

Using Macroprudential Tools to Address Systemic Risks in the Property Sector in Singapore

By Wong Nai Seng, Aloysius Lim and Wong Siang Leng¹
Monetary Authority of Singapore

1. Introduction

The rapid rise of property prices in several Asian markets following the Global Financial Crisis (GFC) has been a macroprudential policy concern for authorities in those jurisdictions. In some instances, emerging signs of speculative behaviour have led authorities to take measures to temper property market exuberance and promote more stable conditions.

In Singapore, property market stability is closely linked to macroeconomic and financial stability. Property is the largest component of household wealth, representing about half of total household assets. Mortgage loans account for some three-quarters of total household liabilities, and property-related loans form a substantial portion of banks' loan books.² As a result, adverse developments in the property market could have serious implications for households, the banking system and the broader economy. Therefore, when property prices rose rapidly shortly after the GFC, the Singapore authorities decided to introduce a series of measures to promote a more stable and sustainable property market.

These macroprudential policy measures aimed to achieve several objectives. First, to safeguard financial stability. Unsustainably high and rising property prices could create financial stability risks given households' and the banking system's exposure to property. Second, to encourage financial prudence among households. The combination of low global interest rates and high asset prices could lead some households to over-extend themselves financially when purchasing properties, without sufficient regard to longer term debt servicing ability. In addition, the measures served an ancillary objective of moderating inflationary pressures, since housing is also a sizeable component of household expenditure.³

Singapore has taken a multi-pronged approach to mitigate macroprudential risks from rising housing prices. The authorities used a combination of demand-side (including both credit-based and fiscal-based measures) and supply-side measures (e.g. government land sales).

This paper investigates whether Singapore's property market measures have been effective in containing the build-up of risks from rising home prices. We examine whether the measures have helped to reduce property transactions, property prices, and mortgage loans and to improve the risk profile of borrowers.

The paper is organized as follows. Section 2 reviews the property market measures implemented in Singapore since the 1990s. Section 3 surveys past studies on the effectiveness of macroprudential policies. Section 4 sets out a model of the

Singapore private property market. Section 5 evaluates the effectiveness of Singapore's property market measures using the model. The last section concludes and discusses policy implications.

2. Evolution of Singapore's Private Residential Property Market since the 1990s

The use of policy measures to stabilize the property market in Singapore dates back to the 1990s (Annex). Responding to an upswing between 1990 and 1996 when private residential property prices had more than doubled, the Singapore government announced a package of measures in 1996 aimed at stabilizing the market. Stamp duty and a capital gains tax were applied to sales of property within three years of purchase to discourage speculative activity. A loan-to-value (LTV) cap of 80% was imposed. Foreigners were prohibited from taking on Singapore dollar loans for property purchases. Land supply for property development was also increased. These measures had an immediate effect in cooling the property market – the private property price index eased by about 16% between the peak in Q2 1996 and Q4 1997.

Measures to cool the property market were eased when the situation warranted it. Following the onset of the Asian Financial Crisis (AFC) when private residential property prices hit a trough in Q4 1998, the Singapore government relaxed stamp duties for both buyers and sellers and permitted the Deferred Payment Scheme (DPS), under which buyers could defer payments until the completion of their properties. Later in 2003, the Singapore government lifted the capital gains tax and allowed foreigners access to Singapore dollar property loans. Between 2003 and mid-2005, stamp duties were reduced by 30%. Further, the LTV limit was raised to 90% in July 2005 while the minimum cash down-payment requirement was reduced from 10% to 5%. Developers were also given more time to complete their projects.

When short-term speculative activities soared between end-2006 and Q2 2008, the stamp duty concession was withdrawn, and buyers were required to pay the stamp duty within 14 days of accepting their Option-To-Purchase (OTP).⁴ The DPS was also disallowed in October 2007.

When the GFC unfolded in Q3 2008, property prices in Singapore declined sharply by 25% over four quarters and transaction activity fell. In response, the Singapore government suspended land sales to developers and allowed them more time to phase in the construction and sale of their projects.

The property market began to show signs of an upswing after Q2 2009 as the economy began to recover and global interest rates eased (Annex). Prices rose by almost 16% in Q3 2009, the largest q-o-q increase since 1981. To pre-empt a speculative bubble, the Singapore government increased land supply and disallowed loan schemes which could have encouraged speculation in September 2009.

Between 2010 and 2012, a mix of credit-based and fiscal-based measures were progressively introduced and tightened to stabilize the property market. The LTV limit was brought down to 80% for private properties and tightened further for borrowers with multiple loans and corporates. A seller's stamp duty (SSD) was introduced in 2010 to discourage speculative flipping of properties. This was followed by an additional buyer's stamp duty (ABSD) in 2011. A cap on loan tenures for housing loans was also put in place in 2012.

In June 2013, the Total Debt Servicing Ratio (TDSR) was introduced for all property loans to encourage financial prudence among borrowers and strengthen credit underwriting practices by financial institutions. Since then, prices in the private housing market have declined for six consecutive quarters between Q4 2013 and Q1 2015 by a cumulative 6%. Monthly property transaction volumes have fallen to less than half of the levels during the preceding two years. New housing loans have also contracted.

3. Literature Review

Various studies have analyzed the effects of macroprudential policies on financial stability. Lim et al. (2011) explored the role of macroprudential policies and found evidence that some policies are effective in reducing the pro-cyclicality of credit and leverage.⁵ Crowe et al. (2011) found that tools that are more targeted - such as macroprudential measures - deliver the highest welfare.⁶ Zhang and Zoli (2014) found that macroprudential measures, in particular property-related measures, appear to have contributed to reducing credit growth in Asia. Further, only property-related measures are found to have had a significant impact, partly reflecting the heavy use of such measures in Asia compared to other prudential tools. While these studies in general show that property-related macroprudential measures are effective in lowering credit, the exact phase of the housing cycle in which the measures are being implemented and whether they are being tightened or loosened might have consequences on the effectiveness of the measures. McDonald (2015) found that tightening property-related macroprudential measures impacted credit and house prices during a boom, whereas the effectiveness of easing these measures during down-cycles is limited.

Other studies have sought to ascertain the differential impact of various policy tools on house prices and credit. A study by the Hong Kong Monetary Authority highlighted that credit-based measures helped dampen mortgage loan growth and transaction volume in Hong Kong, but did not appear to have had a direct impact on house prices. In particular, the second, third and fourth rounds of prudential measures, which imposed stringent LTV requirements, debt servicing ratio (DSR) caps and stress tests of borrowers' repayment ability against interest rate hikes, were found to be relatively more effective in limiting mortgage loan growth than other rounds of prudential measures.⁷ The study also found that demand-management measures (e.g. stamp duties) helped dampen transaction volume and growth in house prices, but did not have a statistically significant direct impact on mortgage loan growth.

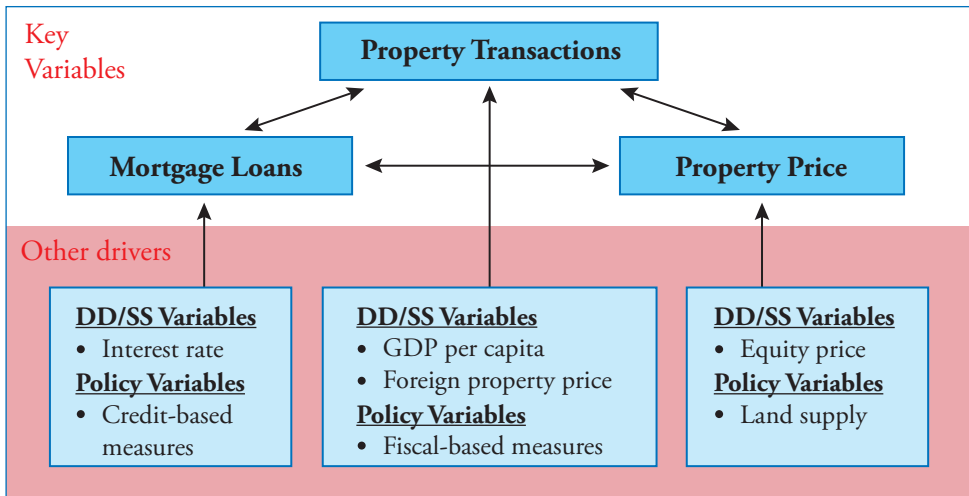
Nevertheless, there remains an indirect effect on loan growth through the impact on house prices and transaction volume.

Kuttner and Shim (2013) found that amongst the non-interest rate policy tools, the debt service-to-income (DSTI) ratio most consistently affects housing credit growth by about 4 to 7 percentage points over four quarters.⁸ In addition, the increase in housing-related taxes can slow the growth of house prices, although the findings are sensitive to the econometric technique used.

4. A Model of Singapore’s Private Property Market

To assess the effectiveness of macroprudential policies, we first set out the drivers and transmission channels in Singapore’s private property market. Figure 1 highlights the dynamic linkages among the key variables, namely property transactions, property prices, and mortgage loans. These key variables are driven by policy variables such as credit-based and fiscal-based measures, as well as other demand and supply drivers in the market.

Figure 1
Interlinkages in Singapore’s Private Property Market



Source: MAS

These relationships and transmission channels are set out in the three underlying equations of the model that we use for this study (Table 1). Regressions of these equations are estimated using data⁹ between Q3 2002 and Q2 2014.

Table 1
Specifications of Equations

Equation	Key Variable	Drivers
1	Property transactions	$= f(\text{Property price, Mortgage loans, Foreign property price, Fiscal-based measures, GDP per capita, Dummy variable 1}^{10})$
2	Property prices	$= f(\text{Mortgage loans, Property transactions, Equity price, Land supply})$
3	Mortgage loans	$= f(\text{Property transactions, Property price, Interest rate, Credit-based measures, Dummy variable 2}^{11})$

The model estimates indicate that the relationships between the three key variables – property transactions, property prices and mortgage loans – are statistically significant and move in the same direction. These findings are in line with existing literature (Igan and Kang, 2011), and can be explained by an increase in property prices raising household wealth, which in turn translates into higher consumption demand, including property purchases (Case et al., 2005).¹² Further, higher property prices and property transactions would tend to increase mortgage loans. Conversely, mortgage loans is an important driver for property transactions and property prices as financing is often required for property purchases. US-centric studies on property markets that do not include mortgage credit growth in their models are not able to show conclusive results (Duca et al., 2011).

Turning to the policy variables, credit-based measures such as LTV limits¹³ and the Total Debt Servicing Ratio (TDSR) framework¹⁴ are found to directly constrain mortgage lending. These measures also impact property transactions and property prices slightly through the credit channel.

Fiscal-based measures as a whole, which include the SSD¹⁵ and the ABSD¹⁶, are found to directly constrain property transactions, with attendant effects on property prices and mortgage loans.

Land supply, which refers to the government land sales programme, is found to impact property prices, with slight spillover effects on property transactions and mortgage loans.

The model included other economic and financial factors – GDP per capita, interest rates, trends in other asset markets such as equity prices, and the prices of product substitutes like foreign property. GDP per capita is an indicator of income and is thus considered to be a fundamental driver of housing demand (Jacobsen and Naug, 2005). Higher interest rates would tend to deter property purchases through the credit channel. Equity prices capture wealth effects on households as well as

general market sentiment.¹⁷ The actual and perceived rise in wealth generated by rising GDP per capita and equity prices could lead to more property purchases. External factors are also important. Property demand is driven in part by foreigners residing in Singapore and non-resident investors searching for yield. Their investment decisions are influenced by the relative prices of Singapore property vis-à-vis foreign properties.

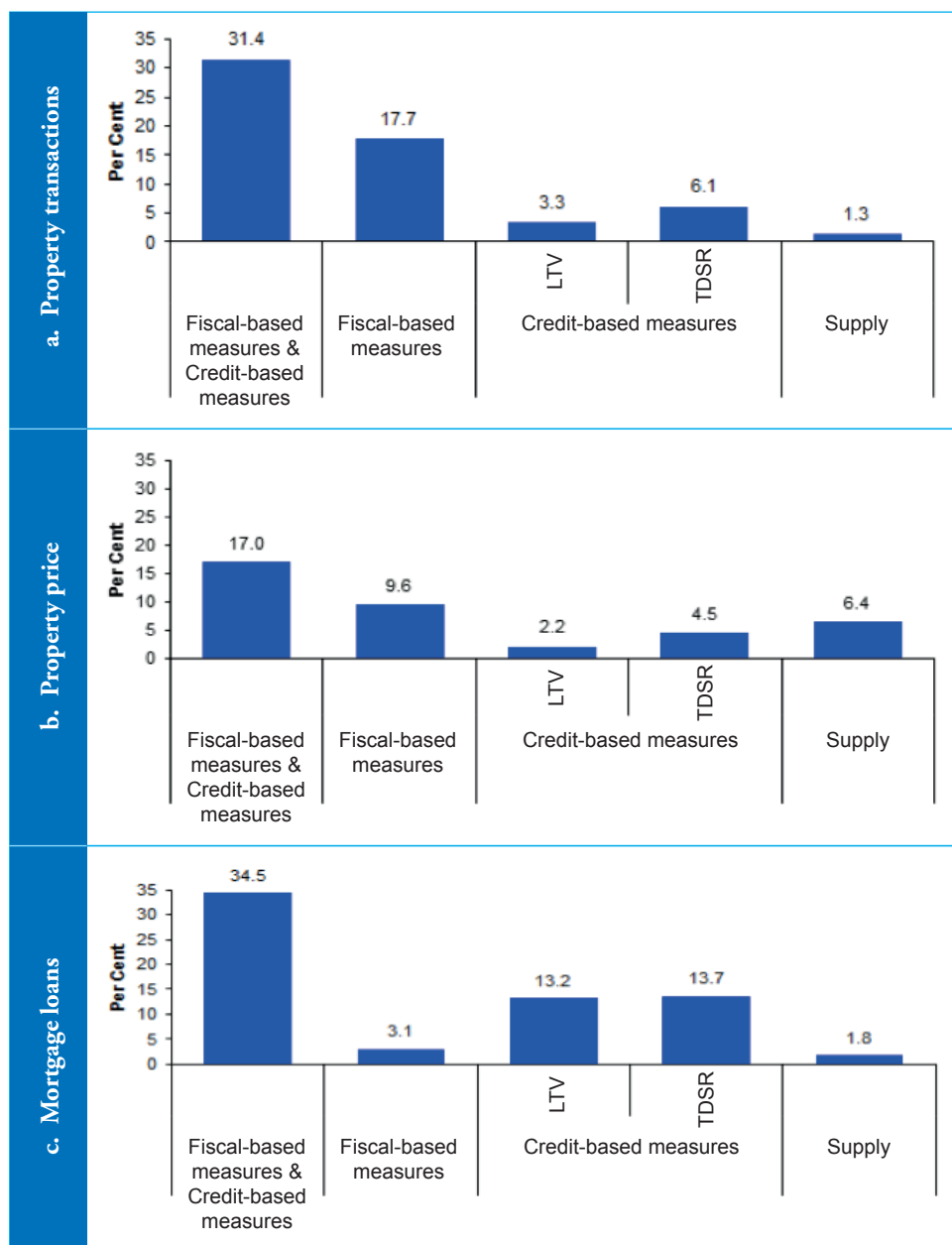
5. Assessment of Policy Effectiveness

This section assesses the effectiveness of the property market measures. We do this in two ways. First, we used the model developed in Section 4 to compare the values of the key variables of property transactions, property prices and mortgage loans under the observed baseline scenario against counterfactual scenarios in which different combinations of policy measures were not implemented.¹⁸ Second, we examine changes in the risk profile of borrowers following the introduction of the credit-based measures.

Our analysis shows that the property market measures helped dampen momentum in the market (Chart 1). Property transactions, property prices and mortgage loans would have been significantly higher (by up to 35%) had the various measures not been implemented. Fiscal-based measures had a larger impact on property transactions and property prices than credit-based measures, which operated largely by constraining mortgage loans. Supply-side measures had an empirically significant impact on house prices, even though these measures took the form of announcements of land supply for housing units which would be completed only much later.

In addition, micro-level data on the number of borrowers with multiple housing loans and on the LTVs of new mortgage loans indicate that the risk profile of borrowers has improved.

Chart 1
Estimated Impact of Policy Measures¹⁹ (%)

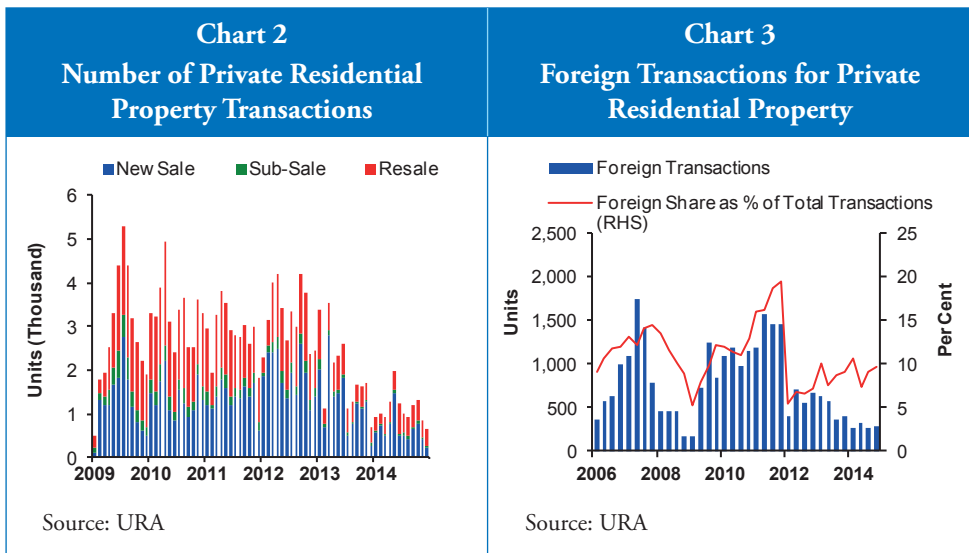


Note: Charts 1a and 1c indicate how much higher property transactions and mortgage loans would have been cumulatively, between Q1 2010 and Q2 2014, under different counterfactual scenarios in which the specified policy measures were not implemented compared with the observed baseline scenario. Chart 1b shows how much higher prices would have been as at Q2 2014 under the different counterfactual scenarios compared with the observed baseline scenario.

5.1 Impact on Property Transactions

Following the implementation of the property market measures, average monthly transaction activity fell from 2,840 units in 2009 to 1,100 units in 2014 (Chart 2).

Our counterfactual simulation suggests that property transactions would have been about 31% higher between Q1 2010 and Q2 2014 had the property market measures not been implemented (Chart 1a). Fiscal-based measures appear to have a larger impact on property transactions than credit-based and land supply measures. The SSD reduced sub-sales significantly, whereas the ABSD raised the hurdle rate of return for foreign buyers and property investors. The share of private residential purchases by foreigners, which peaked at close to 20% of total transactions in Q4 2011, fell sharply after the implementation of the ABSD (Chart 3).

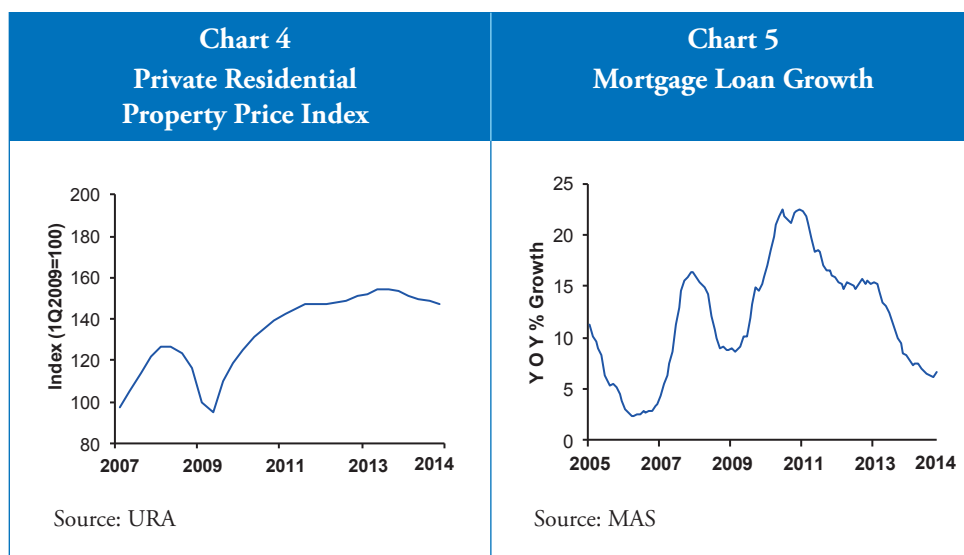


5.2 Impact on Property Prices

Following the implementation of the property market measures, the increase in private residential property prices moderated from 16% in Q3 2009 to a quarterly average of 0.7% in 2012. Property prices started to decline in Q4 2013 after the introduction of the TDSR in June 2013, and had fallen by a cumulative 6% by Q1 2015 (Chart 4).

The counterfactual simulation shows that private residential property prices would have been about 17% higher in Q2 2014 in the absence of the fiscal-based and credit-based measures (Chart 1b). Fiscal-based measures have been more effective than credit-based measures in dampening property prices. Supply-side measures

appear to have an empirically significant impact on property prices. Property prices would have been about 6% higher in Q2 2014 if not for increased government land sales.



5.3 Impact on Mortgage Loans

The property market measures have tempered the growth of outstanding mortgage loans, with y-o-y growth moderating from a peak of 23% in August 2010 to 7% in December 2014 (*Chart 5*).

Our counterfactual simulation shows that mortgage loans would have been about 35% higher between Q1 2010 and Q2 2014 in the absence of any policy measures (*Chart 1c*). Further, credit-based measures appear to be much more effective than fiscal-based measures in constraining the increase in mortgage loans.²⁰

5.4 Risk Profile of Borrowers

Using micro-level credit data and empirical analysis, we assess whether the risk profile of borrowers has improved by looking at (i) shares of borrowers with multiple housing loans; and (ii) shares of borrowers with higher LTVs. Borrowers with multiple housing loans and higher LTVs can be considered to be more risky.

The number of borrowers with multiple housing loans has been declining as the LTV limit for such borrowers was progressively tightened. By January 2013, the LTV cap for borrowers taking on a second housing loan had been reduced to 50%, compared to 80% before August 2010. Meanwhile, the share of borrowers with multiple housing loans halved from 30% in 2011 to 15% in Q4 2014 (*Chart 6*).

An event study on the most recent tightening in January 2013 of LTVs for borrowers with multiple housing loans supports the assessment that the risk profile of borrowers has improved (Table 2). Since then, the share of borrowers with multiple mortgage loans has declined by around 15 percentage points, with a corresponding increase in the share of borrowers with only one mortgage loan. This suggests that there is a shift towards borrowers with a better risk profile.

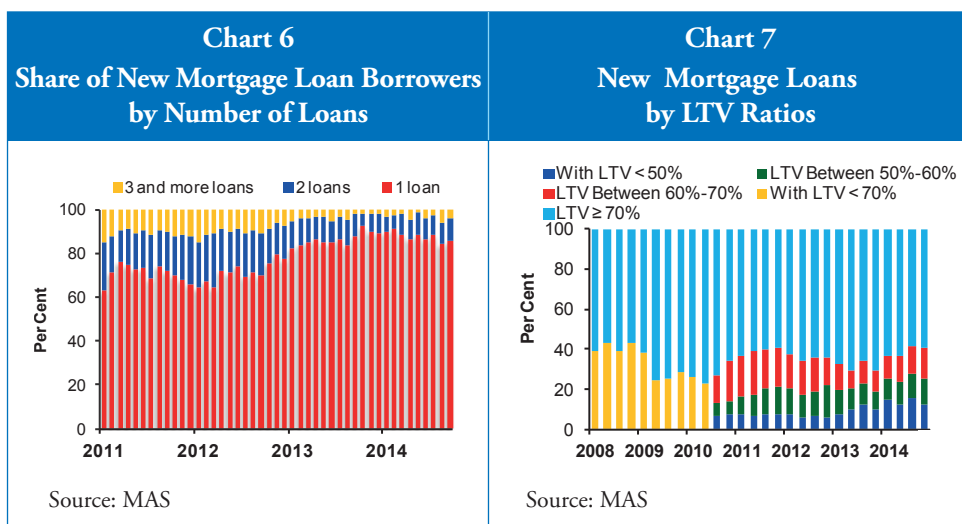


Table 2
Impact on Shares of Borrowers with Multiple Mortgage Loans
Q1 2010 to Q2 2014 (%)

Number of mortgage loans	Comparison of data			T- test results	
	Mean (Pre- Jan 2013)	Mean (Post- Jan 2013)	Difference	Unequal variance	Paired sample
1	71.9	87.1	16.2	2.02***	2.09***
2	18.5	9.5	-9.0	2.02***	2.09***
≥ 3	10.6	3.5	-7.1	2.02***	2.09***

Note: *** represents significance at the 1% level.

The property market measures have also contributed to lower LTVs for new mortgage loans. The share of new mortgage loans with LTVs above 70% has fallen from a peak of 77% in Q2 2010 to around 65% since 2012 (Chart 7).

6. Conclusion

The results presented in this paper suggest that the property market measures implemented in Singapore have helped to dampen property dynamics to promote a more stable and sustainable market.

The results also illustrate how a multi-pronged approach can help mitigate different risks posed by the property market. Credit-based measures work by targeting the pro-cyclical feedback loop between housing credit on the one hand and property transactions and property prices on the other. In contrast, fiscal-based measures and land supply impact property prices more directly. This suggests that having a toolkit with a wide range of tools, combined with judicious policy design, can help authorities target systemic risks more precisely. This would, in turn, reduce the risk of spillovers and unintended effects from macroprudential policy.

Supply-side measures appear to have an empirically significant impact on house prices, notwithstanding that these measures take the form of announcements of land sales for housing units which would be completed only later. This suggests that signalling effects could be significant, and should not be ignored when designing macroprudential policies. For the same reason, there may be advantage in designing a package of measures for implementation at the same time rather than announce individual measures on a piecemeal basis.

Endnotes

1. The authors wish to thank Lam San Ling, Lily Chan, Kenneth Gay, Ng Heng Tiong, John Sequeira, Angeline Qiu and Denise Yeo for their invaluable assistance in the preparation of this article. The views expressed in this article are the authors' and do not necessarily represent the views of the Monetary Authority of Singapore (MAS).
2. Property-related loans make up about 26% of total non-bank loans as of Q4 2014.
3. Housing costs, represented by imputed rentals on owner-occupied housing, makes up a significant share of close to one-fifth of Singapore's consumer price index.
4. An interested buyer can pay 1% of the price of a property for the exclusive right to decide within 14 days whether or not to buy the property. This is called an Option-to-Purchase (OTP).
5. Using cross-country panel regressions for 40 countries that adopted macroprudential measures, they found that tools such as LTV and debt-to-income (DTI) caps, ceilings on credit growth, reserve requirement and dynamic provisioning rules can mitigate the pro-cyclicality of credit.
6. The study covered 36 economies that experienced real estate booms and found that 24 had taken some policy measures. The study used a dynamic stochastic general equilibrium model that includes the housing sector and credit markets.
7. The HKMA has introduced six rounds of counter-cyclical prudential measures on banks' property mortgage business since October 2009 to prevent bank credit from fuelling property market imbalances and ensure that banks and their customers will have sufficient cushions on their balance sheets to ride out volatilities in housing prices.
8. The study used data from 57 countries for more than three decades and investigated the effectiveness of nine non-interest rate policy tools, including macroprudential measures in stabilizing house prices and housing credit.
9. The data used in the analysis were primarily from the Monetary Authority of Singapore (MAS), the Urban Redevelopment Authority (URA) of Singapore, Singapore Department of Statistics (DOS) and various databases such as Bloomberg and CEIC.
10. Dummy variable 1 accounts for the jump in collective sales (where a single buyer purchases a group of housing units in order to redevelop the land on which the housing units are situated) between Q2 2005 and Q3 2007. The rules for collective sales were tightened in October 2007, leading to a significant decline in collective sales thereafter.

11. Dummy variable 2 accounts for an increase in mortgage equity withdrawal loans between Q2 2010 and Q2 2011. The rules for mortgage equity withdrawal loans were tightened in July 2011, leading to a significant decline in mortgage equity withdrawal loans thereafter.
12. Higher property prices could also discourage further property investments as properties become less affordable. However, our research indicates that the wealth effect dominates this price effect.
13. The LTV limit was tightened in several rounds since 2010. LTV limits are currently 80% for a borrower's first housing loan, 50% for second housing loan and 40% for third and subsequent housing loan. For loans where the loan tenure exceeds 30 years or the loan period extends beyond the borrower's retirement age (65 years), the LTV limits are 20% lower (e.g. 60% instead of 80% for first housing loan).
14. The TDSR framework was implemented in June 2013. It requires financial institutions to standardize the computation of borrower's debt servicing ability for property loans, and regards loans in excess of 60% TDSR to be imprudent.
15. The SSD imposed higher tax rates for sales within a shorter period after purchase. SSD rates are 16% for buyers selling their residential property within the first year after purchase; 12% within the second year; 8% within the third year; and 4% within the fourth year.
16. The ABSD was implemented in December 2011 and tiered tax rates by the number of residential property purchases and nationality of the purchaser. The ABSDs on the following categories of residential property purchases are as follows: (i) 15% for foreigners and non-individuals; (ii) 5% for Singapore Permanent Residents (PRs) buying their first property and 10% for PRs buying a second and subsequent property; and (iii) 7% for Singapore citizens buying their second property and 10% for Singapore citizens buying their third and subsequent property.
17. Higher equity prices could also reduce the attractiveness of equity as an alternative asset to property, in turn driving up property demand.
18. For counterfactual simulations on land supply, we excluded the increase in the pipeline supply of private housing units arising from the increase in the Government Land Sales (GLS) program since Q3 2010.
19. Please note that the model is subject to further refinement, which may affect the estimated impact of the policy variables.
20. Counterfactual simulations show that mortgage loans would have been 27% higher in the absence of the credit-based measures, compared to 3% higher without the fiscal-based measures.

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Chart A1
Private Residential Property Price Index and Key Policy Measures Introduced between 1996 and 2008

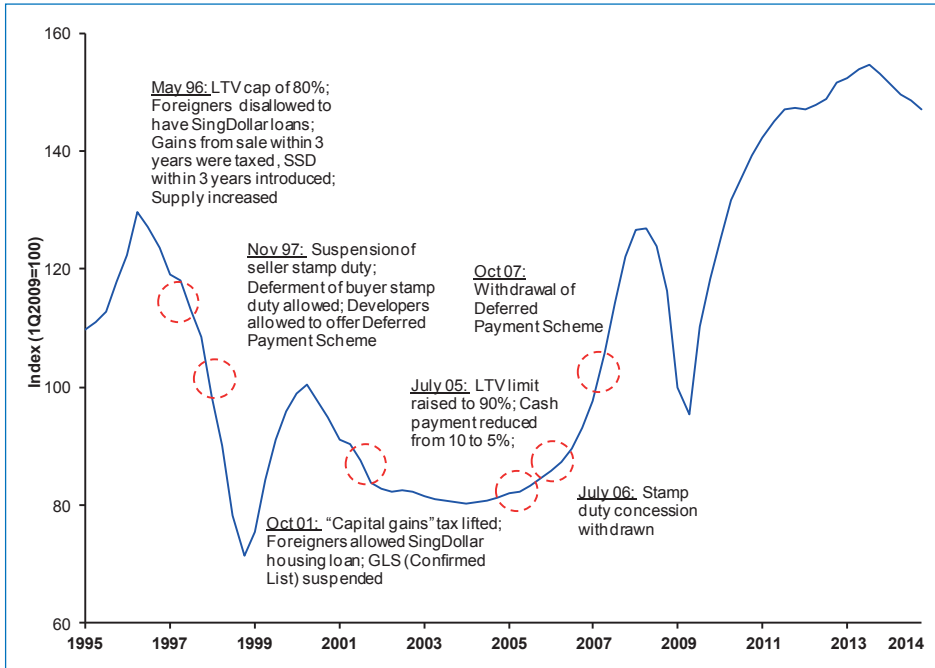


Chart A2
Private Residential Property Price Index and Key Policy Measures Introduced between 2009 And 2014

