework there are several categories of lending that are exempt from the regulations, including:

- Kāinga Ora First Home Loans;
- Refinancing with another bank on the same terms;
- Loan portability;
- Bridging finance;
- Construction loans;
- Remediation loans;
- Combined collateral; and
- Loans granted in error.

Exemptions are intended to mitigate some of the efficiency costs of LVR restrictions without unduly undermining their effectiveness. Additionally, exemptions on new construction loans reduce the extent to which restrictions constrain the supply of new housing. More information on the LVR exemption regime can be found in section BS19 of the Banking Handbook.[14]

78. The LVR regulations also apply 'speed limits' whereby a certain percentage of lending can be undertaken above the LVR threshold. For example, under the current LVR settings banks are permitted to make up to 10 percent of new lending to owner-occupiers at LVRs above 80 percent, and five percent of lending to investors at LVRs above 60 percent. This approach enables flexibility for sbanks to continue providing credit to some creditworthy high-LVR borrowers and to take account of borrowers' individual circumstances.

79. Our current view is that if DTI restrictions are introduced, the exemption framework should mirror the LVR regulations wherever possible – both for ease of administration, and because the rationale for the different LVR exemption categories in most cases applies equally to high LVR loans. (The combined collateral exemption is an exception, since collateral would not be a relevant metric under a DTI cap.) Furthermore, we consider that applying a speed limit would also be appropriate for DTI restrictions, to mitigate efficiency costs.

Q6: Should a DTI restriction incorporate exemptions, and if so should the exemption framework mirror the current LVR regulations?

[14] BS19 - Framework for Restrictions on High-LVR Residential Mortgage Lending

Q7: Should speed limits apply under a DTI restriction? If yes, should there be separate speed limits for different borrower groups?

Calibration of the cap

80. In the past, we have referred to a DTI above five as 'high-DTI' lending. However, with the continued decline in interest rates, almost 60 percent of new lending is now taking place at a DTI above five, while around a third is at DTIs above six.

81. We do not consider it appropriate to calibrate DTI restrictions in a way that would capture a very large share of lending at current levels. This could create a shock for the housing market and the potential for unintended adverse outcomes (e.g. disintermediation). As such, our initial view is that a DTI cap, if implemented, should be set at no lower than six and possibly higher. We have modelled the impacts of a DTI cap of either six or seven in our initial assessment.

82. We may also want to set different calibrations for different borrower types, e.g. owner-occupiers versus investors. As such, banks should operationalise their systems to be able to introduce either the same or different DTI calibrations for owner-occupiers and investors. However, as discussed in the Impact Assessment section, a flat DTI cap at any given level will generally impact more on investors than on other borrowers in any case.

83. It should be noted that this consultation focuses on the framework for operationalising DSRs, rather than the calibration of specific policies. Hence, the choice of DTI levels of six and seven for modelling purposes is illustrative only, and does not mean a DTI cap would necessarily be calibrated at either of these levels. Further consultation on the calibration is likely to be needed, should we proceed with implementing DTI restrictions.

Q8: Do you have any views on the potential calibration of a DTI limit?

Q9: Are there any other issues that should be considered if DTI limits were to be implemented?

Floors on test interest rates

84. In carrying out their debt serviceability assessments, banks stress test the ability of borrowers to continue repaying their loans if interest rates rise to a certain level (the 'test rate'). The lender is, in effect, reassuring themselves that the borrower could maintain their repayments if interest rates rise. Raising test interest rates therefore has the impact of decreasing the borrowing capacity of house purchasers (and vice-versa). However, even if borrowers can maintain their repayments they may still be under financial stress, cutting back on other expenses.

85. Floors on the test interest rates that banks can use in their serviceability assessments is a type of DSR tool, which is in use in some foreign jurisdictions. The floor can be specified in absolute terms, or as a margin or buffer above commercial lending rates. An overview of how test interest rate floors have been implemented in some overseas jurisdictions is outlined below.

Table 2: Summary of test interest rate floors in foreign jurisdictions

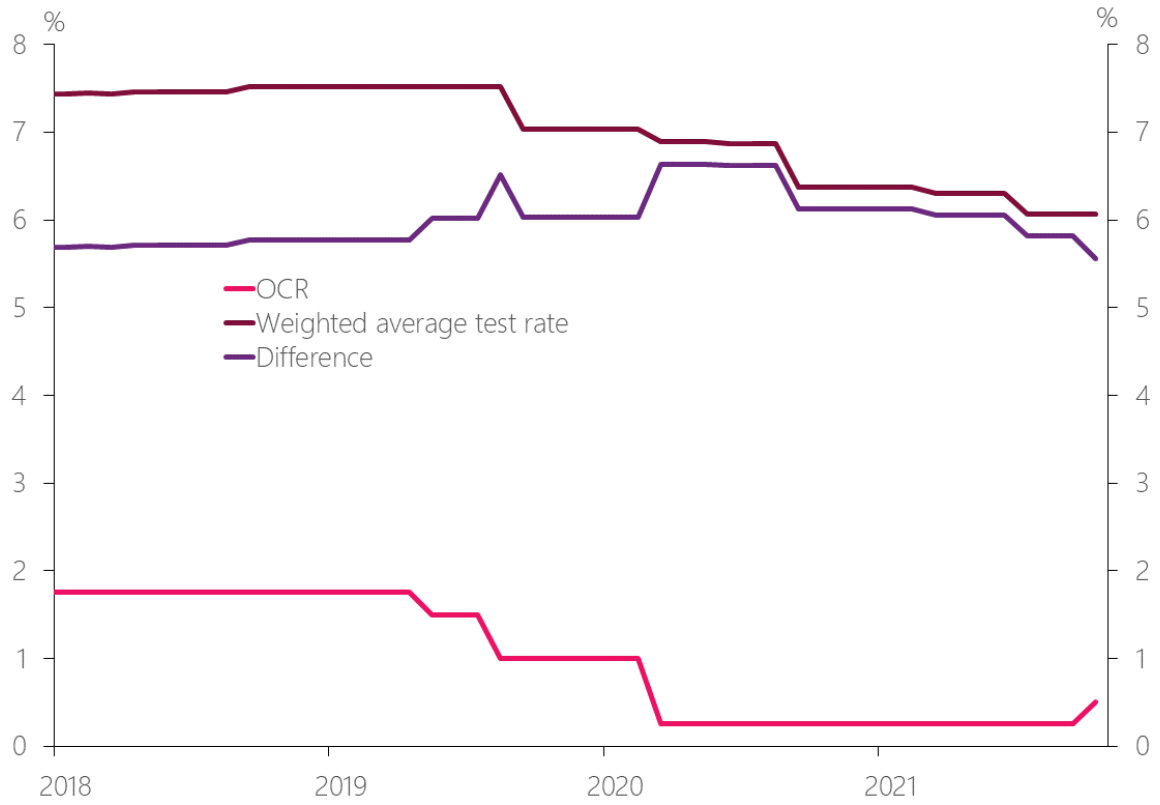
Jurisdiction	Test Interest Rate Floor
Australia	
Since October 2021	3% above the loan's rate at origination
July 2019-Oct 2021	2.5% above the loan's rate at origination
Pre-July 2019	The greater of: (i) 2% above the loan's rate at origination; or (ii) 7%
United Kingdom	3% above the reversion rate specified in the mortgage contract at origination
Canada	The greater of: (i) the mortgage contract rate plus 2%; or (ii) 5.25%
Norway	5% above the prevailing interest rate level

86. We have not previously prescribed a minimum test interest rate that lenders must use when assessing a borrower's debt serviceability. However, when we consulted on debt serviceability restrictions in 2017, the majority of the industry expressed a preference for a floor on test interest rates, on the basis that it would be easier to implement within their current systems for assessing debt servicing.[15]

87. In New Zealand, banks currently set their own test interest rates to assess a borrower's capacity to continue to service the debt if mortgage rates were to rise from their prevailing rates. Figure 5 shows that banks' test interest rates have fallen in the past few years, reflecting the low interest rate environment. However, they have fallen more slowly than the Official Cash Rate (OCR), and hence the margin between test rates and OCR has remained relatively stable. At present the weighted-average test rate across the industry is just over 6 percent, which represents a margin of 5.5 percent above the OCR of 0.5 percent.

[15] Consultation Paper: Serviceability Restrictions as a Potential Macroprudential Tool in New Zealand (2017).

Figure 10: Weighted average test rates versus OCR



Source: RBNZ Credit Conditions Survey

88. There are several options that could be used to specify a floor if we implemented a test interest rate floor, such as:
    a. A uniform fixed test interest rate floor.
    b. The rate specified in the mortgage contract at origination, plus a fixed buffer.
    c. A benchmark rate (e.g. OCR, swap, average floating rate), plus a fixed buffer.
    d. The Reserve Bank's forecast neutral interest rate[16], plus a fixed buffer.
    e. A combination of the above.

89. We believe that a test interest rate floor should:

- Be reasonably stable over time and reflect long-term trends – for example, if there is a genuine long-term reduction in interest rates.
- Move automatically (although not too frequently that it becomes volatile), rather than needing to be regularly reviewed and adjusted.
- Be the same for all mortgage applicants (at any given time), to enhance simplicity and transparency. We note that different test interest rate floors could be implemented for different borrower types, but this would add a lot more complexity and may not be much quicker to implement than a DTI.

90. Option (a) would be simple to implement and stable over time. Additionally, borrowers would all be subject to the same minimum floor. However, a fixed test interest rate floor

[16] The rate that, on average over time, would be consistent with no over- or under-utilisation of resources and stable inflation.

would not take into account the widespread use of differential pricing for different types of loans (i.e. riskier loans will have higher interest rates). We would also have to periodically review the absolute value of the floor as it would not automatically change through time to reflect long term trends.

91. Option (b) would reflect the use of differential pricing of loans, and the starting point for applying a buffer for possible future interest rate rises would better reflect a borrower's actual repayments. While the floor could be volatile over the short-term, the rates specified in mortgage contracts at origination should generally adjust to reflect long-term trends. The floor would also move automatically (although we may need to review the specified buffer from time to time). However, borrowers would all be subject to different test interest rate floors. This could mean, hypothetically, that a borrower entering a contract with a one-year fixed rate is subject to a higher test rate floor than an equivalent borrower entering with a lower six-month fixed rate, even though future rate movements are more uncertain as the time horizon increases.

92. Option (c) would be dependent on what benchmark rate was chosen. For example, mortgage rates are closely linked to changes in the Official Cash Rate. However, a longer term rate, such as a five or ten year swap rate, might better reflect long-term trends in interest rates. To ensure that the benchmark is more stable over time, it could be reset periodically (e.g. quarterly). Additionally, borrowers would all be subject to the same test interest rate floor, which would automatically move through time.

93. Option (d) would reflect our current long term expectations for interest rates. The neutral interest rate is forecast by the Bank and published every six weeks as part of Monetary Policy decisions. This would enable the test interest rate floor to automatically move every six weeks to account for changing expectations. However, the neutral OCR is a projection, unobservable in practice, and subject to modelling assumptions.

94. Our initial view is that option (c) – a benchmark rate, plus a fixed buffer may be the most appropriate methodology for specifying a test interest rate floor – as it fits our preference that a test interest rate floor should be stable over time, move automatically and be the same for all mortgage applicants. If we were to adopt this approach, we would need to specify a preferred benchmark (e.g. OCR, swap or other) alongside the proposed buffer.

Q10: Which methodology for setting test rate floors do you prefer? Please explain your reasoning.

Q11: For banks, please provide information on how your test rates are currently set (on a confidential basis if necessary).

Q12: Are there any other issues that should be considered if test interest rate floors were to be implemented?

Initial assessment of impacts

95. This section presents an initial assessment of the expected impacts of implementing a DTI cap of six or seven, and of a test interest rate floor at seven percent or eight percent,

relative to a counterfactual in which no restrictions are imposed. The calibrations we have modelled are illustrative, and do not mean that the tools would be calibrated at these levels if introduced.

96. Table 5 provides a summary of assessment of the benefits of these two options, while Table 6 provides an overview of the costs. We then discuss the key impacts in more detail. It should be noted that the number of ticks/crosses relate to the relative impacts of the different options, rather than absolute impacts.

97. As discussed above, at this stage it is unikely that we would implement both options simultaneously. Instead, we are considering a staggered approach where test rate floors are implementedinitially, if needed to address short-term risks. These would then be replaced by DTI restrictions once the design and calibration of these tools is finalised.

Table 5: Summary of the benefits of the proposed options

Possible benefit	DTI Cap (6 or 7)	Test rate floor (7 or 8 percent)	Comments
Reducing default risk for banks and borrowers	✓✓	✓	Introducing DSRs will limit the amount of high DTI lending on banks' balance sheets. The restrictions will also over time lower the number of highly indebted households relative to the status quo. Therefore, the financial system will have greater resilience to economic or housing downturns. Test rate floors are likely to allow for more lending at high DTIs, as high income borrowers borrow at high DTIs, but also have proportionally more surplus income than other borrowers.
Reducing the amplitude of the financial cycle.	✓✓	✓	Higher risk, high DTI lending will be reduced for all borrower groups. Therefore, the restrictions are likely to moderate credit cycles, reducing the probability and potential size of a housing market correction. This reduces the likelihood of negative feedback effects to the financial system and wider economy. DTI restrictions that remain stable over time are likely to be more effective in moderating cyclical effects.
Medium-term economic performance	✓✓	✓	Either option will help to support medium-term economic performance by reducing the risk of financial crises and spillovers between the housing market and the wider economy in case of a severe downturn.

Possible benefit	DTI Cap (6 or 7)	Test rate floor (7 or 8 percent)	Comments
Support house price sustainability	✓✓	✓	The introduction of DSRs is likely to moderate house price growth relative to the status quo, as borrowers will be more constrained as a result of DSRs. DTIs are likely to have more impact on moderating house price inflation than test rate floors, as they constrain credit growth more than test rate floors.

Table 6: Summary of the costs of the proposed options

Possible cost	DTI Cap (6 or 7)	Test rate floor (7 or 8 percent)	Comments
Allocative efficiency costs	XX	X	Efficiency costs of DSRs include reduced credit access for credit-worthy borrowers with low deposits and high incomes. Efficiency costs will be higher the tighter that the DSRs are. Test rate floors are likely to have lower efficiency costs than DTI limit, as they also account for expenses of each borrower (which also impacts borrowing capacity).
Risk of disintermediation	XX	X	The use of macroprudential instruments including DSRs can create incentives for financial institutions to avoid the policy by operating outside of the regulatory perimeter. This is a risk especially when introducing new tools. We note that this risk is higher for DTIs than test rate floors, as DTIs are likely to have a greater impact on credit availability.
Impact on first-home buyers	-/X	XX	DTIs are likely to only have minimal impacts on FHBs, as they tend to borrow at lower DTIs than other borrowers. Test rate floors are likely to have a significant impact on FHBs, as they have relatively low surplus income.
Short-term economic performance	X	X	Either option may create a short term drag on the economy by reducing credit growth, and housing wealth effects if house prices fall.

Impacts on borrower leverage and credit cycle

98. In the 2017 consultation we presented evidence that a DTI limit would reduce credit growth during an upswing and reduce the risk of a significant rise in mortgage defaults during a

subsequent severe economic downturn. In our view the analysis presented in the 2017 consultation remains largely valid, and housing market developments since that time have reinforced our views on the potential benefits of a debt serviceability instrument in supporting financial stability.

99. From a financial stability perspective, a key benefit of DTI restrictions is that they link credit availability to income growth and hence can be effective 'through the cycle'. By contrast, since LVRs of existing property automatically fall as house prices rise, LVR restrictions become less binding over time in a rising housing market.

100. This is supported by international research. For example, Ingholt (2018) find that countercyclical debt serviceability restrictions are very effective at curbing increases in mortgage debt, and therefore at constraining excessive growth in the upswing of the credit cycle. Moreover, Millard et al. (2021) find that setting debt serviceability restrictions in booms can significantly increase financial stability by decreasing the volatility of lending, consumption and inflation, since the debt serviceability tool disconnects the housing market from the real economy. They also find that LVR restrictions alone are insufficient to constrain household indebtedness in booms.

101. In 2017, we undertook modelling analysis of the potential impacts of DTI restrictions on borrower leverage over time. The analysis involves comparing an investor's property portfolio size and growth under different scenarios. For comparison, the modelling also assesses the impact of LVR restrictions. Annex Two provides more detail on the modelling assumptions.

102. We have updated this analysis with more recent data and adjust the model to analyse the impacts of interest rate floors.[17] Here we consider two illustrative policy options:[18]
    - The introduction of a DTI limit of six or seven.
    - The introduction of a test interest rate floor at seven percent or eight percent.

103. Figure 10 and Figure 11 display the model dynamics in terms of the number of rental properties able to be owned under a scenario of high and low house price growth. This assumes that the investor has an initial portfolio of four rental properties (which we classify as a medium sized portfolio).

104. Implementing a DTI of six has a significant effect, where the investor is not able to add to their portfolio for three to four years, after which they are only able to grow their portfolio at a very modest rate. The effects are similar for a DTI of seven; however it is not as constraining in the short-term.

105. The test interest floors show substantially different dynamics to the DTI. Under a test interest rate floor, the investor can still grow their portfolio relatively quickly for each house

[17] The analysis involves comparing an investor's property portfolio size and growth under different scenarios involving macroprudential policy. See the Appendix for details on the assumptions.

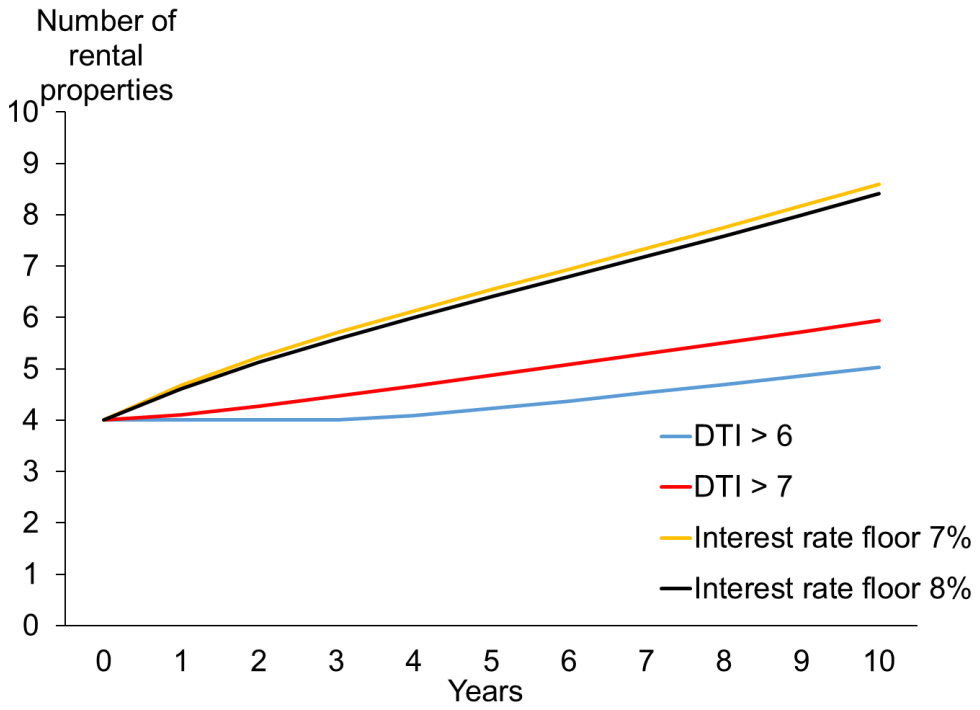
[18] We assume that the investor has initial equity of at least 40%, so is not constrained by current LVR restrictions.

price scenario. This is because as their portfolio grows, so does their surplus income (through rental income), which reduces the effectiveness of the test interest rate floor. Over the medium to long-term, a DTI has much greater impact than test interest rate floors.

106. We also consider different portfolio sizes – the results for these are shown in Annex Three and are similar to what we report here (see Figures A.21 to A.24). The DTI only allows for a very modest growth in portfolio size under each scenario. Furthermore, the DTI completely constrains the investor with a large portfolio for longer than the investor with a medium or small portfolio. The test interest rate floor still allows for substantial growth in portfolio size – especially for the investor with a small portfolio.

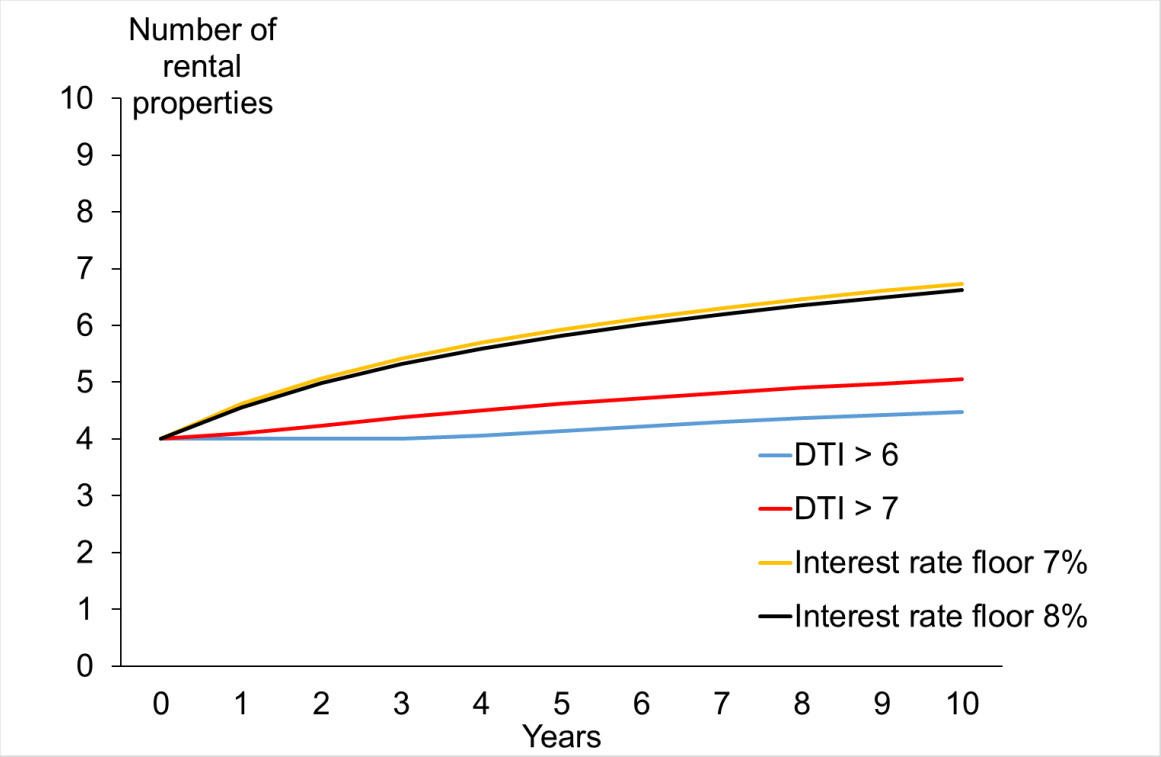
107. Further to this analysis, we note that the 2017 consultation and international academic and policy literature also supports the benefits of a DTI (refer to Annex One).

Figure 11: Number of rental properties under debt serviceability restrictions – medium portfolio, low house price growth



Source: Reserve Bank estimates

Figure 12: Number of rental properties under debt serviceability restrictions – medium portfolio, high house price growth



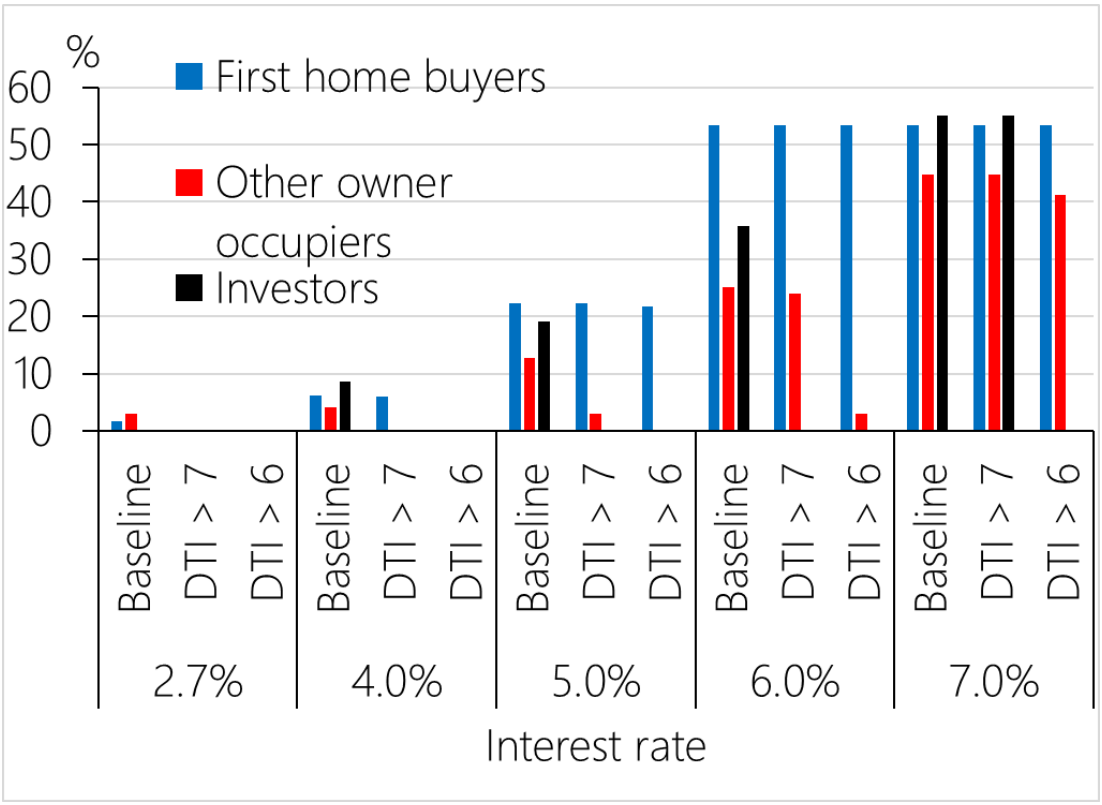
Source: Reserve Bank estimates

108. As a result of debt serviceability restrictions, borrowers would be able to take on less debt than they would be able to if no restrictions were in place (see the change in debt analysis in the Annex). This means that fewer borrowers would experience serviceability stress if interest rates were to rise.

109. By targeting the more highly leveraged investors, DTIs are likely to be welfare improving for the broader economy. Punzi and Rabitsch (2018) find that macroprudential policy improves welfare if the macroprudential tool counter-cyclically responds to the credit growth of the most highly leveraged borrowers. The DTI tool directly addresses this by limiting the amount of leverage a borrower can have against their income.

110. Figure 12 provides an example of this, showing that fewer investors and other owner-occupiers would experience serviceability stress if interest rates or DTI restrictions were in place compared to the baseline of no debt serviceability restrictions. However, the chart also shows that DTI restrictions would have very little impact in reducing serviceability stress for first-home buyers – this is largely due to the fact that fewer first-home buyers borrow at high DTIs.

Figure 13: Estimated proportion of recent lending (year to September 2021) that would experience serviceability stress if facing various interest rates and DTI restrictions, by buyer type



Source: Reserve Bank estimates

Impacts on efficiency

Allocative efficiency

111. As set out in the 2017 consultation, a total DTI limit would create welfare costs by inhibiting home purchases by otherwise creditworthy borrowers. These costs could be sizeable for affected borrowers, as a DTI limit does not take into account individual borrowers' expenses and hence does not directly measure borrower cash flow. Therefore, is not necessarily a reliable indicator of serviceability risk for individual borrowers.[19] Welfare costs could potentially be mitigated by considering the:

- Level at which the DTI cap is set;
- Use of speed limits; and
- Use of exemptions – for example, lending to borrowers eligible for Kāinga Ora assistance could be exempted, as could lending on new builds.

112. The addition of new macroprudential tools may not have as large of an impact on efficiency as when LVRs were initially imposed. Hejlova et al. (2021) show that multiple macroprudential tools can lead to increased efficiency of the individual measures, while not necessarily additionally restricting the total volume of new loans. This is compared to a

[19] As noted above, banks measure serviceability on a net income surplus basis, i.e. income less expenses less the cost of servicing the proposed debt. Consideration of both income and expenses is required under the Responsible Lending Code.

situation where only one measure would be in place. They show that if LVR and loan-to-income restrictions are carefully calibrated they can eliminate new loans with riskier LVR and loan-to-income ratios, while not resulting in higher restriction on the total volume of new loans compared to the single LVR restriction.

113. Restrictions focused on debt servicing ratios, such as a debt-servicing-to-income (DSTI) limit or an interest rate floor, may have lower allocative efficiency costs than total DTI limits, as they take account of other factors affecting ability to service debt such as current interest rates.

Administrative costs

114. There would be implementation and ongoing compliance and enforcement costs if DTI restrictions were introduced. The compliance and enforcement costs are likely to be similar in scale to the current LVR restrictions, but the implementation costs should be somewhat lower, given that banks already collect DTI data (based on a survey template designed by us), and we can apply lessons learned in the LVR policy to implementing DTIs. However, due to the system changes that a DTI would require, it could take up to nine months for banks to implement a DTI. Nevertheless, it was noted that a test interest rate floor could be implemented earlier than a DTI, as the changes required to banks' systems would not be as intensive.

Impacts on house price sustainability

115. Estimating the impact of DSRs on house prices is difficult, particularly given that they have not yet been used in New Zealand. In our 2017 consultation, we estimated that, after allowing for the likelihood that some constrained borrowers would be replaced by low-DTI buyers, house sales could fall by around nine percent following the introduction of DTI restrictions at a cap of five, which in turn could reduce house prices and credit growth by two to five percent, relative to a status quo scenario without restrictions in place.

116. Since the 2017 consultation house prices have continued to rise faster than incomes and DTI ratios have become even more stretched. We estimate that a DTI cap of six now would be roughly equivalent (in terms of the amount of lending constrained) as a DTI cap of five in 2017.

117. The international literature is mixed regarding the impacts of DTI limits on house prices, with some studies finding significant impacts and others finding little to no impact. The impacts are likely to depend heavily on the extent to which the calibration is binding on the flow of new customers, (see Arregui et al., 2013) and whether borrowers are able to avoid the restrictions, for example by moving to non-bank lenders.

118. On balance we expect that DTI restrictions will have at least some impact on moderating house price inflation relative to the status quo. In our modelling of the distributional impacts of DTI restrictions across borrower groups (discussed further below), we have assumed in our central scenario that house prices fall by five percent following the

introduction of DTIs, relative to the status quo. We also consider scenarios in which prices remain flat and fall by ten percent.

119. The impact of DTI restrictions is likely to be sustained over time to a greater degree than LVR restrictions, because during housing booms rising prices increase the amount that can be borrowed, partially or wholly offsetting any tightening of the LVR restriction. Because of this the international literature consistently finds that debt serviceability restrictions like DTIs are better at curbing excessive credit growth than LVR restrictions.

120. Test interest rate floors could achieve some of the outcomes expected from a DTI, but would not be as effective in dampening credit cycles. Therefore, rate floors may also have less impact on house price sustainability, although this would depend on where the floor is set and whether it is adjusted across the cycle. Because an interest rate floor applies evenly across all borrower types, it is also unlikely to be effective in dampening investor demand relative to first-home buyers, as is discussed in the next section.

121. In summary, by dampening the pace of house price inflation during the upswing of a housing credit cycle, DSRs can reduce the risk and magnitude of a future correction in prices. Therefore, DSRs are likely to have positive overall impacts on house price sustainability. However, DSRs do not affect the fundamental supply and demand balance in the housing market and hence any impacts are likely to be marginal relative to these underlying factors.

Impact on investors and first-home buyers

122. We have updated the data and assumptions in our analysis of distributional impacts from the 2017 consultation paper. This allows us to model the potential impact of a DTI policy (at a cap of either six or seven) and a test rate floor (set at seven or eight percent) on the distribution of new lending across borrower groups (first-home buyers, investors, and other owner-occupiers). The model accounts for the current LVR restrictions, as well as assuming that interest is not tax deductible, in line with the policy change enacted in March 2021. In our central scenario, we assume that house prices are five percent lower after the introduction of DSRs than they would be under the status quo of no intervention. Annex Two provides more detail on the modelling assumptions, as well as additional results for scenarios of no change to house prices, and a 10 percent fall in house prices.

123. The results show, for each borrower group, whether or not buyers can purchase an equivalent property following the introduction of the relevant DSR. 'Can purchase equivalent property' means that the buyer would have been restricted by debt serviceability restrictions initially, but after a change in house prices (i.e. a fall of five percent) they would not be restricted in purchasing an equivalent property. 'Cannot purchase equivalent property' means that the buyer would have been restricted by debt serviceability restrictions initially, and after a change in house prices (i.e. a fall) they would still not be able to purchase an equivalent property. This does not necessarily mean that

they would not purchase a property at all, as buyers have the option of purchasing a cheaper property. However we have not attempted to model this outcome.

124. The results also show borrowers who would have been restricted from purchasing an equivalent property, but avoid the impact of the restrictions through an exemption or by being allocated into a speed limit. Further detail regarding our assumptions on speed limits and exemptions is set out in Annex Two.

Results for DTI Restrictions

125. As Figure 13 shows, at a DTI cap of seven, around one percent of first-home buyers or other owner-occupiers are prevented from purchasing a similar property following the introduction of the restriction – they would either purchase the property at a lower price (and hence be financially better off) or be allocated into the speed limit. Investors are the most impacted in terms of restricting purchases of equivalent properties.

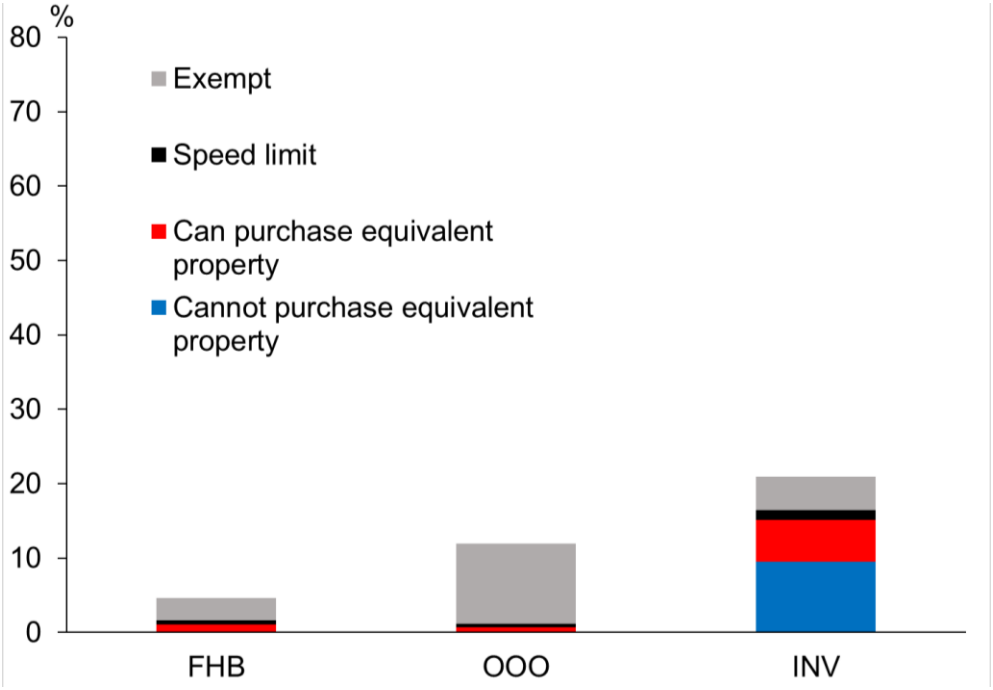
126. Additionally, Figure 14 shows that at a DTI cap of six, around five percent of First-home buyers or other owner-occupiers are prevented from purchasing similar properties. By contrast, there is a material impact on restricting investor purchases.[20]

127. We also run the model with different house price scenarios – the additional charts are shown in Annex Three. Under a scenario where house prices fall 10 percent, more buyers can purchase an equivalent property (given that they would have been initially constrained by the DTI cap) than if house prices fell five percent (see Figures A.1 and A.5 in Annex Three). When house prices are unchanged, the model shows that more buyers cannot purchase an equivalent property, since they were already constrained by the DTI cap. Again, investors are the group most affected.

128. In general, our modelling indicates that a DTI restriction and would have the largest impact on investors, followed by other owner-occupiers, with first-home buyers being the least constrained by the cap. This is because investors borrow at higher DTIs than other groups on average, so would face a larger decrease in what they could borrow (see the change in debt analysis in Annex Three, Figures A.4 and A.8). In addition, the use of speed limits and exemptions would further mitigate any impacts on first-home buyers. This suggests that DTI restrictions align well with the Government's housing policy objectives (as set out in the S68B Direction and the updated Macroprudential MoU) of dampening investor demand for existing housing stock whilst minimising negative impacts on first-home buyers.

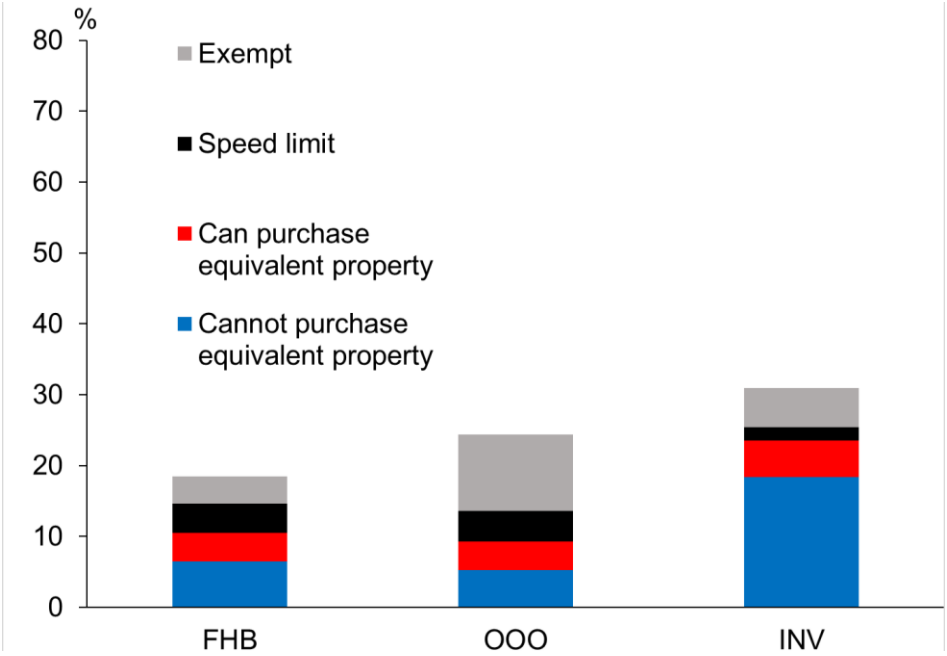
[20] These results are sensitive to assumptions, particularly on the exemptions applied and level of speed limits. However, they indicate the potential impact across different buyer groups.

Figure 14: Indicative distribution of cap at DTI>7 (percentage of lending by buyer type) - 5% house price fall vs status quo



Source: Reserve Bank estimates
Notes: Investors have at least one investment property in the security pool.
Excludes buyers that would have already been captured by current LVR restrictions.

Figure 15: Indicative distribution of cap at DTI>6 (percentage of lending by buyer type) - 5% house price fall vs status quo



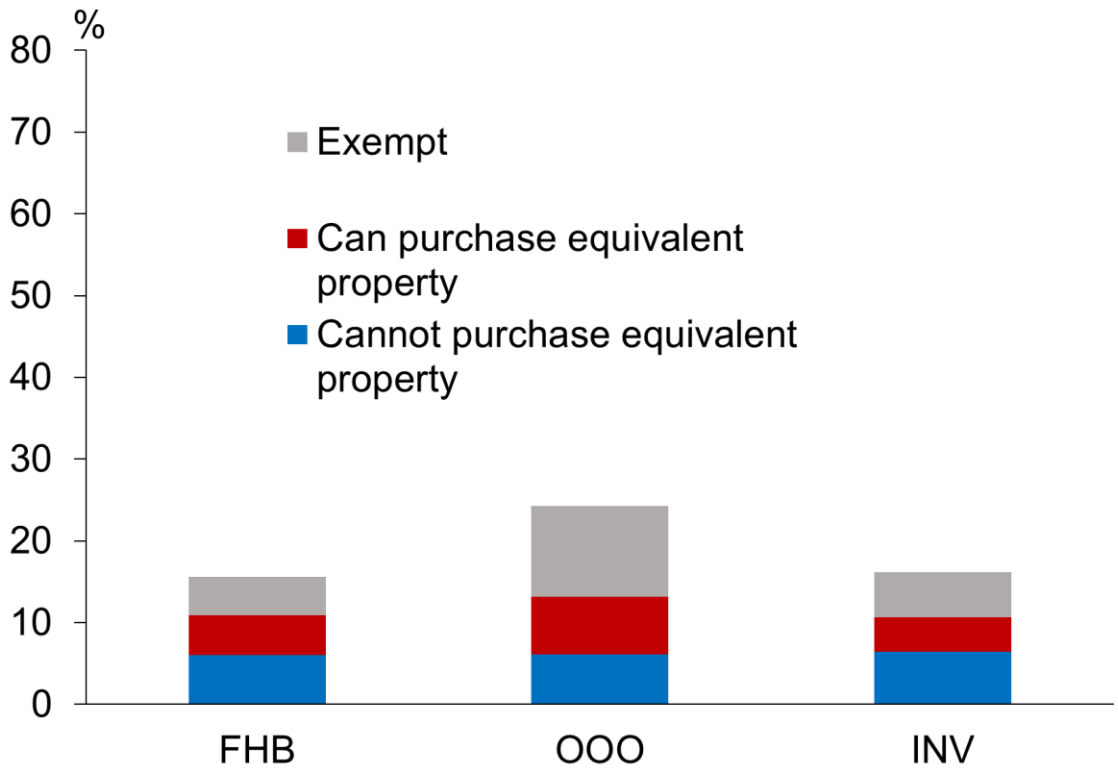
Source: Reserve Bank estimates
Notes: Investors have at least one investment property in the security pool.
Excludes buyers that would have already been captured by current LVR restrictions.

Floor on test interest rates

129. We analyse the impacts of a test interest rate floor across borrower groups following the same set of assumptions as for the DTI modelling above. We run the model with a test interest rate floor of seven percent, or eight percent[21], accounting for the current LVR restrictions and the removal of interest deductibility.

130. Figure 16 shows that if a test interest rate floor was set at seven percent, it would impact other owner-occupiers the most, but would also have some impact on first-home buyers and investors. If the test interest rate floor was set at 8 percent, as is shown Figure 17, then more buyers would be impacted – particularly first-home buyers and other owner-occupiers. The impacts are also relatively even across borrower groups.[22]

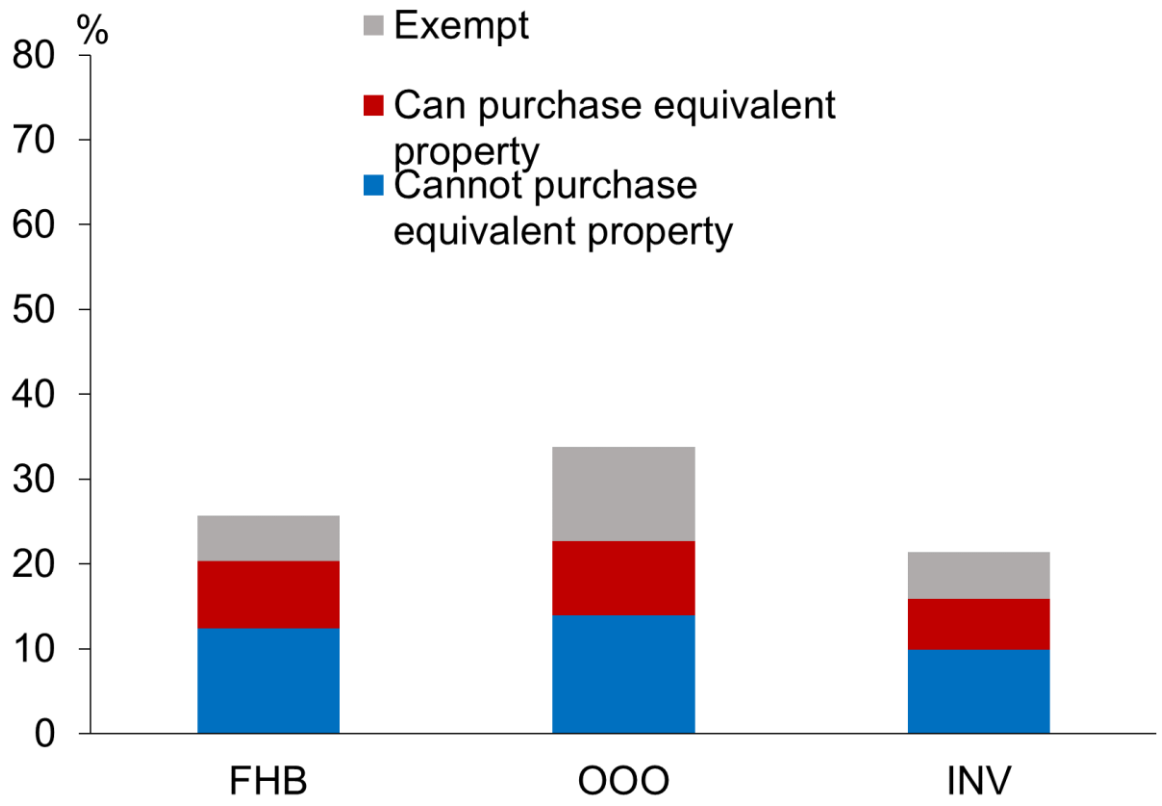
Figure 16: Indicative distribution of interest rate floor at 7% (percentage of lending by buyer type) - 5% house price fall vs status quo



Source: Reserve Bank estimates
Notes: Investors have at least one investment property in the security pool.
Excludes buyers that would have already been captured by current LVR restrictions.

[21] We note that a test interest rate floor need not be a fixed rate – it could also be set as a margin above market rates or the OCR.
[22] We see similar results for different house price scenarios; i.e. the impacts of a test interest rate floor a similar across borrower groups. These results are reported in Annex Three.

Figure 17: Indicative distribution of interest rate floor at 8% (percentage of lending by buyer type) - 5% house price fall vs status quo



Source: Reserve Bank estimates
Notes: Investors have at least one investment property in the security pool.
Excludes buyers that would have already been captured by current LVR restrictions.

131. At first glance, a test interest rate floor has more impact than a DTI across all borrower groups in terms of constraining the ability to purchase an equivalent property. However, the major limitation of the model is that it is it is difficult to allow for differences in expenses at an individual borrower level as we do not have access to that level of granularity in the data. This is also one of the major drawbacks of a test interest rate floor – banks can potentially alter other aspects of their serviceability tests, such as estimates of living expenses, to offset the impact on lending standards of a test interest rate floor (although we note that the ability to do this will be more limited following introduction of the new CCCFA regulations). Therefore it is likely that a test interest rate floor would not be as effective in dampening credit cycles as a DTI cap would.

132. We can, however, draw some tentative conclusions. If a test rate floor was applied evenly across borrower groups, it is likely to impact first-home buyers the most as their surplus income is relatively low. It would also be likely to impact considerably more first-home buyers than a DTI restriction. Furthermore, a test interest rate floor is likely to impact investors the least as they have relatively high surplus incomes because they can adjust their expenses more easily than other borrowers.

133. If we were to implement a test rate floor, potential negative impacts on first-home buyers would need to be considered carefully in light of the Government's housing policy objectives. It may be possible to mitigate these impacts by applying a different rate floor to different borrower groups, or through the use of exemptions. However, this is likely to add

complexity and lead to higher administration costs. This could potentially undermine the benefit of a test rate floor beingstraightforward and faster to implement than a DTI limit since it fits within banks' existing systems for assessing serviceability.

134. As discussed previously, our current view is that we would be unlikely to impose both a test rate floor and a DTI limit simultaneously. Rather, we see consider a test rate floor as a potential interim measure that could be used to address short-term financial stability risks, while we work with the industry to finalise the design and implementation of a DTI limit. Therefore, any negative impacts on first-home buyers from a test rate floor are likely to be short term in nature.

Interaction between DSRs and LVR restrictions

135. As discussed previously, DSR and LVR tools address different aspects of housing market risk. As such, if we were to introduce DSRs, we would envisage these tools working alongside LVR restrictions rather than replacing them.

136. However, it is the combination of high LVR and high DTI lending that is most critical from a financial stability perspective. If house prices fall and some borrowers enter negative equity, but default rates remain low, impacts on the financial system are likely to be limited (although there will be macroeconomic impacts such as reduced consumption via wealth effects). This is also the case if default rates rise but borrowers have high levels of equity, such that banks do not face losses on any mortgagee sales.

137. In addition, both DSR and LVR tools can impact on overall credit growth and the sustainability of house prices.

138. Therefore, although we see the two types of tools working in tandem, the optimal calibration of those tools may differ depending on whether one or both tools are in place. It may be possible to loosen LVR restrictions to some extent if DSRs are in place, while retaining a similar overall impact in terms of supporting financial stability and sustainable house prices. This would need to be considered carefully as part of any future calibration of both LVR restrictions and DSRs, if DSRs are implemented.

139. We also note that LVR restrictions tend to weigh more heavily on owner-occupiers (particularly first-home buyers) relative to investors, as the latter tend to have greater housing equity. This is supported by the Canadian experience, where first-home buyers were more constrained by LVR restrictions than by debt serviceability restrictions (Allen et al., 2020). The debt serviceability restrictions also constrained investors and other owner-occupiers more than first-home buyers. To the extent that it is possible to loosen LVR restrictions following the introduction of DSRs, this may have some positive impacts on the Government's housing policy objectives.

Summary

140. Our assessment indicates that DTI restrictions are likely to be the most effective debt serviceability tool that we could deploy to support financial stability and sustainable house prices. DTI restrictions link credit availability to income growth and are likely to be more effective in constraining debt levels over a longer period than other tools, including interest rate floors and LVR restrictions. A DTI tool can also be calibrated so that there are minimal adverse impacts on first-home buyers – this can be achieved with an appropriate

cap and through the use of speed limits. Therefore, we consider that a DTI should support the Government objective of making house prices more sustainable and dampening investor demand.

141. Furthermore, we consider that DTI limits have some advantages over a floor on test interest rates as a tool, particularly in moderating house price cycles and dampening investor demand. The impact of DTI caps is more predictable and certain than interest rate floors, since test rates are only one input to banks' serviceability calculations, and a regulated test rate could potentially be offset via adjustments to other inputs such as estimated expenses. In addition, an interest rate floor is likely to have greater impacts on first-home buyers, and these impacts would need to be considered carefully in light of the Government's housing policy objectives.

142. However, an interest rate floor – particularly if it is set at the same level for all borrower groups – could be implemented more quickly than a DTI limit, as it does not require changes to banks' internal systems. As such, it could be a useful transitional tool for managing financial stability risks, until such time as a DTI limit could be implemented.

Q13: Do you have any comments on our assessment of the impacts of implementing DSRs?

Q14: Would it be feasible to set test rate floors at different levels for different borrower groups, in order to mitigate potential impacts on first-home buyers?

Next Steps

143. Submissions on this consultation are due no later than 5pm on 28 February 2022. Following consideration of the submissions and completion of a Regulatory Impact Assessment (RIS), we will make a decision as to how to proceed with the implementation of the DSR framework. A second consultation is then likely to be needed on detailed design and calibration issues, if we implement DSR tools. We estimate that a DTI restriction could be implemented by Q4 2022, while a test rate floor could be implemented in Q2 2022.

Q15: Do you have any comments on our indicative timeframes for decision-making and implementation of DSRs?

Summary of consultation questions

Q1: Do you have any comments on the potential interaction between DSRs and other policy measures related to the housing market?

Q2: Do you have any comments on the problem definition for DSRs?

Q3: Are there any other policy options we should consider to address the issues set out in the problem definition?

Q4: How should other types of income be treated in DTI calculations?

Q5: How should different types of debt be treated in DTI calculations?

Q6: Should a DTI restriction incorporate exemptions, and if so should the exemption framework mirror the current LVR regulations?

Q7: Should speed limits apply under a DTI, and if so should there be separate speed limits for different borrower groups?

Q8: Do you have any views on the potential calibration of a DTI restriction?

Q9: Are there any other issues that should be considered if DTI limits were to be implemented?

Q10: Which methodology for setting test rate floors do you prefer? Please explain your reasoning.

Q11: For banks, please provide information on how your test rates are currently set (on a confidential basis if necessary).

Q12: Are there any other issues that should be considered if test interest rate floors were to be implemented?

Q13: Do you have any comments on our assessment of the impacts of implementing DSRs?

Q14: Would it be feasible to set test rate floors at different levels for different borrower groups, in order to mitigate potential impacts on first-home buyers?

Q15: Do you have any comments on our indicative timeframes for decision-making and implementation of DSRs?

Annex One: Literature Review

Albacete, Fessler, & Lindner (2018). *One policy to rule them all? On the effectiveness of LTV, DTI and DSTI ratio limits as macroprudential policy tools* Oesterreichische Nationalbank FSR35 June 2018.

> This paper uses the approach of Banbula et al. (2015) and applys it to Austria, comparing the effectivness of LVR, DTI and DSTI (debt servicing to income tools). They specifically look at which tool is the best at denying vulnerable households credit while allowing creditworthy households access to credit. They found that the income based policies were better at reflecting which borrowers were vulnerable. For example, a high DTI at loan origination was a better predictor of future financial vulnerability than a high LVR at loan origination. Their results suggest a "…higher effectivness of income-based macroprudential tools compared to asset-based ones".

Acharya, Bergant, Crosignani, Eisert & McCann (2020). *The anatomy of transmission of macroprudential policies* IMF Working Paper

> The authors examine the February 2015 introduction of LTV and LTI limits in Ireland, where the policy caused a substantial reallocation of mortgage credit. They document a reallocation of mortgage credit from low- to high-income households and from hot, mostly urban, housing markets to cool housing markets. This reallocation is effective in slowing down house price growth, and in turn, the feedback loop between mortgage credit and house prices, in hot housing markets. Consistent with constrained lenders adjusting their portfolio choice, more-affected banks drive this reallocation and also increase their risk exposure in credit to firms and holdings of securities, two assets not targeted by the limits.

Arregui, Benes, Krznar, Mitra & Santos (2013). *Evaluating the Net Benefits of Macroprudential Policy: A Cookbook.* IMF Working Paper WP/13/167

> The authors evaluate different measures of macroprudential policy. They found that the measures that are most effective and have prolonged effects on credit growth and house price growth are reserve requirements, higher risk weights on capital, and LTV limits. DTIs also have an impact on credit growth if they are binding on the flow of new customers.
>
> The paper estimates the market impact of applying DTIs reduced house prices by around 2.6 percent and credit (relative to GDP) by around 2 percent.

Banbula, Kotula, Przeworska, & Strzelecki (2015). *Which households are really financially distressed: How micro-data could inform macroprudential policy* BIS Working Paper

> The authors create a model for calibration of DSTI/DTI limits that allows them to account for both the effectiveness and cost of these limits, depending on policy makers' preferences regarding type I and type II errors. They found that that DSTI can be an effective tool in identifying over-indebted households and for a range of plausible preferences regarding type I and type II errors the suggested DSTI limit is in a range of 30–40 percent.

Gross & Garcia (2016). *Assessing the efficiency of borrower-based macroprudential policy using an integrated micro-macro model for European households* ECB Working Paper Series (No 1881)

The purpose of this paper was to develop an integrated micro-macro model that can be used to assess the responsiveness of household sector risk parameters (i.e., probabilities of default and loss given default to lending standard-related macroprudential policy measures). Simulation results for seven European countries suggest that both LTV and DSTI caps can help reduce PDs and LGDs and hence loss rates for the household sector.

LTV caps have a stronger potential to reduce LGDs while DSTI caps have a stronger bearing on PDs. Because an LTV ratio is a stock ratio that is closely related to the LGD, while DSTI ratios are related to flow variables (income and expense, the latter including debt service) and therefore to PDs, DSTI caps can be more effective than LTV caps in the sense that a certain reduction in household sector loss rates that a policy maker wishes to achieve can be accomplished with a lower reduction in loan volumes when considering the DSTI cap-based policy.

Ingholt (2018). *LTV v DTI constraints: when did they bind, and how do they interact?* 2018 Meeting Papers 866, Society for Economic Dynamics

The author investigated LTV and DTI constraints in the US from 1975-2017. He found that countercyclical debt-service-to-income limits are very effective at curbing increases in mortgage debt. This was because these increases typically occur in expansions when the debt-service-to-income constraint is binding.

The flip-side of this result was that countercyclical loan-to-value limits did not prevent mortgage debt from rising, since this constraint is typically non-binding when it occurs. Countercyclical loan-to-value limits can, however, abate the adverse consequences of house price slumps on credit availability by raising credit limits.

Kutter & Shim (2016) *Can non-interest rate policies stabilize housing markets? Evidence from a panel of 57 economies* Journal of Financial Stability. Vol.26

The authors examine nine non-interest rate policies and their effect on house prices in 57 markets around the world. They found no evidence of supply-side credit policies impacting the market. None of the tools affecting the overall supply of credit, such as liquidity requirements and limits on credit growth, had a statistically or economically significant effect on either housing credit or house price growth.

On the demand side, the evidence indicates that reductions in the maximum LTV ratio did less to slow credit growth than lowering the maximum DSTI ratio. This may be because during housing booms rising prices increase the amount that can be borrowed, partially or wholly offsetting any tightening of the LTV ratio. Specifically, they found robust evidence that tightening DSTI requirements slowed real housing credit growth by approximately 4–6 percentage points.

Bekkum, Gabarro, Irani, & Peydr'o (2019). *Take it to the Limit? The effects of household leverage caps* CEPR Discussion paper.

This paper looks at the Dutch experience with LVR restrictions. The authors found that LVRs reduce morgage leverage but that the more affected households use up liquidity from other areas in order to get a deposit. Therefore, the overall effect was to make household balance sheets more fragile. However, households overall remain more robust. Distributionally the authors found that fewer households transition from renting to ownership, and that all of these effects were stronger for liquidity constrained households.

Allen, Grieder, Peterson, Roberts (2020). *The impact of macroprudential housing finance tools in Canada* Journal of Financial Intermediation: Vol.42

The authors track the impact of shifts in LVR and amortisation requirements on FHBs in Canada over tightening and loosening cycles. Candian FHBs were more constrained by LVRs than income. Suggested income requirements hit investors more and also had more impact on existing owner-occupiers wanting to trade up to bigger houses.

Millard, Rubio, & Varadi (2021). *The macroprudential toolkit: effectiveness and interactions* BoE staff working paper no.902

The authors found that LTV limits, on their own, are not sufficient to constrain household indebtedness in booms. Instead, setting DSR limits in booms, can lead to a significant decrease in the volatility of lending, consumption and inflation, since they disconnect the housing market from the real economy. Additionally, with DSR limits in place, the average LTV ratio hardly moves in response to shocks. Overall, DSR limits are welfare improving relative to any other macroprudential tool.

Zhang & Zoli (2015). *Leaning against the wind: Macroprudential policy in Asia* Journal of Asian Economics. Vol.42

Asian economies appear to have made greater use of macroprudential tools, especially housing-related measures, than their counterparts in other regions. This analysis suggests that housing-related macroprudential instruments have had an impact – they have helped lower credit growth, slow house price inflation, and dampen bank leverage in Asia. Finally, there appears to be little evidence that non-housing related macroprudential policies and capital flow measures have had a systematic and measurable effect on lending, leverage, or portfolio inflows in Asia. Advanced Asian economies (such as Hong Kong, Korea, Singapore, and Taiwan) have relied more on domestic prudential measures than capital flow measures, especially Hong Kong and Singapore. Given that these economies have typically experienced housing price pressures, the prudential instruments mostly used have been caps on LTV and DTI ratios.

Gambacorta & Murcia (2020). *The impact of macroprudential policies in Latin America: An empirical analysis using credit registry data* Journal of Financial Intermediation. Vol.42

This paper summarises the results of a joint research project by five central banks in Latin American countries (Argentina, Brazil, Colombia, Mexico, and Peru) to evaluate the effectiveness of macroprudential tools. Macroprudential policies have been successful in dampening credit cycles and reducing banking sector risk. In particular, macroprudential policies mainly aimed at curbing the cycle have been demonstrably effective in reducing credit growth even in the short term (within three months).

Peydró, Rodriguez-Tous, Tripathy & Uluc (2020). *Macroprudential Policy, Mortgage Cycles and Distributional Effects: Evidence from the UK,* ZBW – BOE Working Paper No.866

The authors examine micro data on the UK market from LTI limits coming in during a boom, through the post-Brexit slowdown. They found a particularly sharp impact of LTI restrictions on low income borrowers as (a) the number of LTI loans goes down and (b) low income borrower share in those issued also decreases.

However, they note that the result is also considerably lower borrower distress following house market slowdown. For example, some FHBs were saved from taking on risks that would go bad.

Punzi & Rabitsch (2018). *Effectiveness of macroprudential policies under borrower heterogeneity* Journal of International Money and Finance: Vol. 85

This paper considers the implications of macroprudential policies with the aim to lean against the excess in household debt by constraining the ability of the banking system to extend credit to leveraged households. The authors find that a macroprudential tool that countercyclically limits the supply of credit relative to the debt-to-GDP growth is welfare improving for all agents in the economy. However, if macroprudential authorities target only higher leveraged borrowers, then a rule that countercyclically responds only to the credit growth of this particular group (in particular, to the individual debt to GDP ratio) improves welfare even more.

The intuition for this finding is that the borrowing constraint for the high-LTV type borrower binds strongest. Therefore, targeting this group with macroprudential policy leads to the greatest welfare gains. They conclude that it can be advisable for policymakers to consider the LTV ratio distribution and tailor their policy towards highly leveraged agents in an economy

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Carreras, Davis, & Piggott (2018). *Assessing macroprudential tools in OECD countries within a cointegration framework* Journal of Financial Stability. Vol.37

The authors assess the impact of typical macroprudential policy interventions on house prices and household credit growth in 19 OECD countries. Some policies are shown to be more effective than others. These include taxes on financial institutions, general capital requirements, strict loan-to-value ratios, and debt-to-income ratio limits. Policies such as limits on debt-to-income ratios appear relatively more effective for house prices, while tools such as limits on interbank exposures impact comparatively more on household credit.

Lazarov & Hinterschweiger (2018). *Determinants of distress in the UK owner-occupier and buy-to-let mortgage markets.* Bank of England working paper No. 760

This study investigates the determinants of borrower distress as a function of borrower and loan-level stock/flow characteristics over the loans' lifetime in the buy-to-let and owner-occupier mortgage markets. The authors found systematic differences between these two markets, controlling for a range of loan and borrower characteristics as well as macro variables. Further to this, they found that BTL borrowers are around a third less sensitive to changes in the average LTV ratio

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Kelly & O'Toole (2018) *Mortgage default, lending conditions and macroprudential policy: Loan-level evidence from UK buy-to-let* Journal of Financial Stability. Vol.36

This paper employs an empirical strategy that specifies a "double trigger" model. The model links mortgage default to originating values of loan-to-value and rent coverage (our proxy for the debt service-ratio) controlling for a range of other loan and borrower characteristics. The authors found that defaults increase with originating LTV and falls in the rent coverage ratio. To compare the magnitude of the effects, a one standard deviation increase in originating LTV would increase the default rate by 28 per cent while a

one standard deviation decrease in originating rent coverage ratio would increase default rates by 23 percent.

For originating LTV, the threshold appears around 75 percent. For values below 75 percent, there is no considerable variation in the level of default. However, from 75 percent originating LTV onwards, there is a very steep increase in the predicted default rates. For the affordability channel, the effects appear to taper out after approximately 1.5 rent coverage ratio with widening error bars after this level.

For those with multiple loans (including investors), they found that default rates double in the case of multi-loan properties, with significantly greater sensitivity to originating LTV and rent coverage.

Kelly, McCann & O'Toole (2018). *Credit conditions, macroprudential policy and house prices* Journal of Housing Economics. Vol.41

The authors modelled the way in which credit supply can bind along three channels: the Loan-to-Value ratio (LTV), the Loan-to-Income ratio (LTI) and the Debt Service Ratio (DSR). They found that macroprudential policy drives house price changes in two ways: firstly through the direct impact of instantaneously lower credit volumes; secondly through the collateral channel, by scaling down the down-payment available to borrowers via weakened housing equity. Further, they suggest that the levels at which LTV, LTI and DSR limits are set are crucially important in determining the impact on prices. They show that the introduction of an LTV-LTI combination of 70 and 2.8 leads to a house price fall two and a half times as large as a combination of 95 and 4.5.

Finally, they explore the mechanisms at play behind the house price-credit relationship. Their estimates suggest that for borrowers whose loan amount is closest to the credit amount available to them, the elasticity of house prices to credit is more than double that for the group of borrowers whose loan amounts are furthest from their constrained credit limits.

Defusco, Johnson & Mondragon (2020). *Regulated Household Leverage* Review of Economic Studies. Vol.87

This study found that the distributional implications of policy-induced reductions in household leverage depend in large part on the reasons for why households would demand high-leverage in the first place. If high levels of debt relative to incomes is used to simply smooth expected increases in future income, then restricting leverage could be welfare decreasing. However, if the demand for debt is driven in part by inadequate financial literacy or various behavioural biases and cognitive limitations, or if choices over household leverage in the mortgage market are driven in part by house price beliefs, then the welfare implications of policies that limit mortgage leverage may depend on the extent to which such beliefs are based on fundamental versus behavioural factors.

Annex Two: Modelling the distributional impacts of DSRs

Following the approach used in the 2017 consultation paper, we conduct a simulation giving us a pseudo dataset from which we can use to model the distributional impacts of the DTI policy or a test interest rate floor. This involves simulating unit records for DTI and LVR. Further to this, based on the representative income, we can estimate debt, property values, and cash flow.

We apply a similar set of assumptions to the 2017 version (set out in Table A.1), updating them to reflect higher house prices. The model implements a speed limit, exempts borrowers purchasing below the house price cap of Kāinga Ora's First Home Loan (as well as new builds), and allows borrowers to reduce their DTI by purchasing a cheaper property.

Table A.1: Categorisation of high-DTI borrowers under the hypothetical policy

Category	Assumption
DTI policy	Set the DTI at greater than six or greater than seven.
Speed limit	Follows the speed limit set for the LVR restrictions. Five percent of lending to investors can be above the DTI cap. Twenty percent of lending to FHB's and other owner-occupiers can be above the DTI cap.
Measurement error	Drop loans that appear likely to fail bank origination tests (i.e., low income/low cash flow).
Exemption	Exempt borrowers purchasing below the cap on the First Home Grant. $625,000 in Auckland, and $525,000 outside of Auckland. New builds are also exempt, and are estimated to be approximately 4% of total lending.
Change in house prices	The model incorporates a change in house prices that changes a buyers DTI from what it was initially.
LVR restrictions	LVR limits as from 1 May 2021.

To model the potential impacts of a test interest rate floor, we use a similar model to that of the DTI, using the same assumptions as shown in Table A.1 – except for the speed limit. However, we need to calculate an estimate of the borrower's surplus income. We broadly follow the assumptions from our hypothetical borrower scenario, giving an estimate for expenses and a buffer (e.g. for unexpected expenses), which allows us to calculate surplus income.

We assume that expenses as a proportion of income decreases as income increases. For the buffer, we assume $700 per month for owner-occupiers and $900 per month for investors. We subtract tax, expenses, and the buffer from gross income, giving us surplus income that can be used to service a mortgage.

We then calculate how much the repayment would be on the borrower's debt (at the test interest rate floor) and compare to surplus income. If the mortgage repayment (at the test interest rate

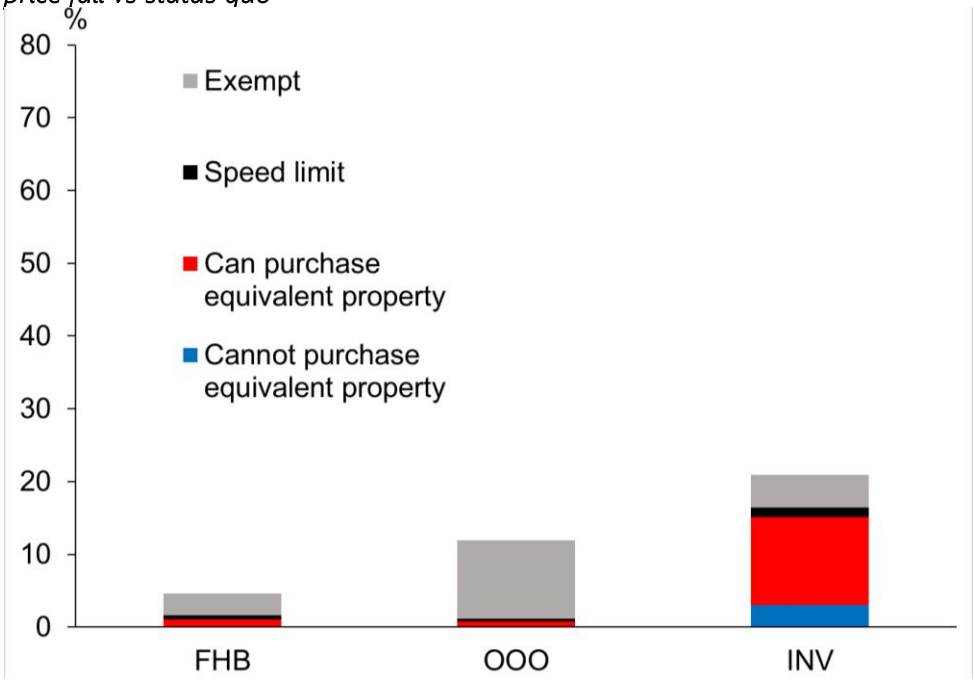
floor) is greater than the borrower's surplus income, then the borrower is constrained and has to lower their current debt level.

Table A.2: Assumptions for scenario analysis

Variable assumptions	
High HPI scenario	15%
Low HPI scenario	5%
DTI cap	6 or 7
Test interest rate floor	7% or 8%
Fixed assumptions	
Initial gross rental yield	4%
Labour income	$200,000
Haircut on rental income	30%
Initial owner-occupied home value	$900,000
Existing equity	40%
Labour income growth	3%
Rent growth	5%
Essential expenses	$30,000 ($2,500 per month)
Minimum net income surplus (NIS)	$10,800 ($900 per month)
Annual principal repayment in calculation of NIS	1.2%
Average tax rate	33%
Rental expenses (per property)	$5,000.00

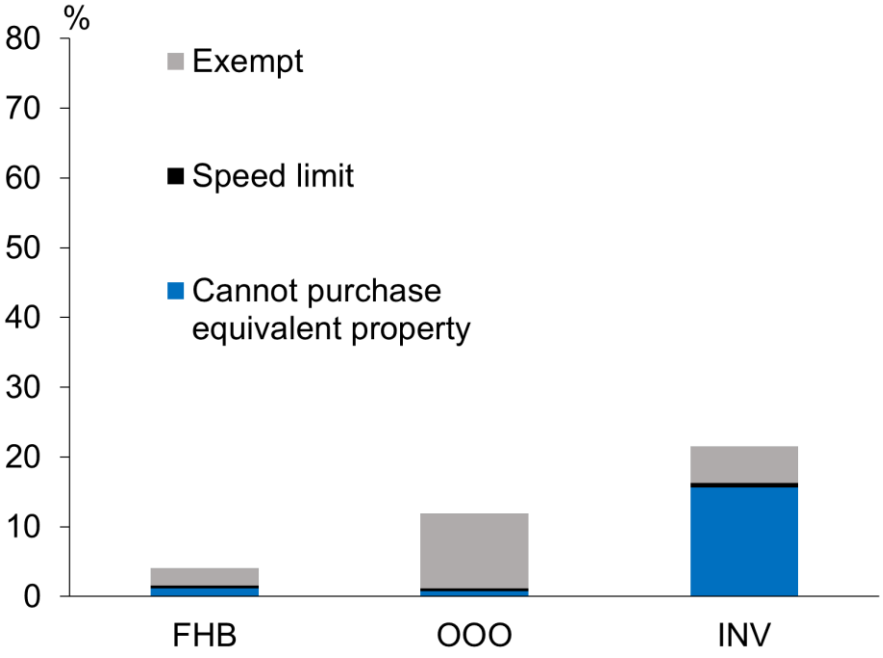
Annex Three: Additional charts

Figure A.1: Indicative distribution of cap at DTI>7 (percentage of lending by buyer type) - 10% house price fall vs status quo



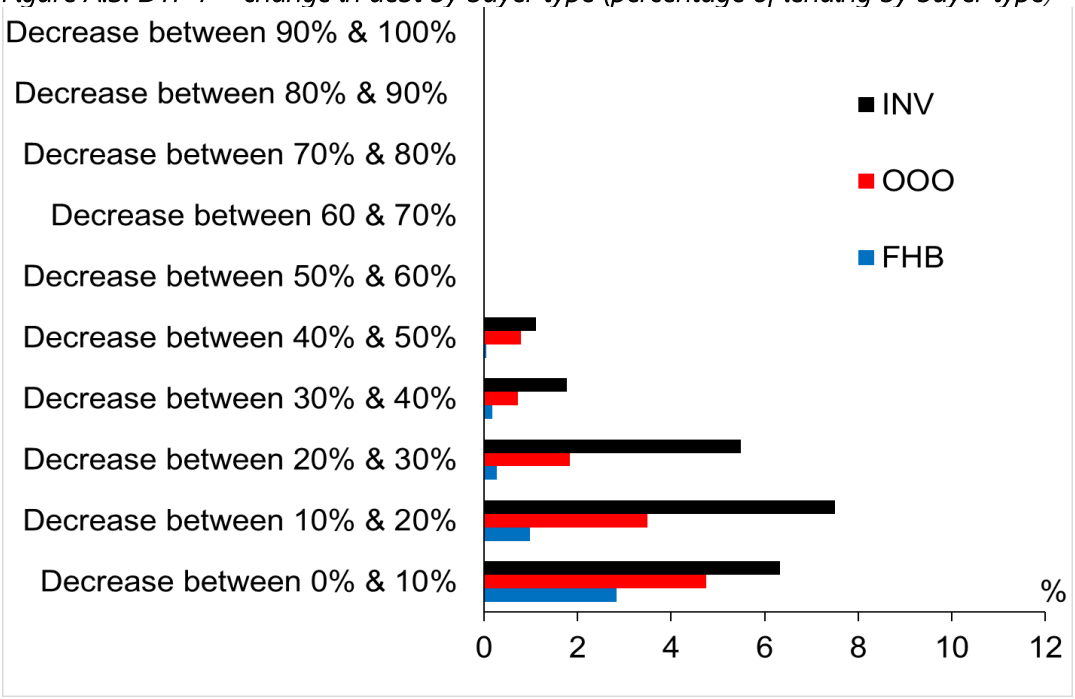
Source: Reserve Bank estimates
Notes: Investors have at least one investment property in the security pool.
Excludes buyers that would have already been captured by current LVR restrictions.

Figure A.2: Indicative distribution of cap at DTI>7 (percentage of lending by buyer type) – no change in house prices



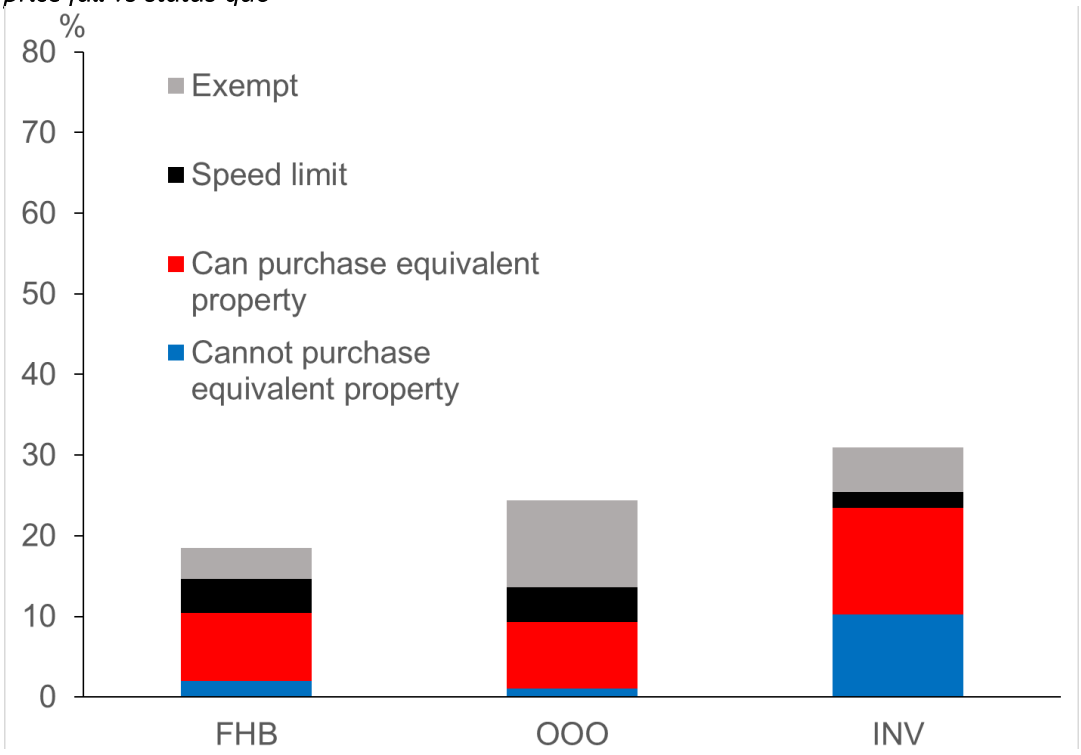
Source: Reserve Bank estimates
Notes: Investors have at least one investment property in the security pool.
Excludes buyers that would have already been captured by current LVR restrictions.

Figure A.3: DTI>7 – change in debt by buyer type (percentage of lending by buyer type)



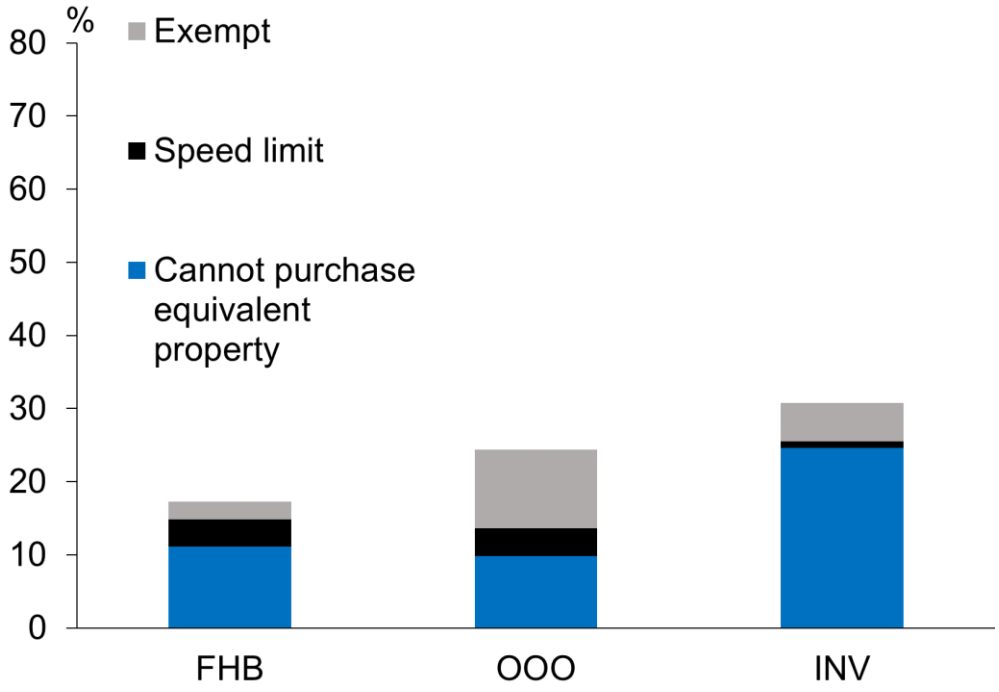
Source: Reserve Bank estimates
Notes: Investors have at least one investment property in the security pool.
Excludes buyers that would have already been captured by current LVR restrictions.

Figure A.4: Indicative distribution of cap at DTI>6 (percentage of lending by buyer type) - 10% house price fall vs status quo



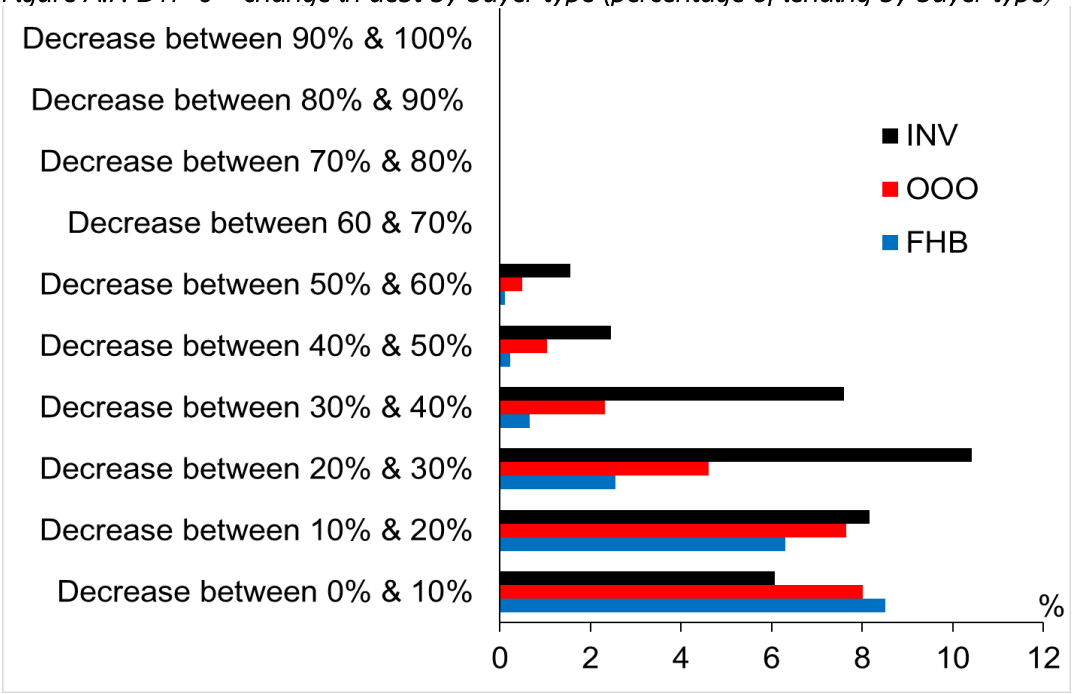
Source: Reserve Bank estimates
Notes: Investors have at least one investment property in the security pool.
Excludes buyers that would have already been captured by current LVR restrictions.

Figure A.5: Indicative distribution of cap at DTI>6 (percentage of lending by buyer type) – no change in house prices



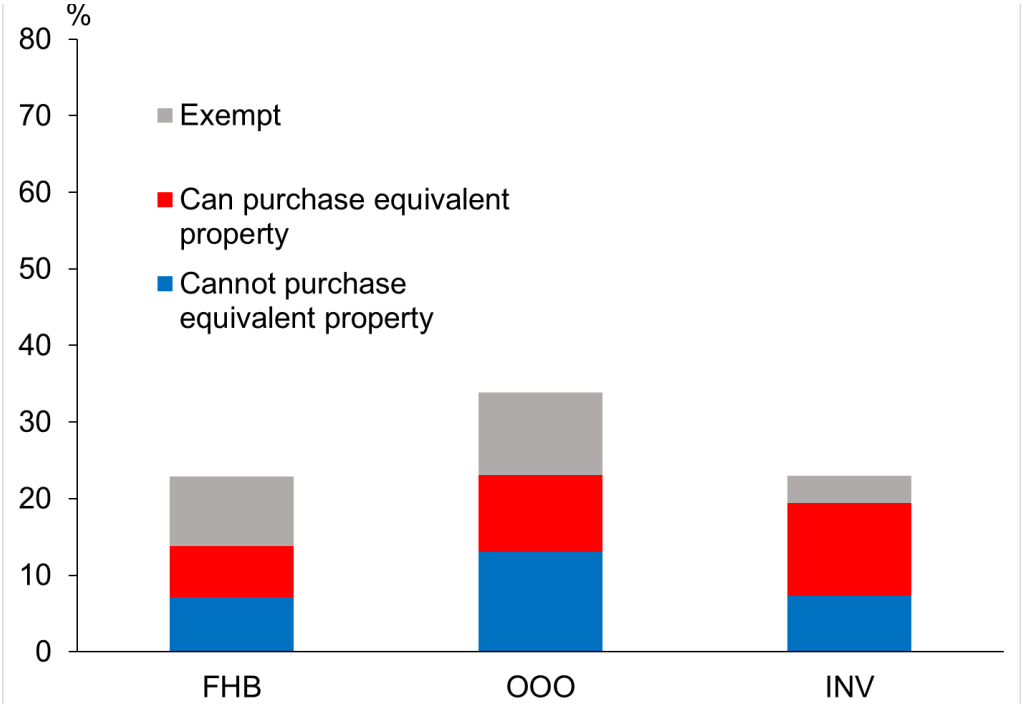
Source: Reserve Bank estimates
Notes: Investors have at least one investment property in the security pool.
Excludes buyers that would have already been captured by current LVR restrictions.

Figure A.7: DTI>6 – change in debt by buyer type (percentage of lending by buyer type)



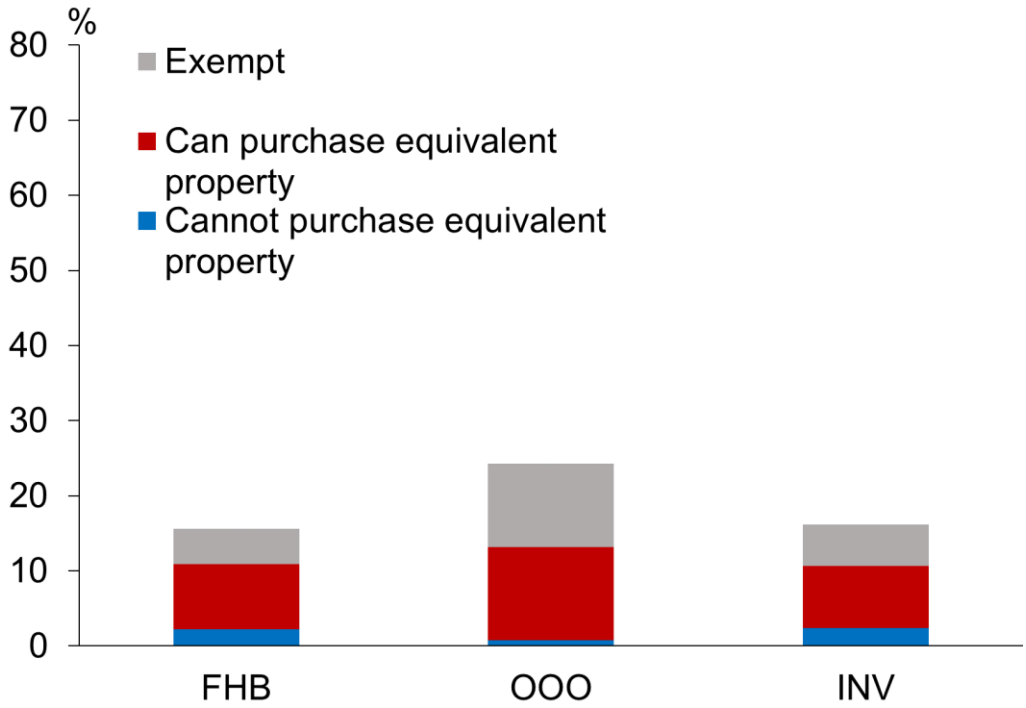
Source: Reserve Bank estimates
Notes: Investors have at least one investment property in the security pool.
Excludes buyers that would have already been captured by current LVR restrictions.

Figure A.8: Indicative distribution of interest rate floor at 6% (percentage of lending by buyer type) - 10% house price fall vs status quo



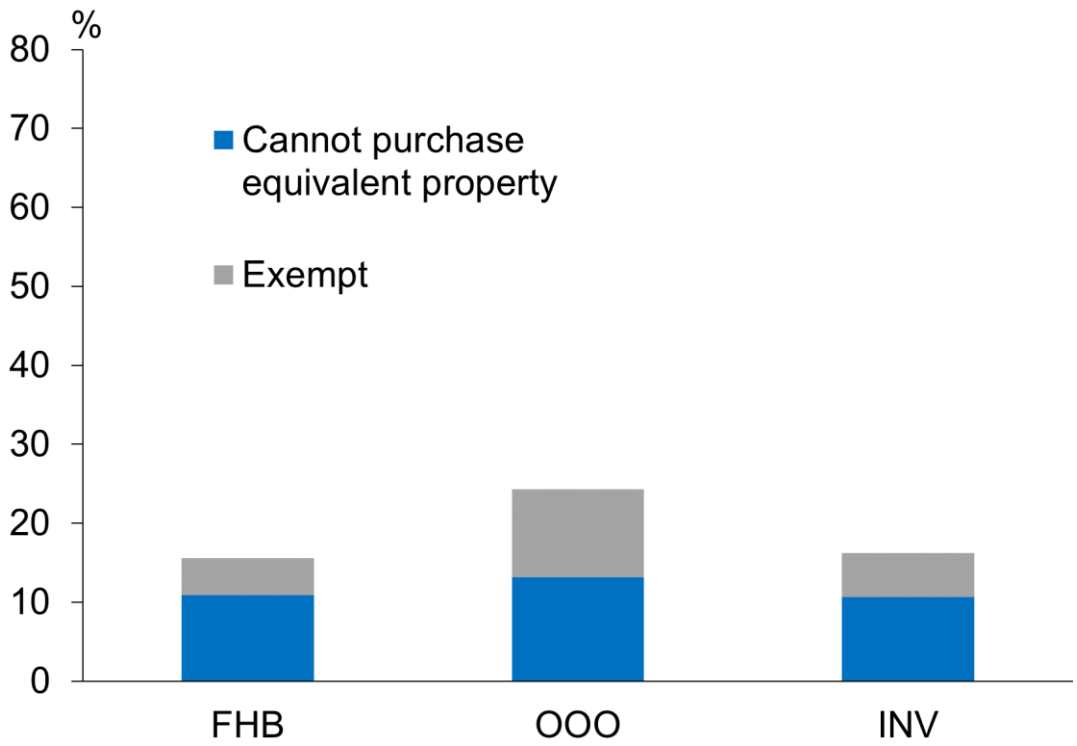
Source: Reserve Bank estimates
Notes: Investors have at least one investment property in the security pool.
Excludes buyers that would have already been captured by current LVR restrictions.

Figure A.11: Indicative distribution of interest rate floor at 7% (percentage of lending by buyer type) - 10% house price fall vs status quo



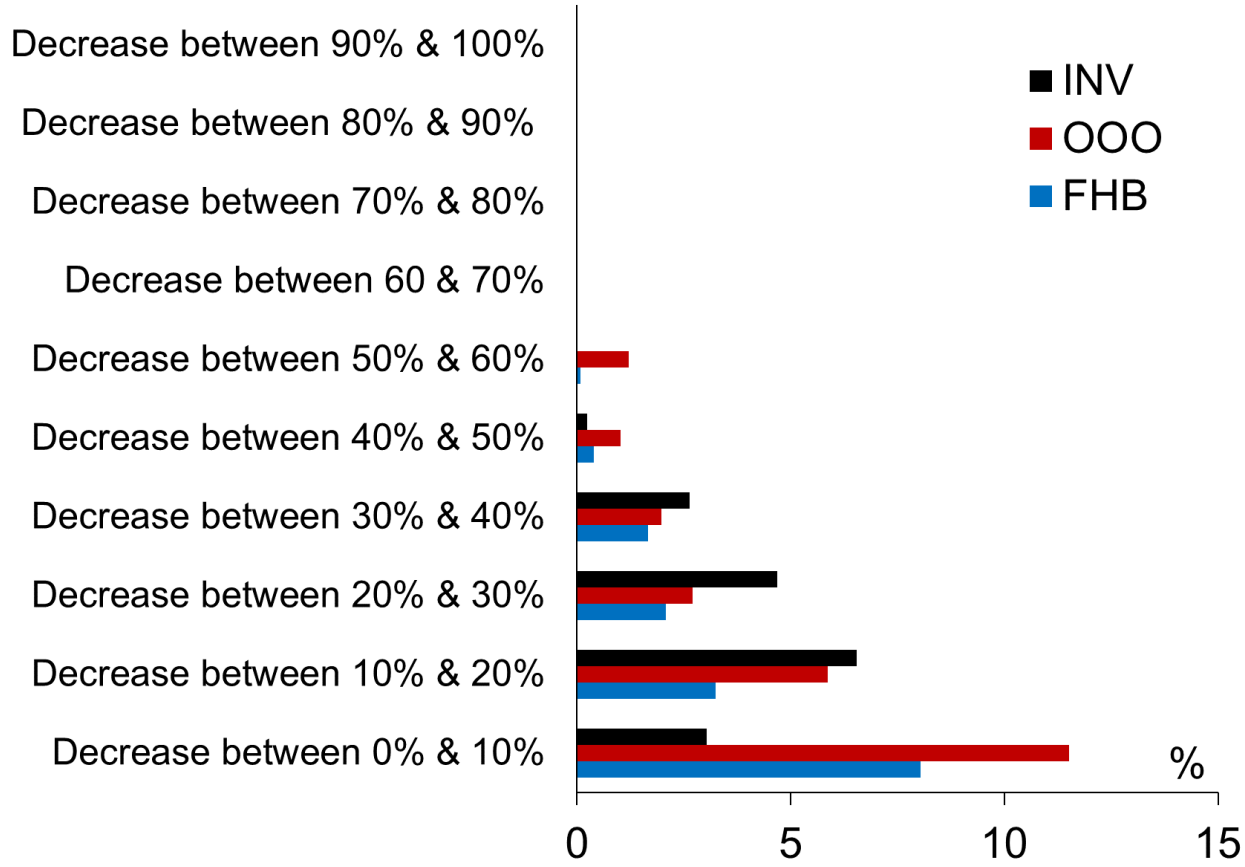
Source: Reserve Bank estimates
Notes: Investors have at least one investment property in the security pool.
Excludes buyers that would have already been captured by current LVR restrictions.

Figure A.12: Indicative distribution of interest rate floor at 7% (percentage of lending by buyer type) – no change in house prices



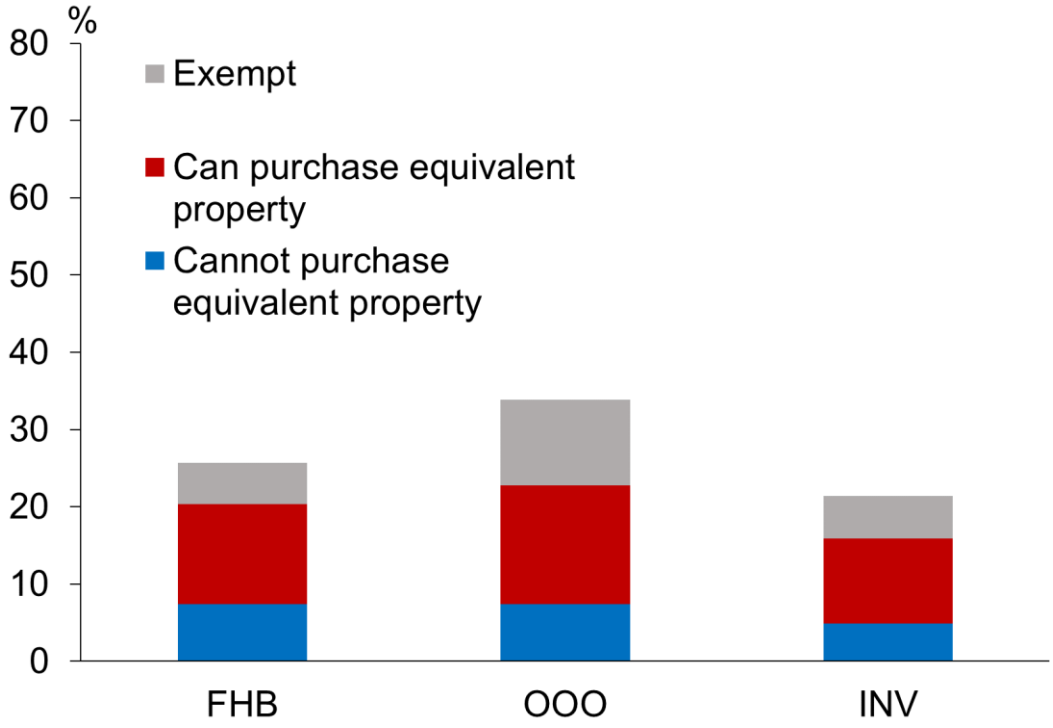
Source: Reserve Bank estimates
Notes: Investors have at least one investment property in the security pool.
Excludes buyers that would have already been captured by current LVR restrictions.

Figure A.13: interest rate floor 7% – change in debt by buyer type (percentage of lending by buyer type)



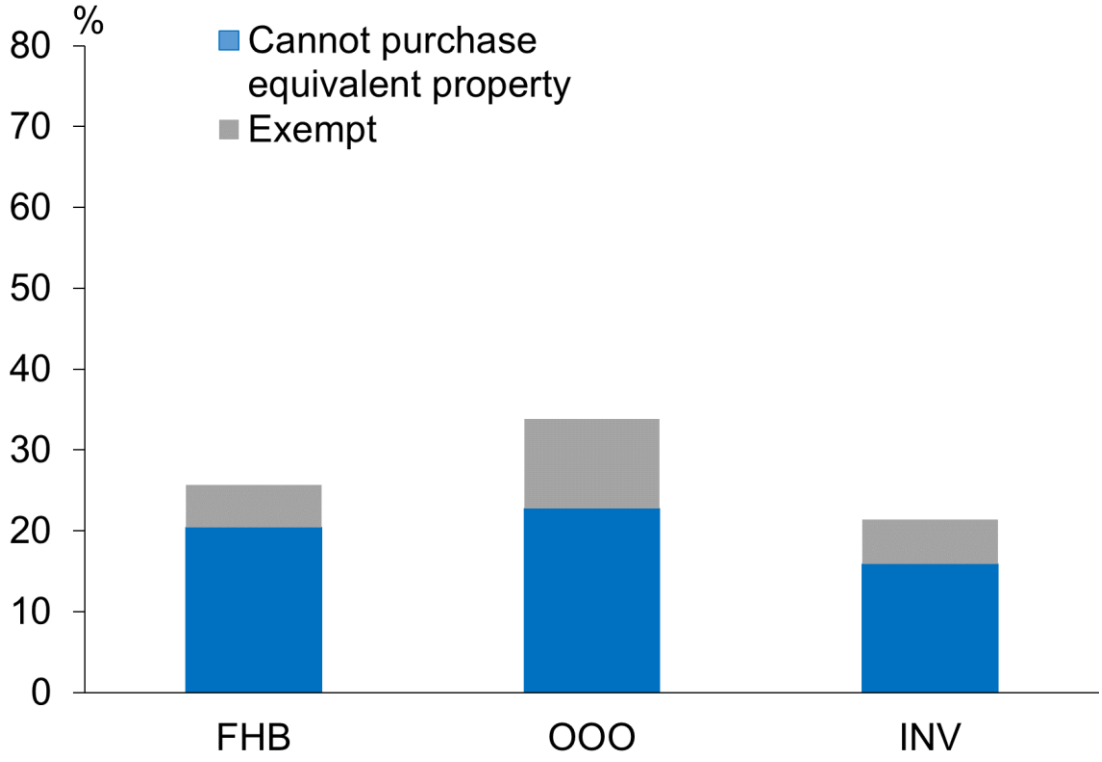
Source: Reserve Bank estimates
Notes: Investors have at least one investment property in the security pool.
Excludes buyers that would have already been captured by current LVR restrictions.

Figure A.14: Indicative distribution of interest rate floor at 8% (percentage of lending by buyer type) - 10% house price fall vs status quo



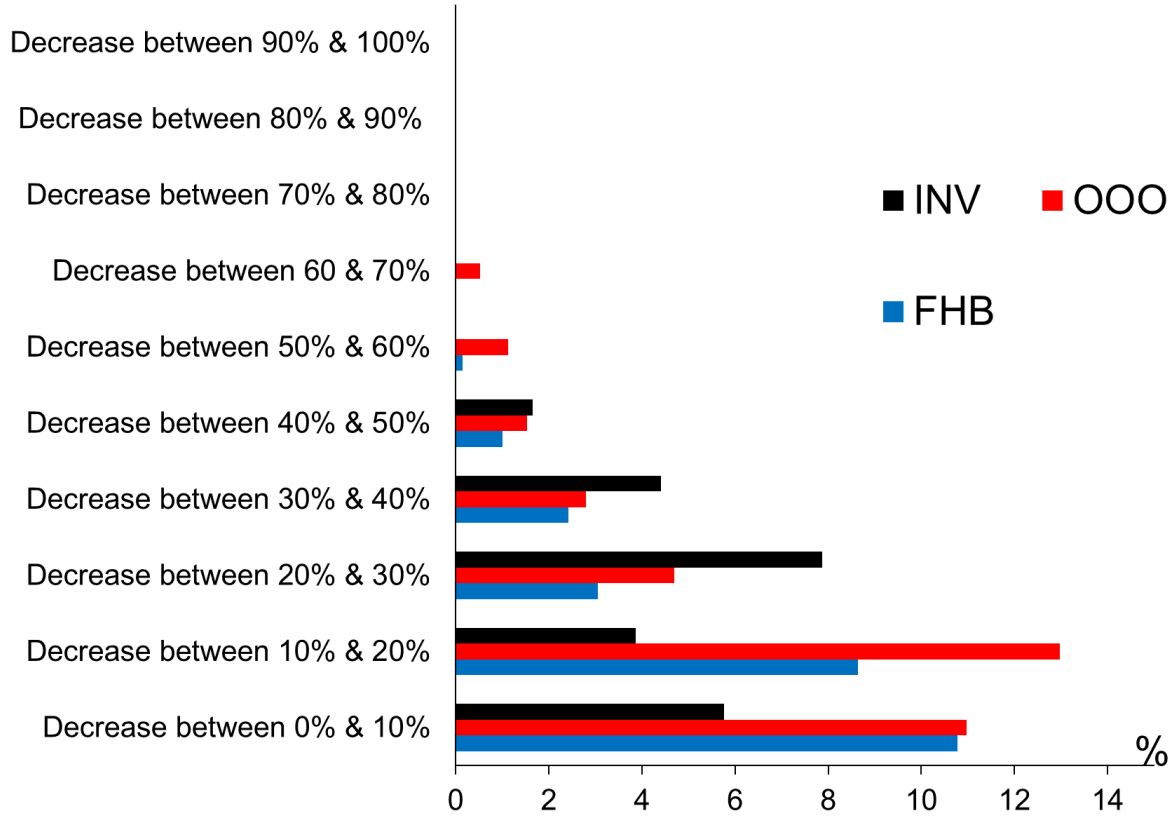
Source: Reserve Bank estimates
Notes: Investors have at least one investment property in the security pool.
Excludes buyers that would have already been captured by current LVR restrictions.

Figure A.15: Indicative distribution of interest rate floor at 8% (percentage of lending by buyer type) – no change in house prices



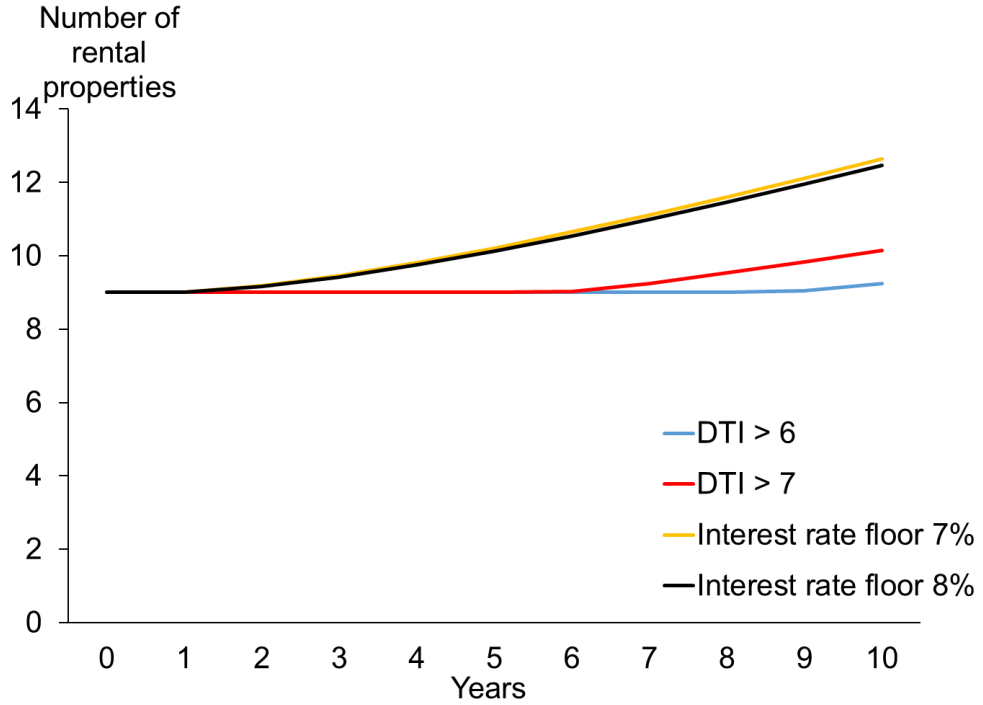
Source: Reserve Bank estimates
Notes: Investors have at least one investment property in the security pool.
Excludes buyers that would have already been captured by current LVR restrictions.

Figure A.16: Interest rate floor 8% – change in debt by buyer type (percentage of lending by buyer type)



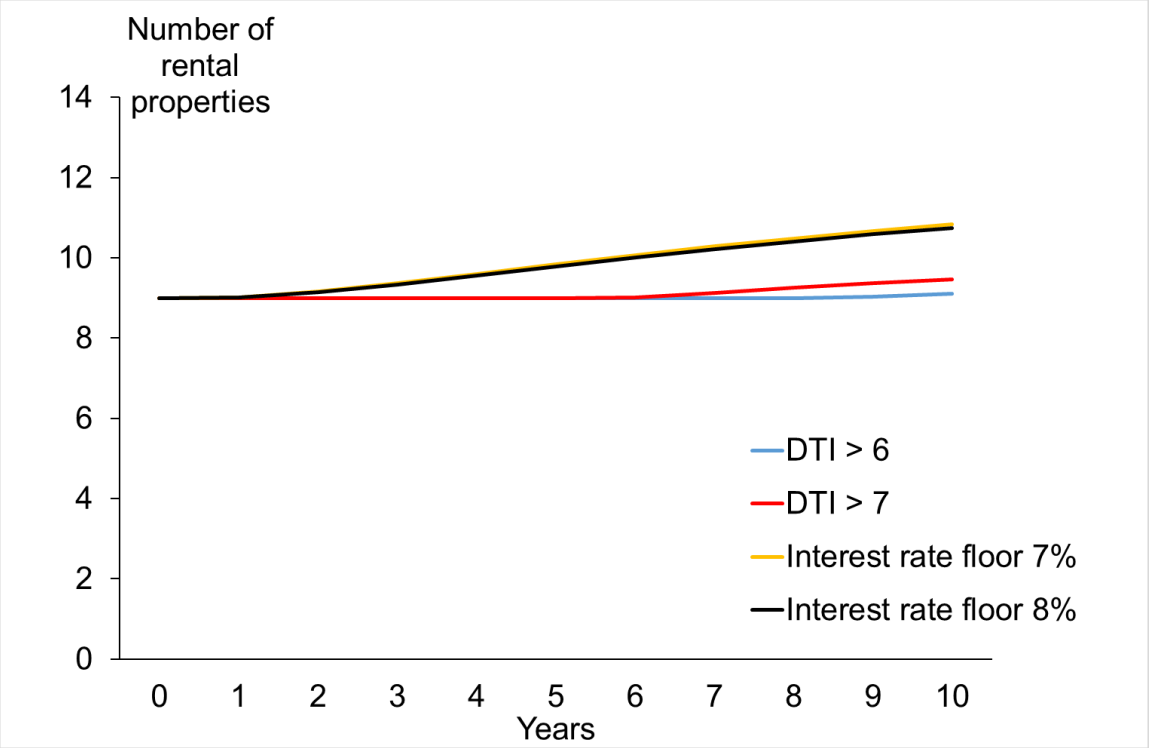
Source: Reserve Bank estimates
Notes: Investors have at least one investment property in the security pool.
Excludes buyers that would have already been captured by current LVR restrictions.

Figure A.17: Number of rental properties under debt serviceability restrictions – large portfolio, low house price growth



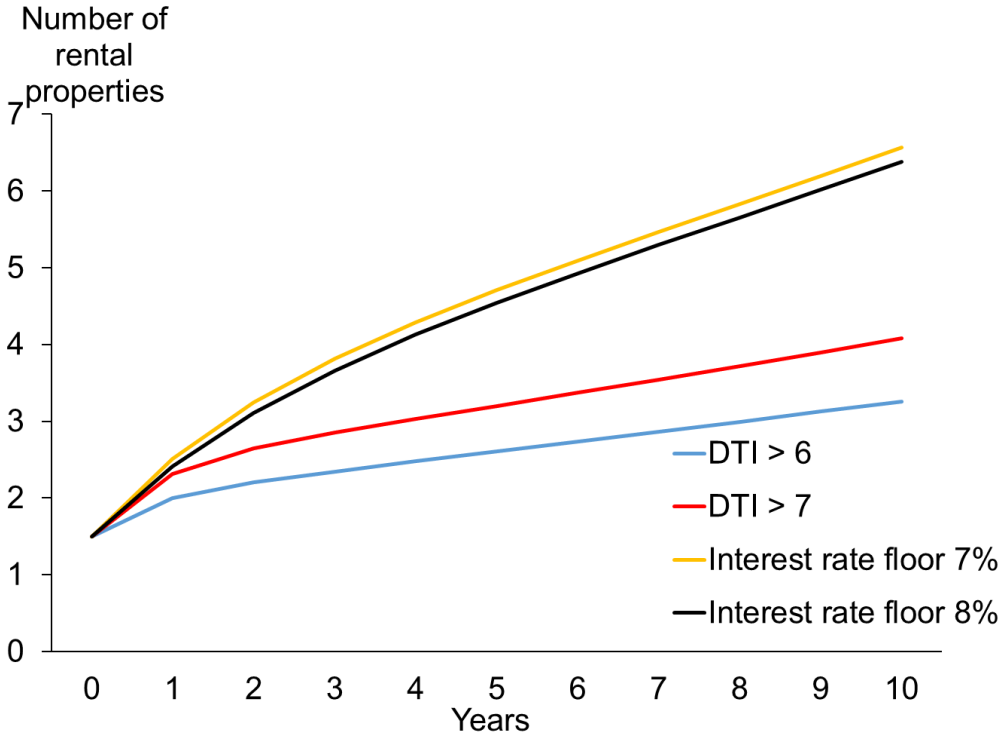
Source: Reserve Bank estimates

Figure A.18: Number of rental properties under debt serviceability restrictions – large portfolio, high house price growth



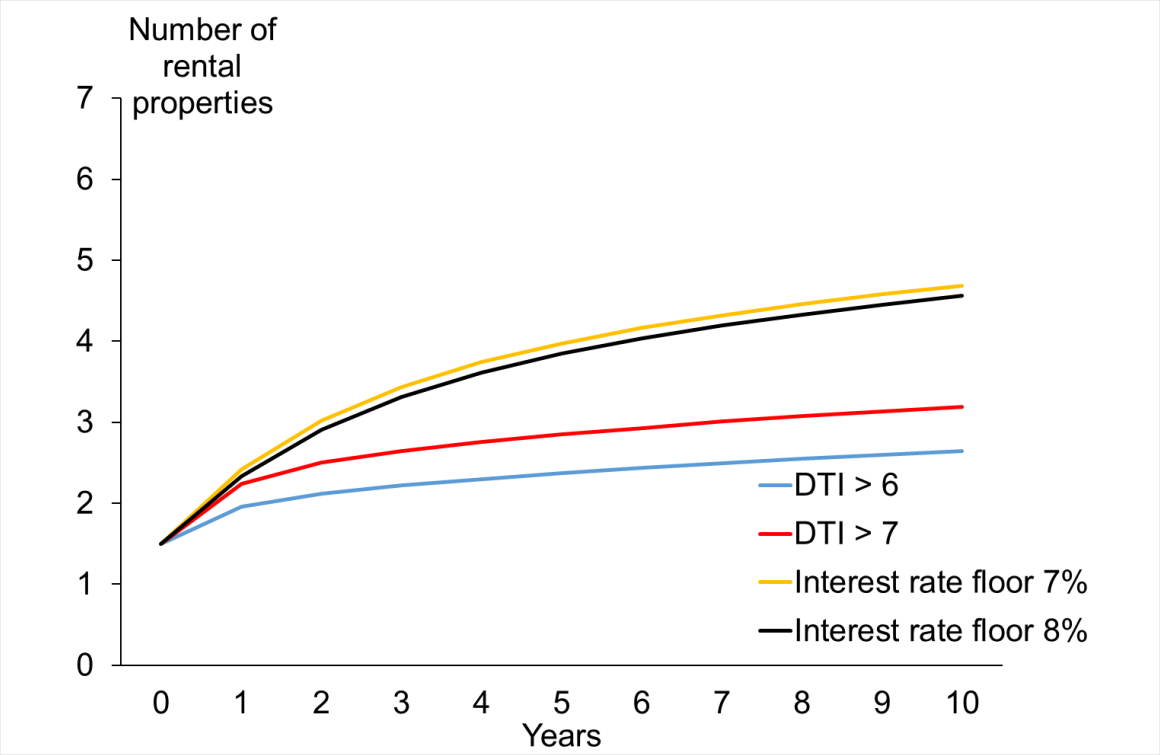
Source: Reserve Bank estimates

Figure A.19: Number of rental properties under debt serviceability restrictions – small portfolio, low house price growth



Source: Reserve Bank estimates

Figure A.20: Number of rental properties under debt serviceability restrictions – small portfolio, high house price growth



Source: Reserve Bank estimates