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**Experiences with Macroprudential Policy—  
Five Case Studies**

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**I N T E R N A T I O N A L M O N E T A R Y F U N D**

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Monetary and Capital Markets Department

**Experiences with Macroprudential Policy—Five Case Studies**

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**Abstract**

This paper presents case studies of macroprudential policy in five jurisdictions (Hong Kong SAR, the Netherlands, New Zealand, Singapore, and Sweden). The case studies describe the institutional framework, its evolution, the use of macroprudential tools, and the circumstances under which the tools have been used. The paper shows how macroprudential policy is conducted under a heterogeneous set of institutional frameworks. In all cases macroprudential tools have been used to address risks in the housing market. In addition, some of them have moved to enhance the resilience of their banks to more general cyclical and structural risks.

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## I. INTRODUCTION

**This paper presents five case studies of experiences with macroprudential policy.** It complements the Staff Guidance Note on Macroprudential Policy ([IMF, 2014a](#)) issued recently by the IMF that provides a framework for staff's advice on macroprudential policy in its bilateral surveillance.<sup>2</sup> The studies describe the institutional framework and its evolution in the five cases, and provide examples of the types of macroprudential tools used and the circumstances under which they have been implemented. The five economies studied are Hong Kong SAR, the Netherlands, New Zealand, Singapore and Sweden.<sup>3</sup> All of these economies have gained experience with implementing macroprudential policies, and most of these economies have large financial sectors relative to their GDP. The study focuses on the post global financial crisis period.

**The institutional frameworks described in this paper resemble to a large extent the stylized institutional models identified in Nier et al. (2011).** One size, however, does not fit all. For example, Singapore fits into the model where the central bank is the overall financial supervisor and also has the macroprudential mandate, but with active role of the government (e.g., (MOF)). New Zealand fits into the model where the integration of supervisory agencies is partial but the macroprudential mandate lies with the central bank and the government does not play an active role in macroprudential policy. Sweden is an example where the central bank does not have supervisory responsibilities and the macroprudential mandate lies with the integrated supervisory agency. In Hong Kong SAR the central bank is empowered to conduct macroprudential policy, whereas in the Netherlands the mandate to implement macroprudential policy is shared between the central bank and the government.

**In all the cases reviewed, the macroprudential tools have been used primarily to address risks in the real estate sector.** Partly for this reason, the loan-to-value (LTV) limit was the most popular macroprudential tool, used in the five cases. Some jurisdictions have used multiple tools to help the effectiveness of the measures. For instance, Hong Kong SAR and Singapore have used the debt service-to-income (DSTI) ratio and taxes applied to real estate transactions along with the LTV ratio. Sweden and Hong Kong SAR also have imposed additional capital requirements for mortgages.

**To enhance the resilience of the banking system, some authorities in these five cases also have used, or plan to use, additional macroprudential tools to address risk in the *time***

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<sup>2</sup> The Staff Guidance Note on Macroprudential Policies comprises of (i) a main paper; (ii) a combined instrument specific note; and (iii) considerations for low income countries.

<sup>3</sup> The paper aims to serve as a complement to the Staff Guidance Note by providing examples of how a sample of jurisdictions used macroprudential tools. It is not intended to provide an assessment of supervisory practices in these jurisdictions.

**and structural dimensions** ([IMF, 2013a](#)). Most of these measures were adopted in response to the global financial crisis. New Zealand, for instance, moved quite quickly compared to other countries and imposed liquidity requirements to contain bank funding risks, and gradually increased the requirement. Sweden did the same in 2013. Banks in both countries rely heavily on wholesale funding. Countercyclical capital buffers will take effect in Sweden in the Fall of 2015 and in Hong Kong SAR in phases beginning 2016, while the Netherlands intends to impose them too. Furthermore, systemically important institutions will have to hold additional capital buffers starting in 2015 in Sweden and 2016 in Hong Kong SAR and the Netherlands.

**It is too early to gauge the full impact of the measures that have been undertaken.** In addition, some measures will only take effect in the future. Nevertheless, there is some early evidence that the implementation of macroprudential measures have enhanced banking system resilience and helped reduce the build-up of housing sector leverage in the cases reviewed. For instance, LTV ratios declined in Hong Kong SAR, New Zealand, and Singapore following the adoption of LTV limits. House prices growth was also affected. For example, the rate of growth of house prices peaked in New Zealand following the imposition of a cap on LTVs. House prices also leveled off in Hong Kong SAR under the combined weight of macroprudential tools and taxes, with the taxes appearing to have a more immediate impact.

## II. CASE STUDIES<sup>4</sup>

### A. Hong Kong SAR

#### Background

**Hong Kong SAR's financial sector is one of the largest in the world.** The banking system, with assets equivalent to 750 percent of GDP, is highly capitalized, profitable, and liquid, and the securities markets are deep, liquid, and efficient. As of end 2014, the Hong Kong SAR financial system faced a number of risks from elevated property prices, spillovers from the impending exit from the low interest rate environment, and increasing economic and financial integration with mainland China.<sup>5</sup>

**During 2014 property prices stood at near historical highs.** Residential property prices resumed an upward trend in 2009 after a brief correction in 2008, rising by 130 percent by mid-2013, as unconventional monetary policy in the U.S. came into effect and interest rates fell to record lows.<sup>6</sup> The increase in property prices was fuelled by increased mortgage lending while housing supply remained tight. Demand from buyers from mainland China

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<sup>4</sup> The cutoff for information in all cases is end January 2015.

<sup>5</sup> [IMF \(2014b\)](#).

<sup>6</sup> [Hong Kong Monetary Authority \(HKMA\) \(2013\)](#).

appear to have also contributed to strong house price gains, which have been larger among non-luxury units.

**Hong Kong SAR banks withstood well the impact of the global financial crisis.** The increase in financial market volatility affected Hong Kong SAR markets in late 2008 as reflected by a spike in interbank rates due to rising concerns over counterparty risk, higher risk aversion, and some liquidity hoarding. The market for term interbank lending dried up with significant tiering among counterparties. In response, the monetary authorities expanded their liquidity facilities, provided a facility for foreign exchange swaps, and introduced a temporary blanket guarantee for all deposits (in line with other countries in the region). Hong Kong SAR banks managed to withstand the market turbulence, in part, because they were in general not exposed to the securitized products at the center of the crisis, had strong internal risk management systems, were highly liquid, and had low loan-to-deposit ratios (Figure 1).

### **Institutional framework**

**Hong Kong SAR has an effective institutional arrangement for macroprudential policy.**

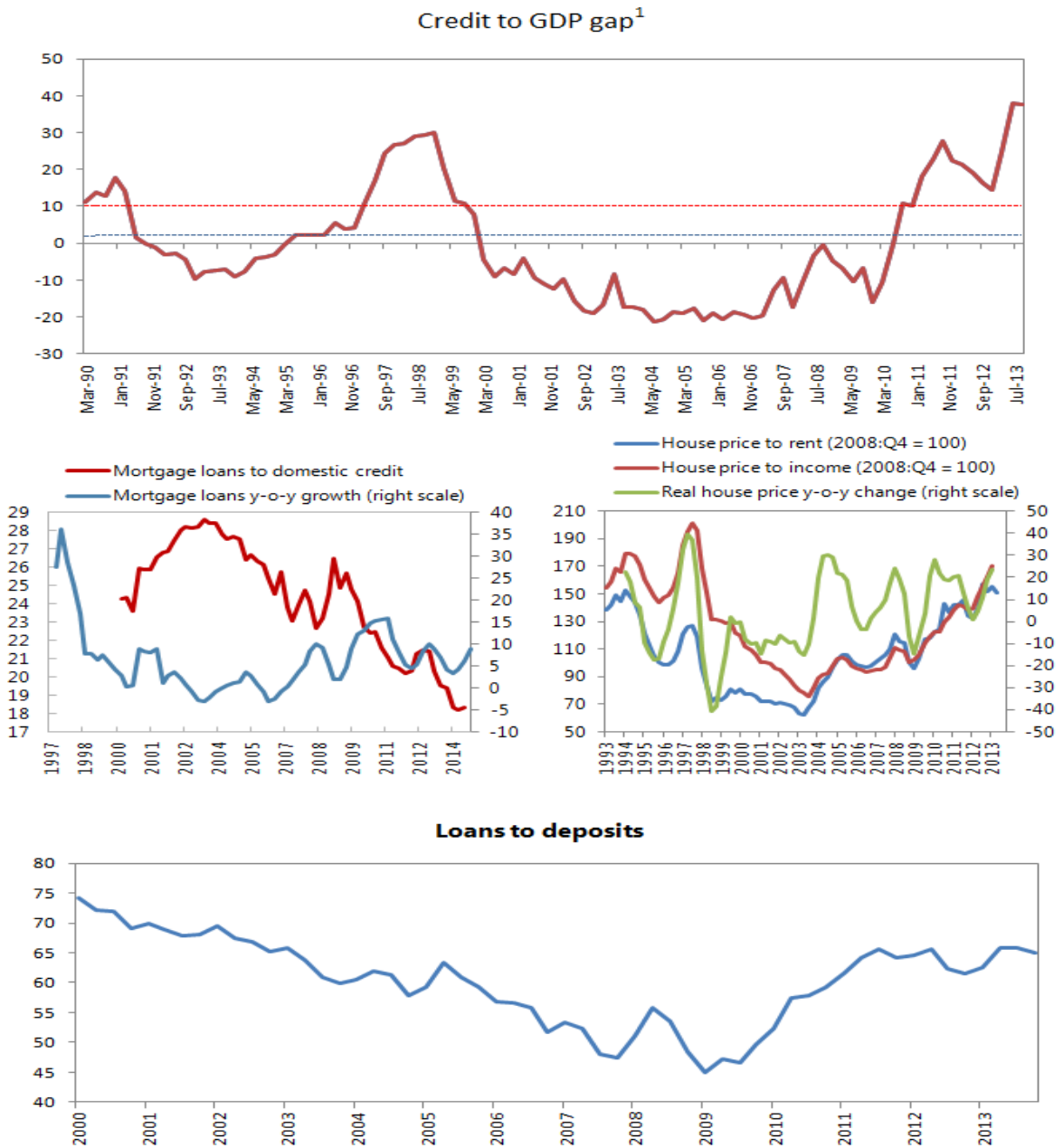
The responsibility for maintaining financial stability is shared among multiple agencies, each of which has its own formal mandate. The Financial Secretary (FS), is responsible for determining the monetary policy objective and the structure of the monetary system, and plays an important role in maintaining the stability and integrity of the monetary and financial system. The Hong Kong Monetary Authority (HKMA), which is the regulator of deposit-taking institutions, shares the financial stability responsibility and plays a key role in the macroprudential framework.

**The HKMA is empowered to implement macroprudential policy.** The mandate for the HKMA to promote the general stability and effective working of the banking system is set out in the Banking Ordinance, which stipulates the principal functions of the HKMA and provides it with the legal basis for regulating and supervising banks and other deposit-taking businesses.<sup>7</sup> The HKMA determines prudential policies, standards, and guidelines relating to the regulation of banks and other deposit-taking institutions, and designs macroprudential instruments to address systemic risks.

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<sup>7</sup> [HKMA \(2006\)](#).

Figure 1. Hong Kong SAR: Selected Macprudential Indicators, 1990–2014  
(In percent)



Sources: Bank for International Settlements (BIS), World Economic Outlook (WEO), International Financial Statistics (IFS), CEIC, Global Property Guide (GPG), Haver Analytics Inc., and Fund staff calculations.

<sup>1</sup>The “credit-to-GDP gap” is defined as the deviation of the ratio of credit to GDP from its long run trend. The long run trend is calculated from the credit-to-GDP series by using a one-sided Hodrick-Prescott filter. This calculation uses a high smoothing parameter ( $\lambda$  equals 400,000) since the series is quarterly. See [IMF \(2014c\)](#) for further details. Credit-to-GDP gap is calculated from the earliest GDP data available.

**Coordination for financial stability is under the auspices of the Council of Financial Regulators.** Chaired by the FS, the Council comprises representatives from the HKMA, the Securities and Futures Commission (SFC), the Office of the Commissioner of Insurance (OCI), the Mandatory Provident Fund Schemes Authority, and the Financial Services and the Treasury Bureau. A smaller Financial Stability Committee, chaired by Secretary for Financial Services and the Treasury Bureau and composed of representatives of the HKMA, SFC and OCI, is responsible for monitoring the functioning of the financial system on a regular basis. The division of functions and responsibilities between the HKMA and FS was set out in June 2003.

### **Use of macroprudential policy instruments**

**The HKMA has made extensive use of macroprudential instruments to address risks in the property sector since the 1990s.** The most frequently used instruments have been the LTV cap and the cap on the DSTI. Both instruments have been adjusted at different phases of the credit cycle to achieve a countercyclical effect. The LTV cap is differentiated, with a lower cap on higher-valued properties and on investment properties.

**Increased risks in the property sector prompted a progressive tightening of the macroprudential instruments starting in 2009.** To strengthen the resilience of banks to potential house price corrections, and to the eventual increase in interest rates in advanced economies, the HKMA undertook a gradual tightening of macroprudential policy measures (Box 1).



<b>Box 1. Hong Kong SAR—Macroprudential Measures, 2009–13</b>	
October 2009	The LTV ratio was capped at 60 percent for residential properties valued at HK\$20 million or more.
	For properties valued below HK\$20 million, the 70 percent LTV cap continued to apply, but the maximum loan amount was capped at HK\$12 million.
August 2010	The LTV ratio for residential properties with a value of HK\$12 million or more, and for non-owner occupied residential properties was lowered to 60 percent from 70 percent.
	For residential properties valued below HK\$12 million, the 70 percent LTV ratio continued to apply, but the maximum loan amount was capped at HK\$7.2 million.
	The limit on DSTI of mortgage applicants was standardized to 50 percent from a range of 50 percent to 60 percent.
	Banks were required to stress-test mortgage applicants' repayment ability with an increase in mortgage rates of at least two percentage points, and limit the stressed DSTI to 60 percent.
November 2010	The LTV ratio for residential properties with a value of HK\$12 million or more was lowered to 50 percent from 60 percent.
	The LTV ratio for residential properties with a value between HK\$8 million and HK\$12 million was lowered from 70 percent to 60 percent, and the maximum loan amount was capped at HK\$6 million.
	The LTV ratio of 70 percent continued to apply to residential properties with a value below HK\$8 million, but the maximum loan amount was capped at HK\$4.8 million.
	The LTV ratio was lowered to 50 percent for all non-owner-occupied residential properties, properties held by a company and industrial and commercial properties regardless of property values.
June 2011	The LTV ratio of 50 percent was applied to all residential properties with a value of HK\$10 million or more.
	The LTV ratio for residential properties with a value between HK\$7 million and HK\$10 million was lowered to 60 percent, with the maximum loan amount capped at HK\$5 million.
	The LTV ratio of 70 percent continued to apply to residential properties with a value below HK\$7 million, but the maximum loan amount was capped at HK\$4.2 million.
	The applicable LTV ratio was lowered by at least ten percentage points regardless of property types or values when the principal income of the mortgage loan applicant was not derived from Hong Kong SAR.
	The LTV ratio was lowered to 40 percent from 50 percent for properties under the net worth-based mortgage.
September 2012	For those mortgage applicants who have already borrowed or guaranteed outstanding property mortgage loans for one or more properties at the time of the loan application.
	<ul style="list-style-type: none"> <li>• The LTV ratio was lowered to 30 percent from 40 percent for mortgage loans assessed based on the net worth of a mortgage applicant.</li> </ul>
	<ul style="list-style-type: none"> <li>• The applicable LTV ratio was lowered by 20 percentage points regardless of property types or values for mortgage applicants whose principal income is from outside Hong Kong SAR.</li> </ul>
	<ul style="list-style-type: none"> <li>• The DSTI limit was lowered to 40 percent from 50 percent for applicants who already have an outstanding mortgage on residential, industrial or commercial properties.</li> </ul>
	<ul style="list-style-type: none"> <li>• Accordingly, the maximum stressed DSTI limit was lowered to 50 percent from 60 percent.</li> </ul>
	The maximum loan tenor of all new property mortgage loans was limited to 30 years.

<b>Box 1. Hong Kong SAR—Macroprudential Measures, 2009–13 (Concluded)</b>	
February 2013	The LTV ratio was lowered by ten percentage points for all commercial and industrial properties from the existing applicable levels.
	The LTV ratio of mortgage loans for stand-alone car park spaces was set at 40 percent and the maximum loan tenor at 15 years.
	The LTV ratio applicable to commercial and industrial property mortgage loans was also applied to stand-alone car park space mortgage loans.
	When computing the stressed DSTI ratio, banks were required to assume a mortgage rate increase of 300 basis points for all types of properties, including residential, commercial and industrial properties.
	The DSTI and stressed DSTI ratios applicable to commercial and industrial property mortgage loans were also applied to stand-alone car park space mortgage loans.
	A risk weight floor of 15 percent was introduced on all residential mortgages for banks using the internal ratings-based approach. <sup>1</sup>
<p><sup>1</sup>The imposition of the risk weight floor reflect concerns that the risk weights generated by banks' internal models are too low.</p>	

**There is some evidence that the tightening of macroprudential policy enhanced the resilience of Hong Kong SAR's banking system and limited household leverage.**<sup>8</sup> For instance, the average LTV ratio at origination declined from 64 percent in 2009 to 55 percent in mid-2013. Mortgage lending growth also slowed following the measures, although it has rebounded since mid-2014 (Figure 1). The impact of tightening macroprudential policy on property prices is less clear; property prices leveled off briefly following the measures but resumed their upward trend in mid-2014.

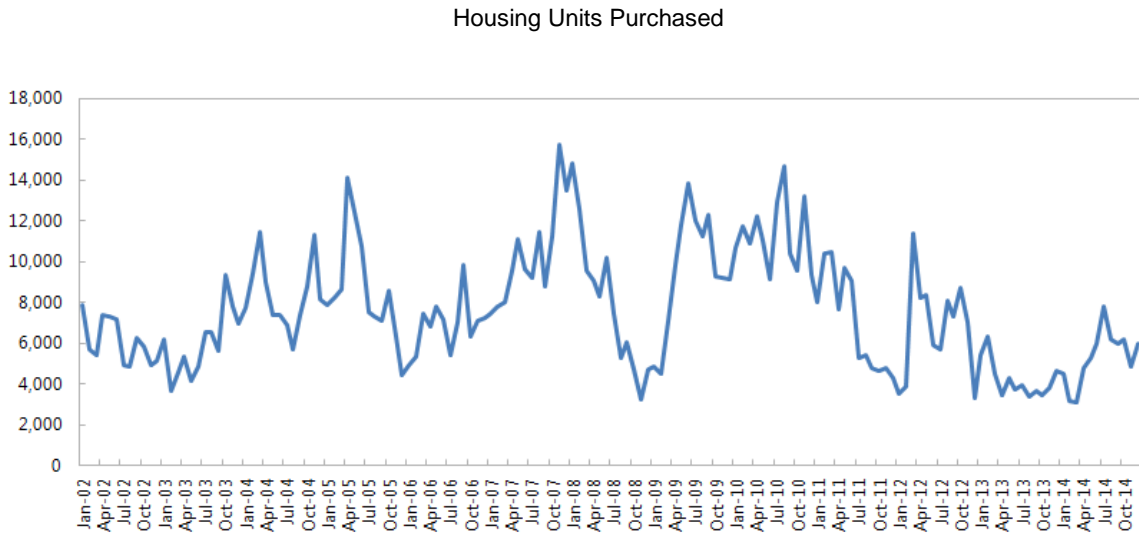
**Taxes on property transactions seem to have had a larger impact on the housing market.**<sup>9</sup> On several occasions, the government raised taxes on property transactions in conjunction with the macroprudential measures. A Special Stamp Duty (SSD) of up to 15 percent on residential properties resold within 24 months of purchase was introduced in November 2010. In October 2012, the SSD was raised to up to 20 percent on re-sales within 36 months, when a Buyer's Stamp Duty of 15 percent was also introduced for buyers of residential properties that are not Hong Kong SAR permanent residents. This was followed by a doubling of the existing ad valorem stamp duty rates across the board to a maximum of 8.5 percent in February 2013.<sup>10</sup> The across-the-board hike in the stamp duty, in particular, seems to have had a significant short-term impact on property prices and transactions (Figure 2).

<sup>8</sup> [Wong et al \(2011\)](#).

<sup>9</sup> [He \(2014\)](#).

<sup>10</sup> Hong Kong SAR permanent residents who do not own any other residential property in Hong Kong SAR at the time of acquisition are exempted.

Figure 2. Hong Kong SAR: Housing Units Purchased, 2002–14



Source: HKMA.

**In early 2015, the authorities announced new macroprudential measures to safeguard financial stability.**<sup>11</sup> Renewed concerns about the above-trend credit-to-GDP ratio and housing price growth prompted the authorities to announce a countercyclical capital buffer of 0.625 percent that will be activated at the beginning of 2016. This will be accompanied by a capital conservation buffer of 0.625 percent and higher loss absorbency surcharges of 0.25 percent to 0.625 percent for domestic systemically important banks implemented under Basel III. While these measures go beyond the property sector, their implementation should enhance banks' overall resilience and reduce their vulnerability to property sector shocks. Over the longer term, though, structural policies that ensure adequate housing supply will be key to preventing imbalances in the property sector.<sup>12</sup>

## B. The Netherlands

### Background

**The Netherlands was hit hard by the global financial crisis.** The Netherlands has a very large financial sector (assets amounting to about 600 percent of GDP at end-2013) and includes large and complex global financial firms.<sup>13</sup> Dutch banks were exposed to the U.S. mortgage market and were also affected by the lack of liquidity in the inter-bank market when the crisis unfolded. Pension and insurance firms were also affected.

<sup>11</sup> [HKMA \(2015\)](#).

<sup>12</sup> [IMF \(2014b\)](#).

<sup>13</sup> Includes assets of banks, insurers, and pension funds.

**Sizeable government funds were required to support the financial sector during the crisis.** These took the form of equity injections, liquidity support, and guarantees. While these interventions helped stabilize the situation, it led to extensive state ownership or participation, including in four of the five largest financial groups. Following a divestment strategy state ownership has wound down to only two institutions by late 2014.

**The measures taken helped restore financial soundness.** By end-2013 all large banks had capital buffers well above the minimum requirements. The capital adequacy ratio (CAR) stood at 14.9 percent at end-2013, and comprised mostly of core Tier 1 capital. In addition, the nonperforming loan (NPL) ratio was at manageable levels.

**Notwithstanding these improvements banks balance sheet risks remain, on account of the large exposure to the real estate sector, the slow economic recovery, and the continued reliance on wholesale funding.**<sup>14</sup> As of end-2013 residential real estate loans represented about 30 percent of total bank loans and the process of household and bank deleveraging continued. The 34 percent share of underwater mortgages remains an important vulnerability.<sup>15</sup> Although mortgage defaults have remained low (in part because the Dutch personal bankruptcy system is creditor friendly with full recourse to borrower's assets), the large debt overhang in a context of low inflation is likely to continue holding back private consumption. Moreover, funding risk remains a challenge, owing to banks' high reliance on wholesale funding (Figure 3).

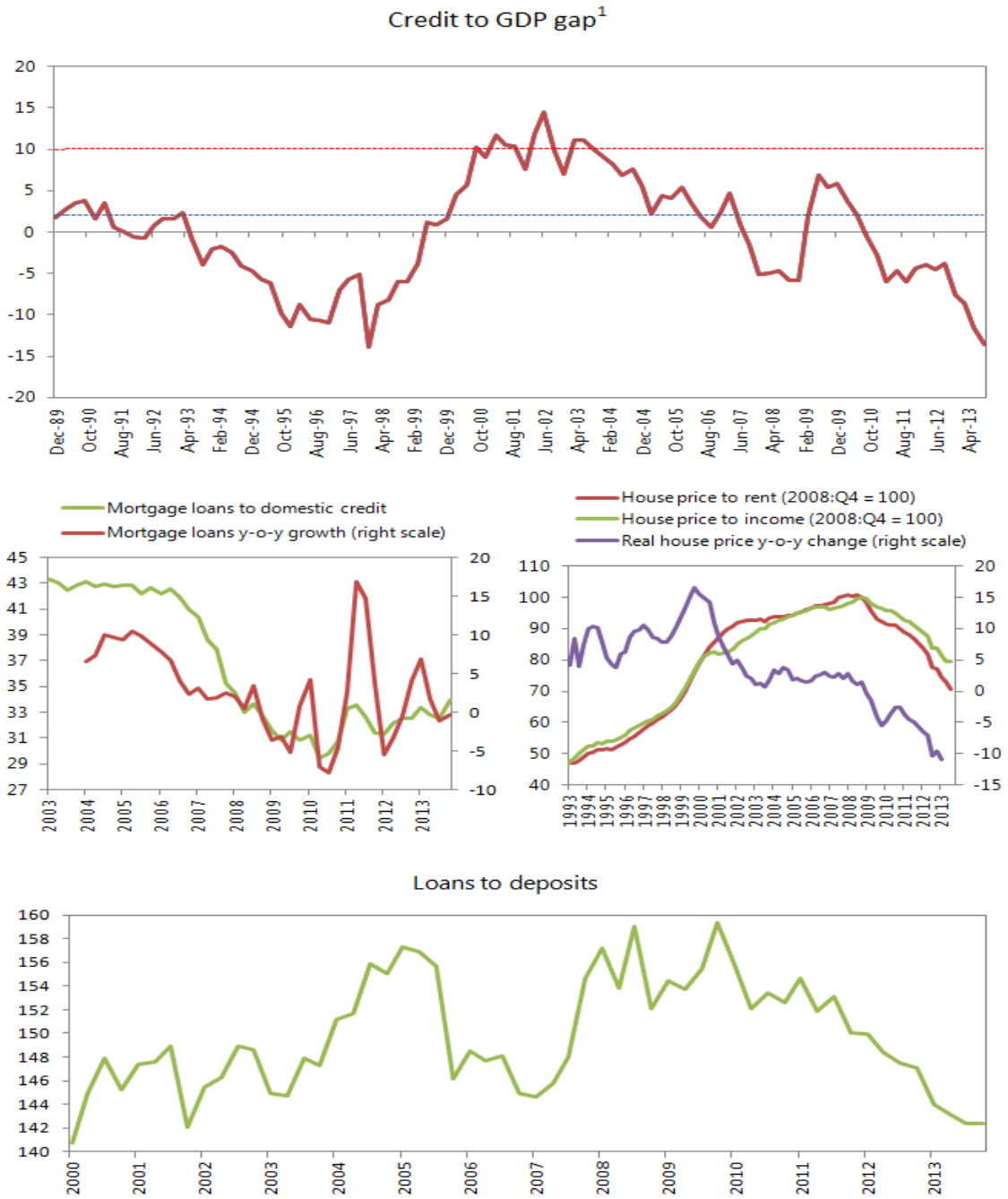
**Household balance sheets also remain vulnerable.** Prior to the crisis, in the context of ample global liquidity, a favorable macroeconomic environment, and supportive tax and regulatory incentives, households accumulated substantial mortgage debt at generous LTV ratios, spurred in part by advantageous mortgage interest deductibility (MID). Mortgage debt as a share of GDP increased steadily until 2012 (Figure 4), while household debt as a share of disposable income doubled from 2000 to 2012—to the highest in the euro area. The expansion in credit activity led to the sharp increases in the credit gap during 2000–06 and 2009–10.

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<sup>14</sup> See [IMF \(2013b\)](#).

<sup>15</sup> [Statistics Netherlands \(2014\)](#).

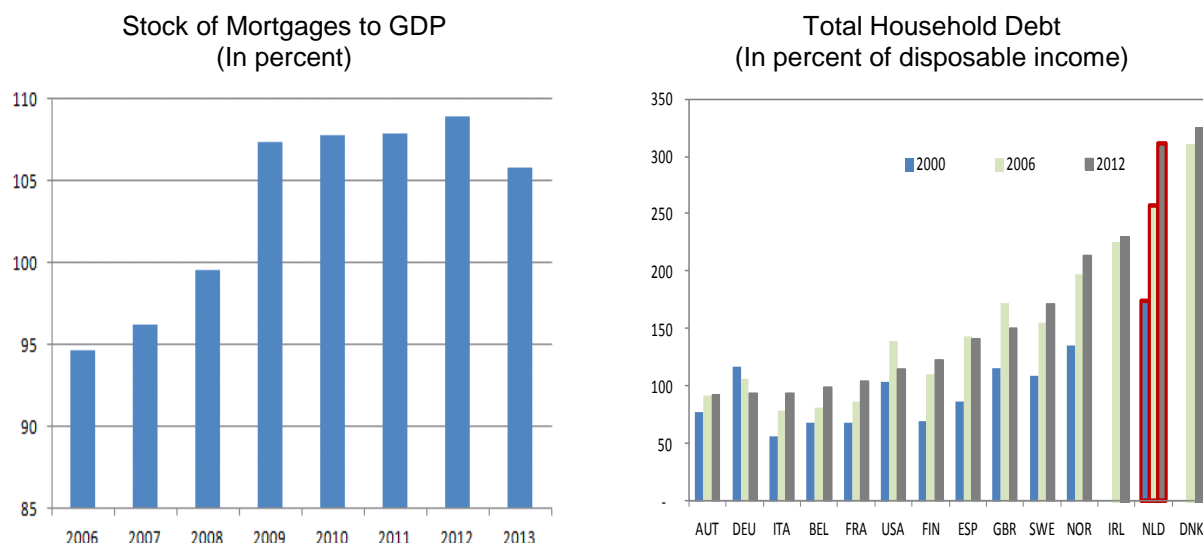
Figure 3. The Netherlands: Selected Macropprudential Indicators, 1989–2013  
(In percent)



Sources: BIS, WEO, IFS, CEIC, Organization for Economic Co-operation and Development (OECD), and IMF staff calculations.

<sup>1</sup>The “credit-to-GDP gap” is defined as the deviation of the ratio of credit to GDP from its long run trend. The long run trend is calculated from the credit-to-GDP series by using a one-sided Hodrick-Prescott filter. This calculation uses a high smoothing parameter (lambda equals 400,000) since the series is quarterly. See [IMF \(2014c\)](#) for further details. Credit-to-GDP gap is calculated from the earliest GDP data available.

Figure 4. The Netherlands: Household Debt Indicators, 2000–13



Sources: De Nederlandsche Bank (DNB), WEO, and IMF staff calculations.

Source: OECD.

Since their 2008 peak, house prices have fallen by about 20 percent in nominal terms (about 25 percent in real terms) (Figure 3). House prices rose on average by 60 percent in nominal terms from 2000 to the third quarter 2008.<sup>16</sup> The rate of decline from the peak was severe compared to previous downturns. Prices have since stabilized and recently there has been a pick-up in demand for residential mortgage loans.<sup>17</sup>

### Institutional framework

Netherlands was one of the early adopters (in 2002) of the so called “twin-peaks” model of supervision. The central bank (DNB) became a single prudential supervisor of all financial institutions (banks, insurance companies, investment firms, pension funds, and securities firms). And the Authority for Financial Markets (AFM) was created as a supervisor responsible for conduct-of-business supervision including supervision of security market activities.

The twin-peaks model worked well during the 2008–09 crisis.<sup>18</sup> Laws that permitted information sharing between the two peaks and the MOF were particularly useful. The pre-crisis institutional set up also helped. For example, the coordination group on financial stability used to meet a few times per year began to meet weekly during the crisis. The crisis showed that having both micro and macro prudential supervision consolidated within the DNB, allowed the central bank to take a systemic view across the financial sector and act

<sup>16</sup> [Statistics Netherlands](#).

<sup>17</sup> [DNB \(2014a\)](#).

<sup>18</sup> [IMF \(2011a\)](#).

quickly and decisively. The clear division of powers and responsibilities across key institutions (DNB, AFM, and MOF) were also instrumental in achieving coordination.

**Nevertheless, the report on the 2011 Financial Sector Assessment Program (FSAP) identified areas that could be strengthened.**<sup>19</sup> In particular, the crisis had underlined the importance of macroprudential regulation and supervision. It noted that there was scope for further integration of its macroprudential and microprudential supervision and for increasing the number of macroprudential policy instruments. The FSAP report also recommended that the DNB be given a greater role in the rule-making process and have some discretion to adjust levels of designated macroprudential instruments. At the time of the 2011 FSAP, most regulatory requirements were directly contained in the Act for Financial Supervision or in Decrees that were issued by the MOF (for example, the decree setting mortgage LTV ratios). The FSAP suggested instead that the DNB be allowed to change the LTV, perhaps within a range agreed with the MOF.

**In recent years, the Netherlands has taken steps to strengthen macroprudential oversight.** In 2012, the authorities established, through a Ministerial Decree, a macroprudential body—the Financial Stability Committee (FSC).<sup>20</sup> The FSC consists of seven representatives: three from the DNB (including the Chair), and two each from the MOF and the AFM. The FSC is responsible for identifying risks to financial stability, issue warnings and recommendations, and monitor the implementation of European Systemic Risk Board recommendations. While the FSC discusses the main risks and coordinates policy, the use of instruments remains the responsibility of the individual authority.<sup>21</sup> The FSC is useful for coordination beyond the use of prudential tools, such as the MID regime. More importantly, starting in January 2014, the division of labor between the MOF and DNB was changed by law, with responsibility of financial stability being entrusted to the DNB and some macroprudential instruments being explicitly assigned to it. In particular, the DNB was designated as the relevant authority for macroprudential instruments forming part of the European Union capital requirements for banks,<sup>22</sup> such as capital buffers for systemic banks and counter cyclical capital requirements, and risk weights for property loan exposures. The MOF remains responsible for other instruments (for example limits on LTV and loan-to-income (LTI) ratios).<sup>23,24</sup>

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<sup>19</sup> [IMF \(2011b\)](#).

<sup>20</sup> [MOF 2012a](#).

<sup>21</sup> [DNB \(2013\)](#).

<sup>22</sup> The European Union (EU) capital requirement is made up of the Capital Requirements Directive (CRD; 2013/36/EU) and the Capital Requirements Regulation (CRR; 575/2013).

<sup>23</sup> [DNB \(2014b\)](#).

<sup>24</sup> The recent peer review report by the Financial Stability Board provides recommendations to further strengthen the macroprudential policy institutional framework ([Financial Stability Board \(2014\)](#)).

## Use of macroprudential policy instruments

**During the upswing in housing prices average mortgage LTV ratios were well over 100 percent.** For example, LTV ratios on new mortgages averaged 114 percent in 2007, and over 120 percent in 2010. The authorities did not set a formal LTV requirement on mortgage lending, but instead adopted a voluntary mortgage lenders' code of conduct in the Fall of 2006. The code restricted mortgage service cost to 30 percent of gross annual income (in effect a voluntary DSTI ratio), and did not set maximum LTV ratios. Compliance with the voluntary code was less than perfect in 2007/08.<sup>25</sup> One of the reasons attributed to the growing indebtedness of households was the generous MID regime, which allowed for unlimited deductions of interest payments on mortgages of primary residences. Against this background, household debt-to-disposable income continued to grow, and exceeded 270 percent in 2010.

**Comfort with the existing buffers and vulnerability indicators less worrisome than in some peers led the authorities to not adopt stricter measures to arrest the growth of household debt.** Mortgages were not deemed risky as systemic risk was seen as being reduced by collateral in mortgage-linked insurance and savings accounts; while a sharp correction in house prices was seen as unlikely given the limited land supply and the generous MID regime. Moreover, indicators of vulnerabilities in the housing/mortgage market were mixed, especially when compared with other European peers. Netherlands was not an outlier in the region in terms of growth in house prices and indicators of affordability. During 2002:Q1–2006:Q3 house prices in European countries rose by 56 percent on average, where as house prices in the Netherlands rose by 22 percent.<sup>26</sup> As no action was taken the rising house prices and household debt continued unabated until mid 2008.

**Following the crisis macroprudential instruments started to be used more proactively.** In January 2013, a cap on LTV was introduced. New legislation mandated a gradual reduction in LTV ratios. The reason for the gradual approach was to not destabilize the housing market in an environment of weak domestic demand and falling house prices. Starting 2013 all new loans could not exceed a threshold LTV ratio of 105 percent. The limit was lowered to 104 percent on January 1, 2014, and to 103 percent on January 1, 2015, and is set to be reduced by one percentage point per year until January 2018. These limits have been introduced through primary legislation, based on a proposal by the DNB. An LTV ratio of

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<sup>25</sup> By 2010, the compliance with the code of conduct had improved with non-compliance estimated at about 5 percent (see [Leeuwen and Bokeloh \(2012\)](#)). In addition, in August 2011 a revised voluntary code of conduct was introduced. It set a LTV ratio of 104 percent plus applicable transfer taxes, so in effect the recommended limit was 106 percent (see [Nederlandse Vereniging van Banken \(2011\)](#)). Transfer taxes were temporarily reduced from six percent to two percent in June 2011, a reduction that was made permanent in June 2012.

<sup>26</sup> Simple average of nine EU countries (Belgium, Denmark, Finland, France, Germany, Ireland, Italy, the Netherlands, and Spain); see page 47 of [IMF \(2011c\)](#).



100 percent however, would still be high compared internationally,<sup>27</sup> and it would thus, seem appropriate to set a more ambitious timetable after 2018.

**Maximum LTI ratios at about the same time (January 2013) were imposed on mortgage loans** (through a MOF regulation).<sup>28</sup> The LTI ratios are based on gross household income, and the maximum financing cost allowed as a percentage of gross income. The financing cost limits were provided by the National Institute for Family Finance Information (Nationaal Instituut voor Budgetvoorlichting), and are expected to be updated annually.

**The MID regime was also reformed in January 2013.** Since then the tax benefit is applicable only if the new mortgage is fully amortized within 30 years (at least on an annuity basis). New interest only mortgages no longer qualify for tax deductibility. As existing mortgages have been grandfathered, the impact of this change on the housing market will only show over time.

**In April 2014, the DNB announced additional capital buffer requirements for systemic banks.** The additional capital buffer requirements will be imposed on four systemic banks and will be phased in during 2016–19. The systemic buffer will be three percent of risk weighted assets for ING Bank, Rabobank, and ABN Amro Bank, and one percent for SNS Bank.<sup>29</sup>

**The DNB is also considering the adoption of counter cyclical capital buffers and leverage ratios.** This would be in line with Basel III (and EU wide implementation). In particular, the DNB plans to assess (four times a year) whether credit growth calls for the imposition of counter cyclical buffers.<sup>30</sup> The authorities have announced their intention to impose a higher minimum leverage ratio of four percent for systemically important financial institutions (compared with three percent recommended under Basel III).<sup>31</sup> In this context, DNB has asked the four largest banks to submit capital migration plans showing compliance with the new requirement by 2018.

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<sup>27</sup> See Figure 5 in [IMF \(2014c\)](#).

<sup>28</sup> [Ministry of Finance \(2012b\)](#).

<sup>29</sup> [DNB \(2014c\)](#).

<sup>30</sup> [DNB \(2013\)](#).

<sup>31</sup> [Ministry of Finance \(2013a\)](#).

## C. New Zealand

### Background

**New Zealand banks weathered the global financial crisis relatively well.** The New Zealand banking system is dominated by four large subsidiaries of Australian banks, which had withstood the crisis without major problems. Since the crisis those subsidiary banks have taken steps to strengthen their balance sheets. Capital adequacy has improved since 2007, with Tier 1 capital ratio reaching 12.4 percent in 2013. The rise in nonperforming loans peaked at around two percent in 2011. Profitability returned to pre-crisis levels in 2011.

**However, the crisis exposed key vulnerabilities in the New Zealand banking system.**

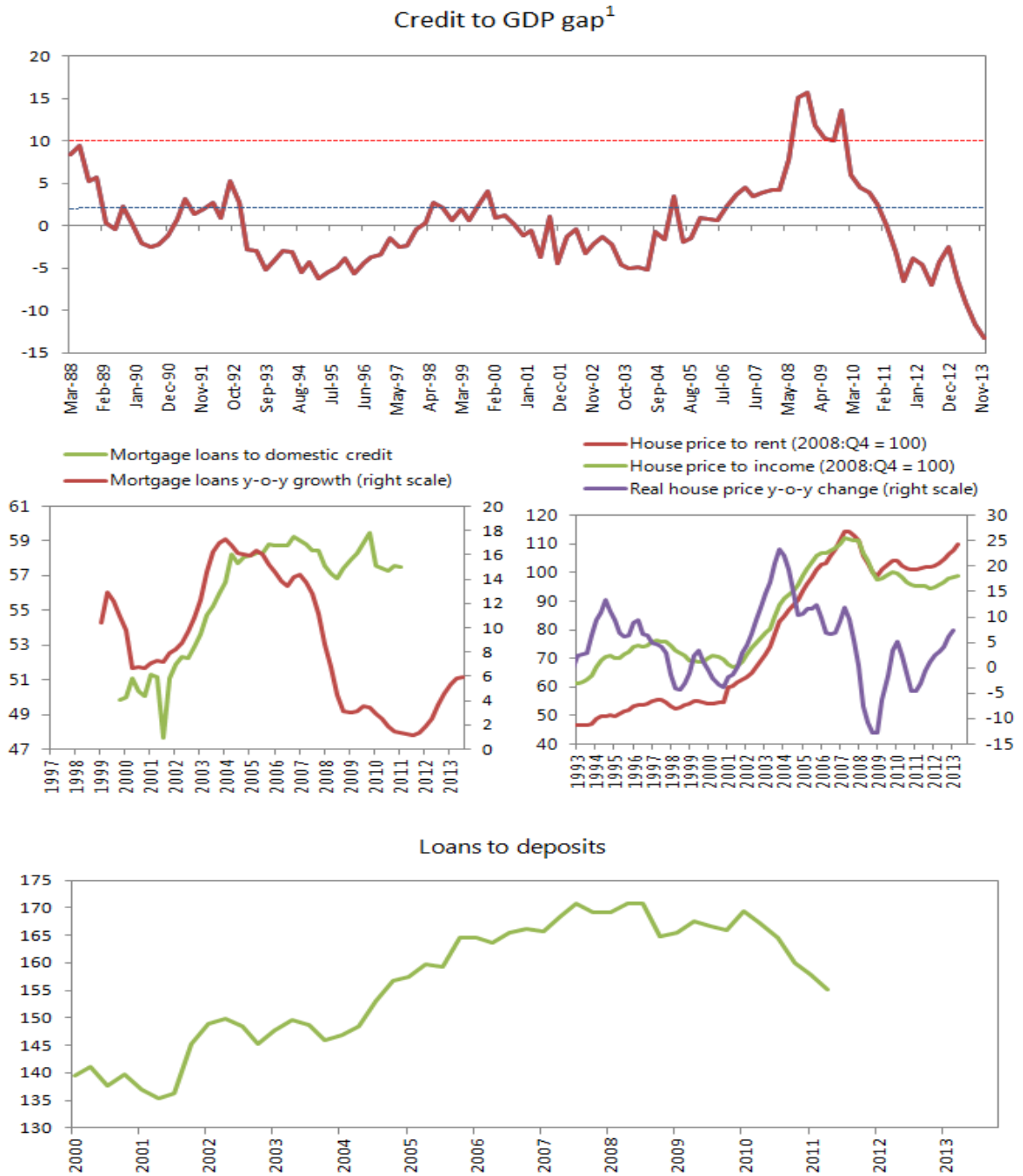
Banks relied heavily on short-term, offshore wholesale funding for their normal operations and the disruption of interbank lending following the collapse of Lehman Brothers gave rise to severe funding pressures. In response, the Reserve Bank of New Zealand (RBNZ, the central bank) provided liquidity support (e.g., by expanding the list of eligible collateral, extending the reverse repo facility to 30 days, and introducing a term auction facility), and the government introduced wholesale funding guarantees in 2008. Following the crisis the banks improved their funding structures; banks' reliance on short-term wholesale funding for example, declined from 53 percent of total funding in 2007 to 42 percent in late 2010. Nonetheless, reliance on offshore wholesale funding remains substantial (reflected in high loan-to-deposit ratios, Figure 5), and banks remain vulnerable to disruptions in wholesale funding and foreign exchange swaps.

**Banks are also significantly exposed to highly indebted households and farmers.** The largest exposure is to households (Figure 6), with over 50 percent of bank lending accounted for by residential mortgages (Figure 5). Affordability metrics show a significant deterioration in the last two decades. As of third quarter 2012 house prices were estimated to be about 25 percent above equilibrium and are beginning to rise again, particularly in Auckland and Christchurch.<sup>32</sup> While mortgage lending is seen as a better risk than agriculture lending (a key sector in New Zealand), a sharp decline in house prices could force many borrowers into negative equity, and a sharp increase in unemployment could increase potential of defaults. Risks to lending in agriculture arise from the potential for droughts or a sharp decline in commodity prices, especially since access to insurance vehicles to mitigate such risks is limited.

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<sup>32</sup> See Annex 2 in [IMF \(2013c\)](#).

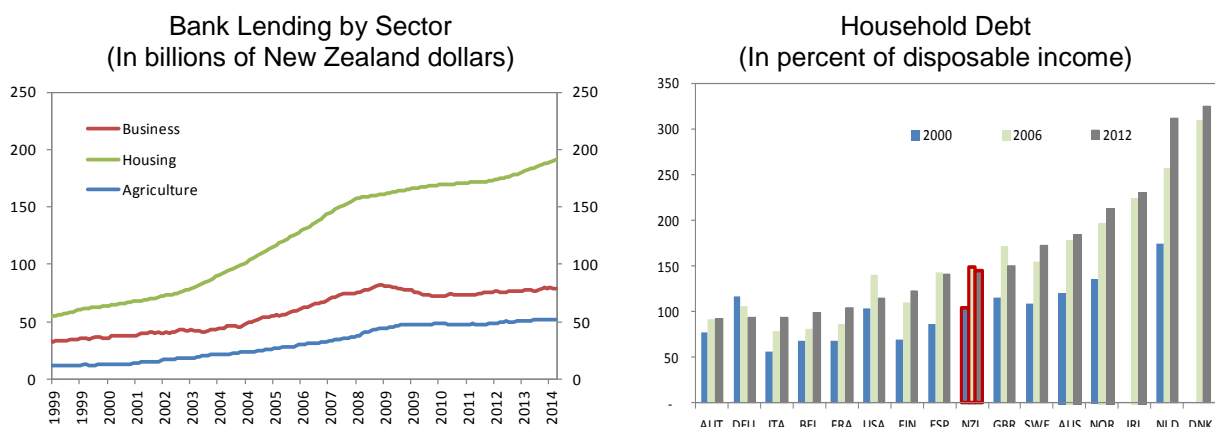
Figure 5. New Zealand: Selected Macropprudential Indicators, 1988–2013  
(In percent)



Sources: Haver Analytics Inc., IFS, CEIC, OECD, and IMF staff calculations.

<sup>1</sup>The “credit-to-GDP gap” is defined as the deviation of the ratio of credit to GDP from its long run trend. The long run trend is calculated from the credit-to-GDP series by using a one-sided Hodrick-Prescott filter. This calculation uses a high smoothing parameter (lambda equals to 400,000) since the series is quarterly. See [IMF \(2014c\)](#) for further details. Credit-to-GDP gap is calculated from the earliest domestic credit data available.

Figure 6. New Zealand: Bank Lending and Household Debt, 1999–2012



Sources: RBNZ Standard Statistical Return (SSR).

Sources: OECD and RBNZ.

## Institutional framework

**The RBNZ draws its macroprudential powers from the Central Bank Act**, which gives it the responsibility for “promoting the maintenance of a sound and efficient financial system.” Following the global financial crisis the RBNZ began evaluating the use of macroprudential policy. In 2013 the authorities formalized the macroprudential framework with a Memorandum of Understanding (MoU) on macroprudential policy signed by the Governor of the RBNZ and the Minister of Finance that provides the RBNZ with a framework to implement macroprudential policy.<sup>33</sup> Concretely the MoU authorizes the RBNZ to use four tools: (i) core funding ratio (CFR); (ii) countercyclical capital buffer; (iii) sectoral capital requirements; and (iv) LTV ratios on loans to the residential property sector. The MoU requires that the RBNZ informs the Minister of Finance when it is contemplating using the macroprudential tools, but the final decision on implementation resides with the RBNZ. As per the RBNZ Act the banks would be given an opportunity to comment on the tools being considered. The MoU covers the application of macroprudential policy only on banks (which account for the majority of lending). Any extension of macroprudential instruments to nonbanks or involvement of other agencies would require consultation with the Minister of Finance.<sup>34</sup>

**The RBNZ announced its macroprudential policy framework shortly after the signing of the MoU.** In a policy position paper, published in May 2013 the RBNZ outlined the objective of macroprudential policy, identified the instruments that could be used, and detailed the process of assessing and implementing macroprudential policy.<sup>35</sup> It explained

<sup>33</sup> [MOF and RBNZ \(2013\)](#).

<sup>34</sup> The RBNZ supervises banks and insurance companies and non-bank deposit takers (including finance companies that take deposits from the public, building societies and credit unions).

<sup>35</sup> [RBNZ \(2013a\)](#).

that the RBNZ would inform the public about its assessments and decisions on macroprudential policy primarily through its regular six-monthly financial stability reports. The framework also contemplates giving banks notice periods to implement changes in the macroprudential instrument (i.e., up to twelve months for counter cyclical buffer; up to three months for sectoral capital requirements; up to six month for adjustments to the CFR; and at least two weeks for LTV ratios). The RBNZ also identified a set of macroprudential indicators that it plans to review periodically to help guide implementation of macroprudential policy (Table 1).<sup>36</sup>

### Use of macroprudential policy instruments

**Before the macroprudential framework had been formalized New Zealand had started to adopt liquidity rules to contain/address banks' dependence on short-term wholesale funding.** In April 2010, the RBNZ introduced two quantitative requirements: liquidity mismatch ratios and a CFR (similar in spirit to the Basel Committee's proposed liquidity standards—the liquidity coverage ratio and net stable funding ratio). The liquidity mismatch ratios compares a bank's likely cash inflows to its likely outflows over a period of one week and one month, while the CFR aims to ensure that banks hold sufficient stable retail and long-term wholesale funding. The CFR is based on a comparison between an estimate of the funding of the bank that is stable and can be assumed to stay in place for at least one year ('core funding'), and the core lending business of the bank that needs to be funded on a continuing basis.<sup>37</sup> The RBNZ foreshadowed the adoption of these requirements through a Consultation Paper issued in October 2008.<sup>38</sup> Following a consultation period, regulations were issued on October 22, 2009 with implementation beginning in April 2010. The minimum CFR was initially set at 65 percent and it was estimated that at the time all the banks' CFR would be just slightly above the required minimum.<sup>39</sup> The RBNZ also indicated at that time that it planned to increase the minimum CFR to 75 percent in stages to allow sufficient time for banks to adjust to meet the new requirements. The minimum CFR was increased to 70 percent from July 1, 2011; and to 75 percent from January 1, 2013 (Figure 7).

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<sup>36</sup> [Wolken \(2013\)](#).

<sup>37</sup> The CFR = 100 x (core funding/total loans and advances), where core funding equals the sum of: (i) all funding with residual maturity longer than one year, including subordinated debt and related party funding; (ii) 50 percent of any tradable debt securities issued by the bank with original maturity of two years or more and with residual maturity at the reporting date of more than six months and not more than one year; (iii) non-market funding that is withdrawable at sight or with residual maturity less than or equal to one year, where the percentage to be included decreases with size of funding; and (iv) Tier 1 capital ([RBNZ \(2014\)](#)).

<sup>38</sup> [RBNZ \(2008\)](#).

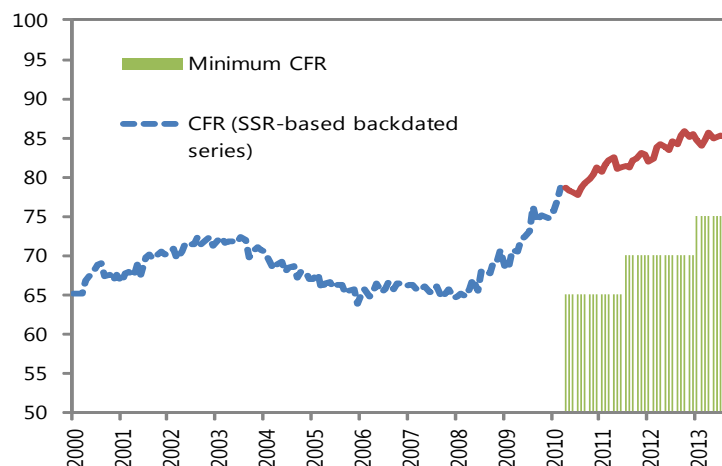
<sup>39</sup> [Hoskin et al \(2009\)](#).

**Table 1. New Zealand: Macprudential Indicators**

<b>I. Early warning indicators</b>	
Credit measures	Private sector credit-to-GDP level; Real-time credit-to-GDP trend; Credit-to-GDP real time gap; Total credit growth; Private sector credit cross-country; Household credit-to-disposable income (level, trend, gap, credit growth); Business credit-to-gross operating surplus (level, trend, gap, credit growth); Agricultural credit-to-agricultural GDP (level, trend, gap, credit growth); Share of non-bank lending; Public debt cross-country; Public and private debt ratios; Net foreign liabilities.
Asset price measures	House price-to-disposable income level; Real-time house price to disposable income trend; House price to disposable income gap; House price inflation; Commercial property prices to gross operating surplus (level, trend, gap, asset price growth rate); Farm prices to agricultural GDP (level, trend, gap, growth rate).
Capacity to service debt	Debt servicing ratio; Debt servicing ratio gap; Analysis replicated for the household and business/agricultural sector (level, gap).
Lending standards	Bank lending standards for retail borrowers; Bank loan-to-value ratio monthly flow; Net interest margins.
<b>II. Indicators of banking system's capacity to absorb risk</b>	Tier 1 capital ratio; CFR; Bank wholesale funding profile.
<b>III. Indicators of financial system stress</b>	
Coincident stress measures	Financial stress index (comparable indices constructed for New Zealand, Australia, and U.S.). Basis swap spreads; Australian bank credit default swap spreads.
Asset quality	NPLs; Sectoral NPLs; Sectoral watchlist loans; Impaired asset expense.

Source: [Wolken \(2013, pp. 27–30\)](#).

Figure 7. New Zealand: Banking System Core Funding Ratio, 2000–13  
(In percent)



Sources: SSR, RBNZ liquidity statistics.

Note: The dotted section of the core funding ratio is an approximation based on SSR data.

**After the formalization of the macroprudential framework, the RBNZ introduced a cap on the share of new high-LTV housing loans.** Noting that debt-to-disposable income was high by historical standards and house prices were rising, beginning October 2013, housing loans with LTV ratios above 80 percent were restricted to ten percent of all new housing loans made by a bank. Interestingly New Zealand introduced this cap on LTVs at a time when the credit gap was negative (Figure 5). The RBNZ argued that the credit gap was not a useful metric in the aftermath of a large credit boom, such as the one experienced by New Zealand during 2002–07. It explained that the decision to impose caps on LTVs was influenced by two factors—rising house prices (which brought house prices relative to income or rents to very high levels); and the rise in lending to borrowers with less than 20 percent equity.<sup>40</sup> Analysis by RBNZ showed that loss rates of high-LTV loans increased more than those of lower-LTV loans following a sharp fall in house prices. Prior to the introduction of the minimum LTV ratios on new lending the RBNZ undertook a consultative process and conducted an impact analysis.<sup>41</sup> The RBNZ decided to impose temporary restrictions on high-LTV residential mortgage lending instead of a sectoral capital requirement because it concluded that the former measure would be more effective in dampening excessive house price growth and to building up resilience. The RBNZ also concluded that it would be administratively complex to target LTV restriction to particular regions.

<sup>40</sup> [Wolken \(2013\)](#).

<sup>41</sup> [RBNZ \(2013b\)](#).

**Following the imposition of the caps there was a sharp fall in loans with high LTVs.** Housing loans with high LTVs made up 5.2 percent of total new commitments in February 2014 compared with 25.1 percent in September 2013 (Table 2). In addition, the slowdown was accompanied by lower house sales and a lower growth in house prices.<sup>42</sup>

**Table 2. New Zealand: New Residential Mortgage Lending, August 2013 – February 2014**

	Total new commitments	LTV 80 percent or below	LTV above 80 percent	Exempt above 80 percent LTV <sup>1</sup>	High-LTV share before exemptions <sup>2</sup>	High-LTV share after exemptions <sup>2,3</sup>
	(in \$NZ millions)			(in percent)		
August 2013	4,472	3,336	1,136	..	25.4	..
September 2013	4,735	3,549	1,187	..	25.1	..
October 2013	4,485	3,913	572	54	12.7	11.7
November 2013	4,435	4,124	310	57	7.0	5.8
December 2013	4,509	4,258	252	43	5.6	4.7
January 2014	3,090	2,942	147	31	4.8	3.8
<b>February 2014</b>	<b>3,863</b>	<b>3,663</b>	<b>200</b>	<b>40</b>	<b>5.2</b>	<b>4.2</b>

Source: RBNZ.

<sup>1</sup>Figures do not include the construction lending exemption announced in December 2013.

<sup>2</sup>High-LTV is where the LTV is above 80 percent. Percentages are calculated from non-rounded figures.

<sup>3</sup>The 'high-LTV share after exemptions' is calculated by subtracting exempt lending (with LTV above 80 percent) from new commitments then dividing by total new commitments less exempt lending (with LTV above 80 percent). Though similar, it is not the same as the high LTV "speed limit." Banks' compliance with the "high-LTV" speed limit will initially be measured against the average 'high-LTV share after exemptions,' for October 1, 2013 to March 31, 2014. Thereafter, it will be measured against the three-month rolling average for the larger banks (ANZ, ASB, BNZ, Kiwibank and Westpac) and the six-month rolling average for the smaller banks.

<sup>42</sup> [Onselen \(2014\)](#).



## D. Singapore

### Background

**Singapore's financial system is very sophisticated/advanced.** Singapore is one of the world's largest financial centers, built around a core of domestic and international banks, which offer a wide range of financial services. Singapore's financial system is exposed to a broad array of domestic and global risks (as a consequence of its interconnectedness) ranging from possible spillovers from changes in global interest rate to a deterioration of economic conditions in Europe or in China.<sup>43</sup> Its most pressing vulnerability, however, stems from the rapid growth of credit and real estate prices in recent years.

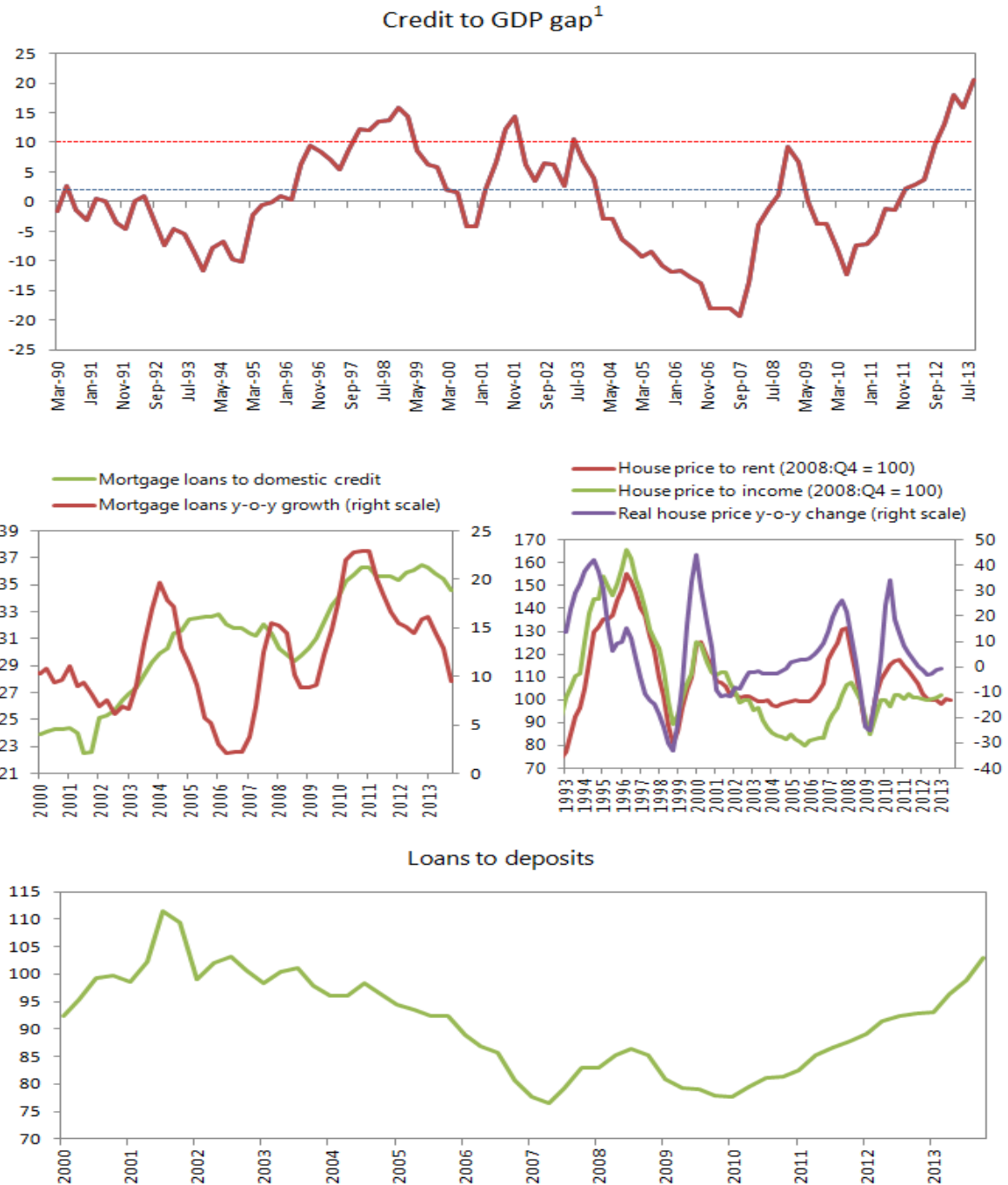
**Singapore's real estate market is dominated by public housing, which accounts for almost 80 percent of the housing stock.** The government's Housing and Development Board (HDB) builds apartments (flats) on government-allocated land and sells them at subsidized prices to eligible Singapore citizens. Apartments can be resold after a minimum occupancy period of five years to other eligible citizens or Singapore permanent residents. While the program has helped increase home ownership to about 90 percent of the eligible population, supply seems to have fallen short of demand in recent years. Since 2003, house prices have almost doubled, accompanied by strong growth in mortgages, and total credit growth of 15 percent, on average, during 2010–13. The growth in mortgages has fueled an increase in household debt as a percent of disposable income posing an increasing risk to the banking sector. Mortgages account for 35 percent of credit to the private sector, the bulk of which is provided for private housing purchases (Figure 8).

**Singapore's financial sector emerged largely unscathed from the global financial crisis.** Domestic financial markets were tested but continued to operate in an orderly fashion. Singapore money market experienced liquidity pressures in the Fall of 2008 and interbank rates spiked with rising counterparty risk, but markets never seized up. Liquidity pressures eased by January 2009, following coordinated actions by central banks around the globe. The Singapore authorities implemented a range of measures to support the stability of Singapore's financial system. In particular, in 2008, the Monetary Authority of Singapore (MAS) (i) adopted a temporary blanket deposit guarantee (as was done by others in the region); (ii) agreed to a currency swap arrangement with the U.S. Fed.; and (iii) broadened access to its liquidity facility. Activity in Singapore financial sector recovered quickly, and by 2010, credit to non bank sector was above pre-Lehman levels.

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<sup>43</sup> [IMF \(2013d\)](#).

Figure 8. Singapore: Selected Macprudential Indicators, 1990–2013  
(In percent)



Sources: BIS, WEO, IFS, CEIC, OECD, GPG, Haver Analytics Inc., and IMF staff calculations.

<sup>1</sup>The “credit-to-GDP gap” is defined as the deviation of the ratio of credit to GDP from its long run trend. The long run trend is calculated from the credit-to-GDP series by using a one-sided Hodrick-Prescott filter. This calculation uses a high smoothing parameter (lambda equals to 400,000) since the series is quarterly. See [IMF \(2014c\)](#) for further details. Credit-to-GDP gap is calculated from the earliest domestic credit data available.

## **Institutional framework**

**The MAS is responsible for conducting macroprudential policy.** MAS is both a central bank and an integrated financial supervisor overseeing all financial institutions and is mandated to promote financial stability.<sup>44</sup> Under the current institutional arrangement, the Deputy Prime Minister and Minister of Finance serves as the Chairman of the Board of MAS, who presides over the Board level Chairman's Meeting (CM) where microprudential and macroprudential policies as well as monetary policy are decided.<sup>45</sup> At the level of the CM, the MAS holds meetings with the MOF to discuss macroeconomic and financial stability issues and seek agreement on policies that can have broad ramifications.

**The CM's role in macroprudential policy is supported by the MAS Management Financial Stability Committee (FSC).** The FSC is chaired by the Managing Director of MAS and comprises other MAS senior managers. It coordinates policies aimed at maintaining financial stability as well as the stability of asset and consumer prices and collaborates with all relevant government agencies. For instance, the MAS collaborates with the Urban Redevelopment Authority, HDB, and MOF on policies that affect the housing sector. The FSC receives inputs from MAS staff in financial supervision departments, including the macroeconomic surveillance department, drawing both on bottom-up assessments of risks in individual financial institutions and on a top-down assessment of the system as a whole.

## **Use of macroprudential policy instruments**

**In the aftermath of the global financial crisis the Singapore authorities started to tighten macroprudential policy to cool the housing market.** The tightening was incremental and targeted, and the instruments used included caps on the LTV and DSTI ratios, and loan tenor rules (often accompanied by stamp duties and increased government land sales; Box 2). In addition, to limit excessive increases in household leverage the authorities introduced measures on auto loans and unsecured credit (including credit cards).

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<sup>44</sup> [IMF \(2013e\)](#).

<sup>45</sup> [MAS \(2013/14\)](#).

<b>Box 2. Singapore—Macroprudential Measures, 2009–13</b>	
September 2009	Removal of the Interest Absorption Scheme and Interest-Only Housing Loans.
February 2010	<p>The LTV cap was lowered from 90 percent to 80 percent for housing loans granted by financial institutions.</p> <p>A seller stamp duty (SSD) (including on executive condominium units and Housing and Urban Development Company apartments bought from the resale market) was introduced on all private properties sold within one year of purchase at the rate of one percent for the first S\$180,000, two percent for the next S\$180,000 and three percent for the remaining balance.</p>
August 2010	<p>The LTV cap was lowered from 80 percent to 70 percent for housing loans granted by financial institutions to borrowers with one or more outstanding housing loans; the minimum cash down payment was increased from five percent to ten percent.</p> <p>The SSD was extended to sales within three years of purchase, with the full SSD rate pro-rated depending on the length of the holding period.</p>
January 2011	<p>The LTV cap was lowered to 60 percent for housing loans granted by financial institutions to individuals with one or more outstanding loans and to 50 percent for non-individuals.</p> <p>The SSD was extended to sales within four years and rates raised to 16 percent for sales within a year, decreasing gradually thereafter to a minimum of four percent in the fourth year.</p>
December 2011	An Additional Buyer's Stamp Duty (ABSD) was imposed at a rate of ten percent on foreigners and corporate entities buying any residential property, and three percent on permanent residents buying second or subsequent residential property and Singapore citizens buying their third and subsequent residential property.
October 2012	A limit of 35 years was introduced for all new housing loans granted by financial institutions; if the loan tenor exceeded 30 years, or the sum of the loan tenor and the age of the borrower exceeded 65 years, the LTV cap was reduced to 40 percent from 60 percent for borrowers with one or more outstanding housing loans, and to 60 percent from 80 percent for borrowers with no outstanding housing loans; the LTV cap was reduced to 40 percent from 50 percent for new housing loans to entities such as corporations.
January 2013	<p>For individuals obtaining a second mortgage from financial institutions, the LTV cap was lowered from 60 percent to 50 percent (30 percent if the loan exceeded 30 years or would mature after the borrower's retirement age of 65); for individuals obtaining the third or subsequent mortgages, the LTV cap was lowered to 40 percent (20 percent if the loan exceeded 30 years or would mature after the borrower's retirement age of 65); and for non-individual borrowers, the LTV cap was lowered to 20 percent from 40 percent; the minimum cash down payment was increased from 10 percent to 25 percent for borrowers with one or more outstanding housing loan.</p> <p>The mortgage servicing ratio (MSR) was capped at 30 percent of a borrower's gross monthly income for housing loans granted by financial institutions for the purchase of HDB apartments, and lowered from 40 percent to 35 percent for loans granted by HDB for the purchase of its apartments.</p> <p>The ABSD rates were raised from 10 percent to 15 percent on foreigners and corporate entities; from three percent to ten percent on permanent residents purchasing the second or more residential properties and on Singapore citizens purchasing the third or more residential properties; a new ABSD of five percent was imposed on permanent residents purchasing their first residential property, and of seven percent on Singapore citizens purchasing the second residential property.</p>
February 2013	<p>LTV ceilings were introduced for motor vehicle loans (excluding commercial vehicles and motorcycles). A maximum LTV of 50 percent was set for cars with open market value of greater than S\$20,000 and 60 percent for lesser valued cars. The maximum tenor of a motor vehicle loan was capped at five years.</p> <p>The 2013 budget contained tax measures targeting the non-owner-occupied residential properties (let-out residential properties were taxed at progressive rates between 10–20 percent compared to the flat ten percent) with the revised rates phased in over two years; the property tax refund was removed for vacant properties from January 2014; and the progressivity of the property tax system was increased for owner-occupied residential properties.</p>

<b>Box 2. Singapore—Macroprudential Measures, 2009–13 (Concluded)</b>	
June 2013	<p>MAS introduced a Total Debt Servicing Ratio (TDSR) framework for all property loans granted to individuals, limiting total debt service payments to 60 percent of a borrower's income. Under this framework, debt service on the housing loan is calculated based on the higher of the prevailing market interest rate or a medium-term interest rate of 3.5 percent, while debt service on non-residential property loans is computed based on the higher of the actual market rate or a medium-term interest rate of 4.5 percent.</p> <p>As a refinement of previous measures, borrowers named on a property loan were required to be mortgagors of the residential property for which the loan was taken. Guarantors would need to be brought in as co-borrowers if the borrower did not meet the TDSR threshold of 60 percent. In case of joint borrowers, the income-weighted average age of the borrowers would be used in applying rules on loan tenor.<sup>1</sup></p>
August 2013	<p>The maximum tenor was reduced from 30 years to 25 years, and MSR lowered from 35 percent to 30 percent, for public housing loans granted by HDB; for housing loans granted by financial institutions for the purchase of public housing, the maximum tenor was reduced from 35 years to 30 years and loans with tenors exceeding 25 years and up to 30 years were subject to tighter LTV limits.</p>
September 2013	<p>Announced measures to be progressively implemented between December 2013 and June 2015 include prohibiting financial institutions from granting further unsecured credit to individuals whose amount outstanding on any credit card or unsecured credit facility is 60 days or more past due or with total outstanding interest-bearing unsecured debt aggregated across all financial institutions exceeding their annual incomes for three consecutive months or more.</p> <p>Financial institutions were required to review a borrower's total debt and credit limits aggregated across all financial institutions before granting a new credit card, unsecured credit, or credit limit increases, to disclose to borrowers the potential cost of rolling over credit card debts and revolving credit and how the debt would accumulate, and to obtain a borrower's express consent for the amount of each credit limit increase.</p>
December 2013	<p>Introduction of MSR of 30 percent for housing loans granted by financial institutions for executive condominium units bought directly from property developers.</p>
<p><sup>1</sup>In February 2014, MAS refined the TDSR framework with broader exemptions. Borrowers refinancing owner-occupied housing loans borrowed before the TDSR's June 2013 introduction would be exempt from the 60 percent limits, and those refinancing public housing loans from limits on the mortgage servicing ratio. Similarly, borrowers were allowed to maintain the remaining loan tenors when refinancing owner-occupied housing loans taken before the loan tenor limits were introduced.</p>	

**The combination of macroprudential and fiscal measures was effective in building buffers and moderating price appreciation in Singapore.** The recent macroprudential measures lowered the average LTV ratio on new housing loans, and increased the share of borrowers with single mortgages. As of 2013:Q1, over 90 percent of outstanding housing loans had an LTV ratio below 80 percent. The rise in housing prices has abated. The HDB Resale Price Index declined eight percent from its peak in mid-2013 to the end of 2014 following a rise of almost 50 percent since end-2008. Similarly, the Private Residential Property Price Index declined by five percent from its peak in the third quarter of 2013 to the end of 2014. The decline in housing prices was accompanied by a sharp drop in transaction volumes. Annual new home sales in the private residential market declined by 1/3 in 2013 and

by 50 percent in 2014.<sup>46</sup> Sales of HDB units also declined (by 28 percent in 2013 and a further four percent in 2014). While the macroprudential measures have had a cooling effect on the housing market, continued vigilance is warranted as the prospective rise in interest rates could make it difficult for households to service their debt given the large proportion of mortgages with floating interest rates. Over the medium term, maintaining adequate land supply for housing would be key to the healthy development of the housing market.<sup>47</sup>

## E. Sweden

### Background

**Sweden's banking system is large, concentrated and regionally interconnected.** Bank assets amount to over 400 percent of GDP and the four biggest banks account for about 85 percent of the system's assets. More than 80 percent of the lending activities of the four largest banks are to households and firms in Sweden, Denmark, Finland, and Norway.

**Since the mid 1990s house prices and household indebtedness have risen steadily.** Prices rose by about 40 percent during 1995–2010, and only suffered a mild correction during the global financial crisis. Since 2012 house prices have rallied, growing by 7½ percent per year for single-family homes and by nearly 13 percent for tenant-owned apartments in the first half of 2014.<sup>48</sup> Household debt has almost doubled since 1995; the ratio of household debt to personal disposable income reached 174 percent in 2013, driven largely by increases in mortgage debt (Figure 9). The share of variable interest rate debt also increased to over 65 percent in 2013 from below ten percent in 1996. Banks' mortgage lending is largely funded through the covered bond market.<sup>49</sup> Housing and real estate developers' loans account for 60 percent of total lending.

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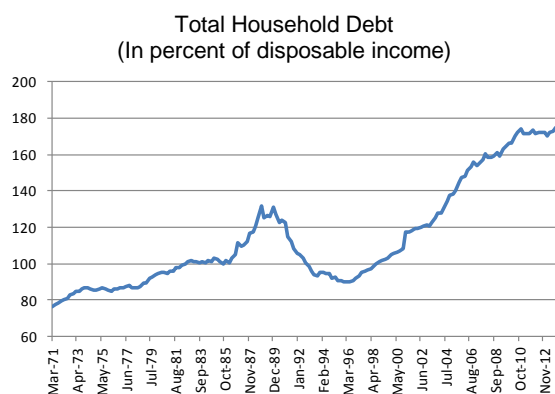
<sup>46</sup> [MAS \(2013\)](#).

<sup>47</sup> During 2011–13 the authorities increased new (build-to-order) flat supply to more than 25,000 units annually.

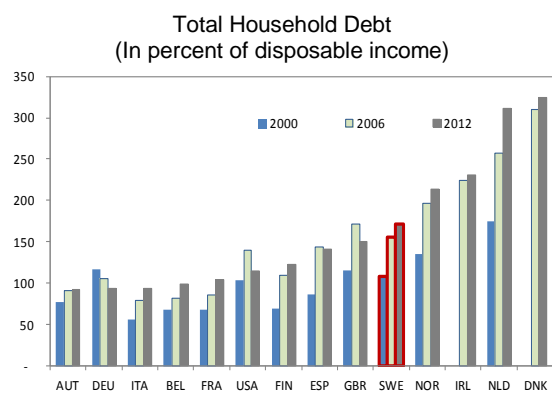
<sup>48</sup> [IMF \(2014e\)](#).

<sup>49</sup> The Swedish Covered Bond Act took effect in 2004. One of the main features of a covered bond is that investors have a claim both on the issuer and on the underlying cover pool (mostly mortgages). This dual nature of protection reduces the investors' risk of losses compared to when investors only have a claim on the issuer.

Figure 9. Sweden: Household Debt, 1971–2014



Source: Riksbank Financial Stability Report 2014:1.



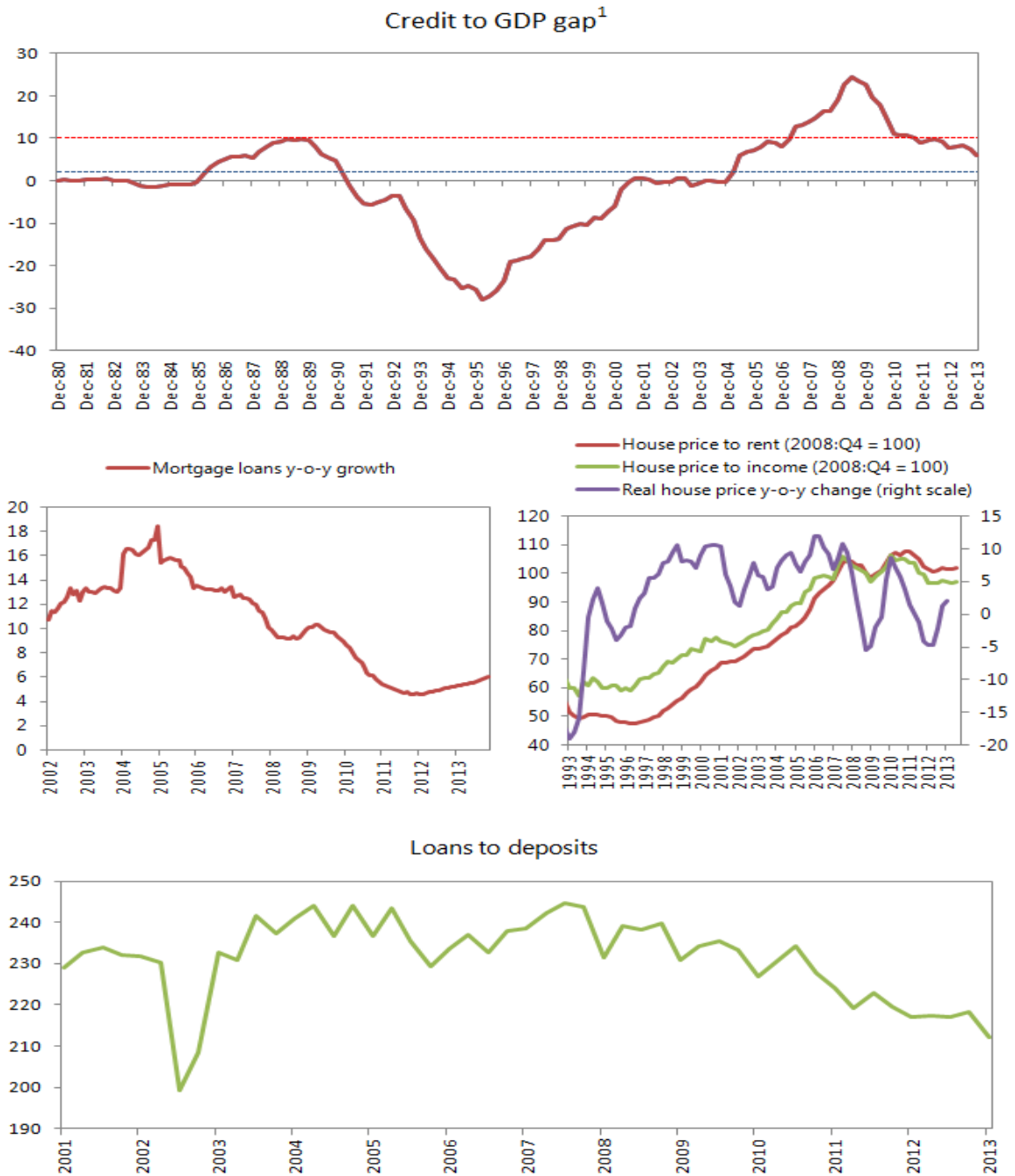
Source: OECD.

**Several factors contributed to the increase in house prices and household debt.** The main ones include: a low interest rate environment and strong economic growth; a tax regime that provides a 30 percent mortgage interest deduction; a stagnant supply of new houses; and financial innovation (such as “interest only” loans or “amortization-free” mortgages). Mortgages and the share of mortgage loans to total credit increased rapidly in 2008–09, pushing the credit gap measure to positive territory in 2005 (Figure 10).

**Swedish banks are highly dependent on wholesale funding.** The loan-to-deposit ratio for the sector is well over 200 percent (Figure 10). About half of the wholesale funding is short-term and in foreign currency. The rest of the funding comes in the form of long-term covered and senior unsecured bonds, a significant share of which is denominated in foreign currency. The banks’ mortgage lending is largely funded through the covered bond market (mostly in local currency). Even though covered bond funding is a more stable source of funding than other wholesale funding instruments, this funding structure renders banks vulnerable to a drying up of wholesale markets or sharp increases in funding costs.

**The global financial crisis had a significant impact on Sweden’s financial sector.** Several Swedish banks faced funding pressures as wholesale funding markets dried up. The authorities took rapid steps to help restore confidence in the system, including increasing central bank liquidity and approving legislation enabling the government to intervene, for example, with guarantees and capital injections.

Figure 10. Sweden: Selected Macropprudential Indicators, 1980–2013  
(In percent)



Sources: WEO, IFS, Riksbank, OECD, Statistics Sweden, and IMF staff calculations.

<sup>1</sup>The “credit-to-GDP gap” is defined as the deviation of the ratio of credit to GDP from its long run trend. The long run trend is calculated from the credit-to-GDP series by using a one-sided Hodrick-Prescott filter. This calculation uses a high smoothing parameter (lambda equals 400,000) since the series is quarterly. See [IMF \(2014c\)](#) for further details. Credit-to-GDP gap is calculated from the earliest GDP data available.



## **Institutional framework**

**Financial stability responsibilities fall on many institutions.**<sup>50</sup> The Swedish Financial Supervisory Authority (FSA), established in 1991, is a single integrated regulator responsible for the supervision and regulation of banking, securities, and insurance industries and has a statutory mandate for financial stability and consumer protection. The Riksbank (central bank) is responsible for promoting a safe and efficient payments system but does not have an explicit mandate for financial stability. However, it has control over instruments related to financial stability such as provision of emergency lending and systemic liquidity. The Swedish National Debt Office (SNDO) manages the stability fund (along with the MOF) and the deposit insurance and investor protection systems, and is the support authority when public funds are allocated to credit institutions.<sup>51</sup> The MOF is responsible for legislation concerning the financial sector and plays a role in crisis management especially when public funds are required to support failing institutions.

**In 2011 the government formed a Financial Crisis Committee (FCC) to propose improvements in the regulatory framework.** In an interim report, in January 2013, the FCC proposed the creation of a macroprudential council chaired by the governor of the Riksbank and including the Director General of FSA, one additional official each from Riksbank and FSA and two independent members appointed by the government.<sup>52</sup> The FCC recommended that responsibility for macroprudential policy be shared by FSA and Riksbank. Both the Riksbank and the FSA disagreed with the FCC proposal.

**In August 2013, the government decided that the FSA would be responsible for macroprudential policy.**<sup>53</sup> The Riksbank was not given any mandate on macroprudential issues. A Financial Stability Council was also established, which replaced a council for cooperation on macroprudential policy.<sup>54</sup> The Financial Stability Council consists of the Minister for Financial Markets, the Director General of FSA, the Director General of the SNDO and the Governor of the Riksbank. The purpose of the council is to discuss issues relating to financial stability and the need for measures to prevent the build-up of financial imbalances. In the event of a financial crisis, it would also discuss the need for measures to manage the crisis. The Council is a forum for discussion and not a decision-making body. In particular, the Council does not have any formal powers of recommendation, thereby reducing the Riksbank's influence on macroprudential policy.

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<sup>50</sup> [IMF \(2011d\)](#).

<sup>51</sup> In 2008, a stability fund was established that will finance future government measures to support the financial system. Banks and other credit institutions pay an annual stability fee to the fund.

<sup>52</sup> [FCC \(2013\)](#).

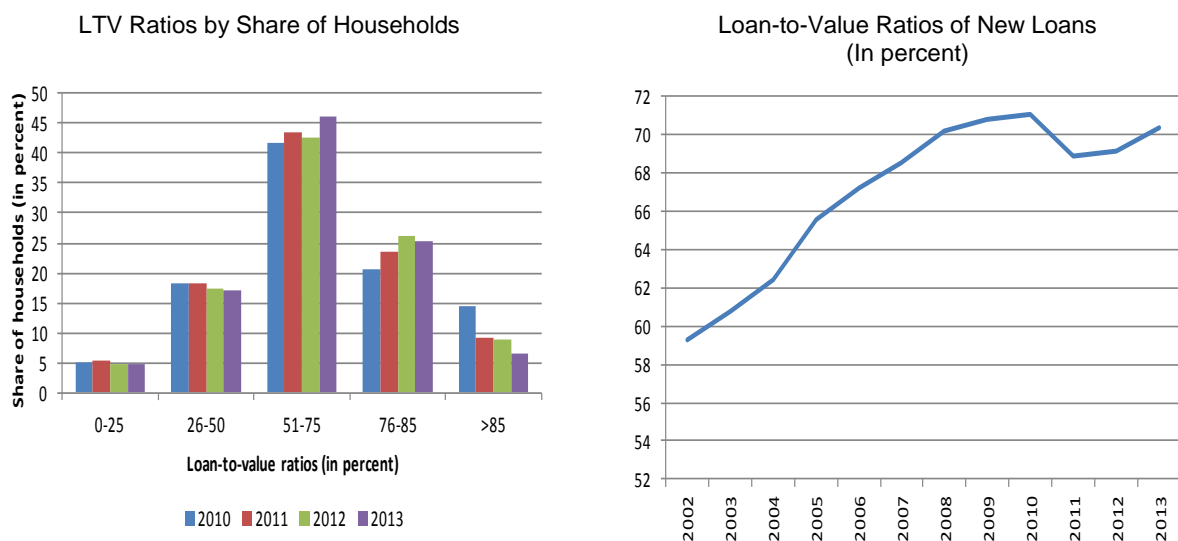
<sup>53</sup> [Ministry of Finance, \(2013b\)](#).

<sup>54</sup> In January 2012, the Riksbank and FSA established a council for cooperation on macroprudential policy. The council discusses and shares information on the assessment of risks to the financial system as a whole, including analyses and the development of tools and methods in the area of macroprudential policy.

## Use of macroprudential policy instruments

**In October 2010 the FSA introduced an LTV ratio on mortgages.** An LTV cap of 85 percent was applied to all new mortgages or extensions to existing mortgages that used the home as collateral. Prior to October 2010, no LTV ratios on mortgages existed. At the time of the measure, the average LTV ratio had risen to 55 percent at end-2010 (from ten percent in 1995), and the average LTV ratios on new-lending had risen to about 71 percent. Twelve percent of new borrowers had an LTV ratio above 90 percent and one third above 85 percent.<sup>55</sup> The FSA expected that the new LTV limit would help curb mortgage loans and at the same time not have a major adverse impact on mortgage practices and the housing market.<sup>56</sup> Following the cap, the share of households with loans exceeding LTV ratio of 85 percent dropped and the average LTV ratio of new loans in 2013 stayed at about 70 percent (Figure 11).<sup>57</sup>

Figure 11. Sweden: Loan-to-Value Ratio, 2002–13



Sources: FSA, The Swedish Mortgage Market 2014.

Sources: FSA, The Swedish Mortgage Market 2014.

**Two and a half years later, in May 2013, the FSA introduced a risk-weight floor of 15 percent for mortgages.**<sup>58</sup> This measure applies to firms that use the internal ratings based approach to calculate the capital requirement for credit risk on Swedish mortgages. The risk weight floor of 15 percent is set on an aggregated portfolio level for each bank and relates to the exposure-weighted average risk weight. This measure was implemented through the

<sup>55</sup> [IMF \(2011e\)](#).

<sup>56</sup> [Finansinspektionen \(2010\)](#).

<sup>57</sup> [Finansinspektionen \(2014a\)](#).

<sup>58</sup> As per the response to the 2013 IMF survey on Macroprudential Instruments.

framework of Pillar 2 as part of FSA's ongoing supervisory review and evaluation process. This approach was adopted as FSA concluded that regulatory changes on risk weights through the adoption of CRR and CRD4 would not be possible. The FSA recently increased the risk weight floor to 25 percent.<sup>59</sup>

**In November 2014, the FSA announced plans to introduce mandatory amortization of mortgages.** The proposed regulation would ensure that new loans are to be repaid in two steps. New mortgages with an LTV higher than 70 percent will repay at least two percent of their original loan each year until the LTV ratio is 70 percent. Thereafter, households will repay at least one percent of the loan each year until the LTV ratio is 50 percent.<sup>60</sup>

**A liquidity coverage ratio (LCR) requirement was adopted on January 1, 2013.**<sup>61</sup>

Following the financial crisis the FSA introduced enhanced reporting requirements for credit institutions and investment firms, which enabled it to monitor Basel III-type liquidity indicators starting in 2011. The LCR requirement adopted in 2013 is based on the Basel III guidelines and was introduced ahead of the international schedule. This requirement is applied to large firms and financial groups and currently eight firms have to comply. The LCR measures the amount of liquid assets a bank can rely on for a stress period lasting 30 days assuming no other source of funding is available. The ratio is designed as a single ratio covering all currencies as well as separately for the U.S. dollar and euro in view of substantial foreign exchange funding liquidity risk that Swedish banks face. A ratio of one or 100 percent implies that the bank is in compliance with the regulation (Figure 12).

**Capital requirements higher than those stipulated in Basel III have been proposed for the four largest banks.** The MOF, FSA and Riksbank proposed that the largest four Swedish banks have capital requirements equivalent to ten percent on January 1, 2013, rising to 12 percent on January 1, 2015. These thresholds include a capital conservation buffer of 2.5 percent but not a countercyclical buffer. In May 2014, the FSA decided that the systemically important banks will hold additional capital buffer of three percent and a further two percent within the framework of Pillar 2, as of January 1, 2015.<sup>62</sup>

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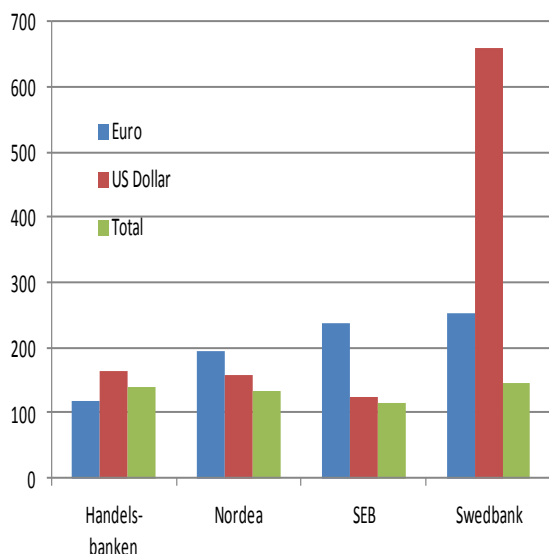
<sup>59</sup> [Finansinspektionen \(2014b\)](#).

<sup>60</sup> [Finansinspektionen \(2014c\)](#).

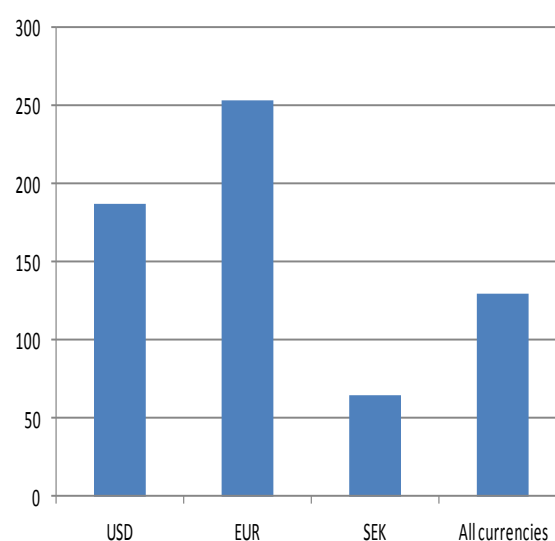
<sup>61</sup> [Finansinspektionen \(2012\)](#).

<sup>62</sup> [Finansinspektionen \(2014d\)](#). The FSA undertook a cost benefit analysis to determine the level of the additional capital buffers. The increase in capital requirement involves a clear tightening of capital requirements that would increase the resilience. At the same time the FSA estimated that banks would be able to meet the new requirement (see [Finansinspektionen \(2014e\)](#)).

Figure 12. Sweden: Major Banks' Liquidity Coverage Ratio, 2013–14  
(September 2013; In percent) (February 2014; In percent)



Source: Riksbank Financial Stability Report, 2013:2.



Source: Riksbank Financial Stability Report, 2014:1.

**In May 2014, the FSA announced the intention to implement a countercyclical capital buffer requirement.**<sup>63</sup> The level of the counter cyclical buffer was set at one percent of risk weighted assets and was decided in consultation with the other authorities that make up the Financial Stability Council. To give time to banks to meet the additional capital requirement the countercyclical buffer will be applied as of September 2015.<sup>64</sup>

### III. CONCLUDING REMARKS

**Increasing attention has been given to the field of macroprudential policy following the global financial crisis.** This paper reviews the use of macroprudential policy in five economies (Hong Kong SAR, the Netherlands, New Zealand, Singapore, and Sweden). All these jurisdictions actively implemented macroprudential policy measures following the global financial crisis. The analysis shows that each jurisdiction reviewed adopted an institutional framework for macroprudential policy suited to their own circumstances. The evidence reviewed confirms that “one size does not fit all,” and that it is possible to conduct macroprudential policy with a heterogenous set of institutional frameworks. In all cases, most of the macroprudential tools used were directed at containing risks arising from a booming housing market (for e.g., LTV and DSTI ratio limits). Some of the cases studied also took steps to enhance the resilience of the banking system to more general cyclical and structural risks (for e.g., liquidity requirements and additional capital requirement for systemically

<sup>63</sup> [Finansinspektionen \(2014d\)](#).

<sup>64</sup> [Finansinspektionen \(2014f\)](#) and [Finansinspektionen \(2014g\)](#).

important institutions). While there is some early evidence that the measures taken have enhanced banking system resilience, it is still early to determine their full impact.

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