

Macroprudential Policy and Household Debt: What Is Wrong with Swedish Macroprudential Policy?¹

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Abstract

Much is right with Swedish macroprudential policy. But regarding risks associated with household debt, the policy does not pass a cost-benefit test. The substantial credit tightening that Finansinspektionen (FI) has achieved – through amortization requirements and more indirect ways – has no demonstrable benefits but substantial costs. The FI, and international organizations, use a flawed theoretical framework for assessing macroeconomic risks from household debt. The tightening was undertaken for mistaken reasons. Several reforms are required for a better-functioning mortgage market. A reform of the governance of macroprudential policy – including a decision-making committee and improved accountability – may reduce risks of policy mistakes.

Keywords: Macroprudential policy, housing, mortgages, household debt, macroeconomic risk.

JEL codes: E211, G01, G21, G23, G28, R21.

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1. Introduction

What is wrong with Swedish macroprudential policy? Importantly, several things are right. The government has introduced a framework for financial stability with a clear separation of monetary policy and macroprudential policy, with Finansinspektionen (the FI, the Swedish Financial Supervisory Authority) in charge of the latter and with all the macroprudential instruments at its disposal (Swedish Ministry of Finance 2013a). The Riksbank has no macroprudential instruments.

The FI's mandate is:

to ensure that the financial system is stable and characterised by a high level of confidence and has well-functioning markets that meet the needs of households and corporations for financial services, and provides comprehensive protection for consumers (Swedish Ministry of Finance 2017, Section 2).

The FI has been quite active in strengthening the stability and resilience of the Swedish financial system. The systemically important banks in Sweden have become among the best capitalized in Europe. They pass severe stress tests and are thus most resilient. The FI also thoroughly monitors bank's mortgage lending standards and, in particular, continuously monitors households' debt-service capacity and ability to withstand disturbances.

Nevertheless, regarding potential risks associated with household debt, the macroprudential policy is wrong. First, at the end of 2013 – quietly and without any public debate – the Swedish government added an ambiguous clause to the mandate, according to which the FI is responsible for:

taking measures to counteract financial imbalances with a view to stabilising the credit market ... (Swedish Ministry of Finance 2013b, 2017, Section 1).

This clause is ambiguous because it is not clear what is meant by 'financial imbalances' – in spite of the term's frequent use in the literature. Neither is it clear what is meant by 'stabilizing the credit market.'

Second, for mistaken reasons, and with reference to this clause, the FI has undertaken – directly through regulation of compulsory amortization requirements, and indirectly through soft power ('communicative supervision') – a considerable tightening of mortgage lending standards from 2010–2011 until today. This credit tightening does not pass the most rudimentary cost-benefit analysis. It has no demonstrable benefits but substantial and obvious individual and social costs. It also violates the part of the mandate that says that the FI shall ensure that the financial system has well-functioning markets 'that meet the needs of households ... for financial services and provides comprehensive protection for consumers.'

Importantly, the credit tightening has *not* been undertaken to improve *financial stability* in Sweden. The FI does actually not see much risk to financial stability from household indebtedness. The FI's assessment is that the risks to financial stability associated with household indebtedness are relatively small. This is because mortgagors generally have good potential to continue paying the interest and amortization on their loans, even if interest rates rise or their incomes fall. On average, households also have comfortable margins to cope with a fall in housing prices. Finally, Swedish mortgage firms are deemed to have satisfactory capital buffers, should credit losses still arise (FI 2017d, p. 9).

The FI's view is instead that household indebtedness poses an 'elevated *macroeconomic risk*.' The authority argues that the risks associated with household debt are primarily related to the possibility that *highly-indebted households may sharply reduce their consumption in the event of a macroeconomic shock*. The FI's primary, indeed *only*, justification for this view is its observation that 'this development was noted in other countries during the financial crisis in 2008–2009.' The FI concludes that, because loan-to-income ratios are high and rising among many mortgagors, they represent an elevated macroeconomic risk (FI 2017d, p. 1).

Thus, the FI's credit tightening serves to limit the level and growth of household indebtedness and this way reduce the perceived macroeconomic risk of a consumption fall and deeper economic downturn. The benefits of the tightening are thus supposed to be a reduction of the macroeconomic risk of a consumption fall

and deeper economic downturn and an increase in households' resilience to shocks.

However, the FI's view – more precisely, its *theoretical framework* to assess macroeconomic risks associated with household debt – is flawed and contradicted by existing research. There is no evidence that the fall in consumption during the financial crisis in the countries that the FI refers to was caused by indebtedness in itself. Instead, research has found that the consumption fall was due to the fact that increased mortgage borrowing in the form of housing-equity withdrawal had before the crisis financed overconsumption in relation to household income. This was reflected, among other things, by an unsustainable aggregate consumption boom and a low household saving rate. When the financial crisis came, this overconsumption could not continue. The crucial research result is that, among the households that had *not* engaged in mortgage-financed overconsumption, highly indebted households did *not* reduce their consumption more than less-indebted households. Thus, the fall in consumption was due to mortgage-financed overconsumption, not to indebtedness in itself (Andersen et al. 2016, Broadbent 2019, Svensson 2019c, 2020b).

But there is no evidence of a large mortgage-financed overconsumption in Sweden. The household saving rate has risen to a historic high, which is incompatible with unsustainable overconsumption of 'macroeconomic significance': an aggregate consumption boom of at least a few percentage points of disposable income. Furthermore, the proportion of durable consumer goods in household consumption has not increased. Neither is there any evidence from existing microdata studies that indicates a debt-financed overconsumption of macroeconomic significance. There is thus no evidence that the FI's credit tightening would reduce the macroeconomic risk (Svensson 2019c).

On the contrary, the amortization requirements reduce the resilience of households and increase the risk of deeper recessions. The households' ability to maintain their consumption in the event of negative shocks does not depend on indebtedness itself, but on the households' cash-flow margins and their access to liquidity (Baker 2018). Amortization requirements increase house-

holds' debt service, reduce their cash-flow margins, and make it more difficult for households to build up liquidity buffers. It takes many years for households to amortize down their loans so that their debt service will be less than for an interest-only loan. Meanwhile, households have lower resilience (Svensson 2019b).

The FI has referred to international organizations – such as the European Systemic Risk Board (ESRB), the European Commission, the OECD, and the IMF – for support of its view (FI 2017d). The organizations have also supported the amortization requirements. But several of them use misleading indicators to infer that housing is overvalued by as much as 40%, which is contradicted by more relevant indicators and estimates. The organizations apparently also have the same weaknesses in their frameworks for assessing macroeconomic risks from household debt as the FI.

Thus, the credit tightening does not bring any demonstrable benefit. If anything, through decreased household resilience, the benefit is negative. Furthermore, the tightening has large individual and social costs. These are summarized in this paper and detailed in an online appendix and in Svensson (2019b). The tightening reduces welfare for households without high income or wealth and is thus regressive. Households restricted or excluded from the market of owner-occupied housing because of large compulsory amortization and corresponding involuntary saving are forced to turn to a dysfunctional rental market with ten-year waiting lists for rent-controlled apartments and exorbitant rents in the secondary market. The tightening creates or exacerbates many different distortions, including that it reduces construction and makes the large structural housing deficit worse.³

The crucial role of mortgage-financed overconsumption in creating a macroeconomic risk is confirmed by seminal work by Mian et al. (2017). They have documented an empirical household-

³ Several of these arguments were presented in less detail in Englund and Svensson (2017), and in Swedish in Boije et al. (2019), Swedish Fiscal Policy Council (2019), and Svensson (2019a). See also Swedish NAO (2018).

debt-driven business cycle across 30 countries in a panel from 1960 to 2012. The results show that an increase in the household-debt-to-GDP ratio finances a simultaneous consumption boom, with the consumption-to-GDP ratio rising. This gives a temporary boost to GDP, but subsequently consumption and GDP fall. Thus, a rise of the household-debt-to-GDP ratio over a three-year period predicts a fall in subsequent GDP growth. A crucial ingredient in this kind of boom-bust cycle is that the increase in household debt is used to finance a consumption boom with a fall in the saving rate.

But such a debt-driven consumption boom need not be the only source of a relation between household debt and macroeconomic (in)stability. We can easily think of overoptimistic households and responsive developers inducing a household-debt-financed unsustainable boom of residential real-estate construction that gives a temporary boost to GDP and later ends in a bust.

These are not the only possible ways that high household debt may be related to a subsequent fall in GDP. But these two cases indicate that the nature of the boom may help in understanding the risks of a subsequent bust. As Mian and Sufi (2018, p. 32) say, 'we must understand the boom to make sense of the bust' – and thereby be able to assess any macroeconomic risks involved. In these two examples, a household-debt increase combined with a fall in the saving rate (household *overconsumption*) is a crucial ingredient in the first, and a debt increase combined with a construction boom, and probably a rise in the saving rate to finance down payments (household *overinvestment*) is a crucial ingredient in the second. Furthermore, a consumption bust is a crucial ingredient in the first and a construction bust in the second. Hence, the lack of debt-driven consumption and construction booms may indicate little macroeconomic risk.

The paper is organized as follows. Section 2 extends on what is right with Swedish macroprudential policy. Section 3 specifies the FI's existing theoretical framework to assess macroeconomic risks from household indebtedness, explains why the framework is flawed, and shows why the credit tightening has no demonstrable benefits. It also suggests a corrected research-based framework. Section 4 scrutinizes the inter-

national organizations' assertions of a large overvaluation of Swedish housing and their assessments of macroeconomic risks from Swedish household debt. Section 5 warns about drawing superficial conclusions for Sweden from the experience in Denmark before and during the crisis. Section 6 provides a brief summary of the costs of the credit tightening and explains why it reduces household resilience. Section 7 proposes a few reforms of the FI's regulations of the mortgage market, including the FI building up new expertise in housing economics and additional monitoring of the housing and mortgage market. Section 8 presents some conclusions, as well as a suggestion of a reform of the governance of macroprudential policy.⁴

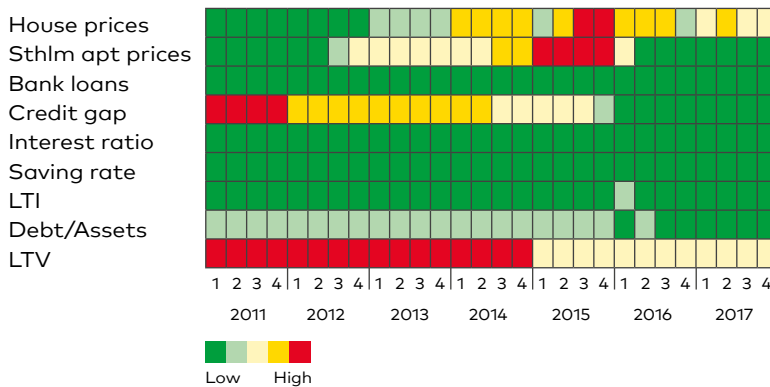
2. Several things are right with Swedish macroprudential policy

Several things are right with Swedish macroprudential policy. The government has introduced a framework for financial stability with a clear separation of monetary policy and macroprudential policy with the FI in charge of and accountable for the latter (Swedish Ministry of Finance 2013a). The FI has been quite active in strengthening the resilience of the Swedish financial system. It has also thoroughly monitored bank lending standards and the households' debt-service capacity and resilience to disturbances.

The FI has taken a series of actions to strengthen the resilience of the financial system. The authority introduced a loan-to-value (LTV) cap of 85% for mortgages in 2010. It raised the risk-weight floor for mortgages first in 2013 to 15% and then in 2014 to 25%, which is quite high given historical credit losses and the fact that mortgages are full recourse. The FI introduced the Basel 3 Liquidity Coverage Ratio regulation in 2014, a Basel Pillar 2 add-on of 2% later in the same year, and a systemic buffer of 3% in 2015

⁴ An online appendix, available at <https://larseosvensson.se/2019/12/05/macprudential-policy-and-household-debt-what-is-wrong-with-swedish-macprudential-policy/> provides details of the consequences and costs of the credit tightening. It also contains more complete references with web-links.

Figure 1 Vulnerability indicators for the household sector



Source: FI (2018a, diagram 3).

for the four largest banks.⁵ The Countercyclical Buffer was activated at the level 1% in 2015, raised to 1.5% in 2016, 2% in 2017, and 2.5% in 2019. In 2017, the capital requirements for the four largest and systemically important banks stood at 24% of risk-weighted assets. Their actual capital was 28% of risk-weighted assets. Swedish banks are among the best capitalized in Europe and very resilient in severe stress tests (FI 2017c).

Regarding households and household debt, the FI introduced a new mortgage-market report in February 2010, which is published annually from 2012 as *The Swedish Mortgage Market*. The report uses microdata on new mortgagors collected from the banks and provides a detailed report of the volume and distribution of household debt. In particular, the results of stress tests of households, in order to assess their debt-servicing capacity and resilience to disturbances, are reported. The first report demonstrated that, already in 2010, the debt-service capacity was good, as was the resilience to disturbances in the form of housing-price falls, interest-rate increases, and income losses from unemployment.

⁵ See Rangvid (2020) for explanations of the Basel 2 and 3 regulations.

ment increases. Since then, the debt-service capacity and resilience have improved steadily (FI 2018b). Also, the average LTV in 2017 was only 63% for new mortgages and only 55% for the total stock of mortgages. The FI's current judgment is that the risks to financial stability associated with household debt are small, consistent the heatmap of vulnerability indicators shown in Figure 1.

3. The amortization requirements have no demonstrable benefits: A flawed theoretical framework

After the government's approval, the FI introduced a first amortization requirement in 2016. According to this, new mortgagors must amortize at least 1% per year if the LTV ratio exceeds 50% and at least 2% if it exceeds 70%. A second amortization requirement was introduced in 2018: New mortgagors with mortgages exceeding 4.5 times their gross income must amortize at least 1% in addition to the first amortization requirement (FI 2016, 2017d).

Before and in parallel with the introduction of the amortization requirements, the FI has encouraged mortgage firms to tighten lending to households in other ways.⁶ For example, in November 2015, the newly appointed director-general wrote an op-ed in which he proposed a loan-to-income (LTI) cap of six times annual disposable income (Thedéen 2015). There are several indications that the FI encouraged the mortgage firms in general to tighten lending to households, for instance, in non-public meetings with mortgage firms, what the FI calls 'communicative supervision'. The FI has indeed stated that:

the tightening of the requirements and credit assessments in recent years is healthy [and]... has been fuelled by FI's actions. ... [T]he open debate FI has fostered about what needs to be done has played an important role in how banks... act and think (FI 2017a, p. 2).

⁶ In response, SBA (2010) issued a recommendation that mortgages be amortized down to an LTV of 75% in 10–15 years. In response to the public discussion about amortization – and presumably in the hope of avoiding an inflexible regulation – SBA (2014) recommended that loans be amortized further down to 70% (Svensson 2019c, appendix A).

Mortgage firms, perhaps due to concerns about future binding regulations, have introduced new – or attached greater importance to existing – internal LTI limits. They now appear to be 5–6 times annual gross income (Svenska Dagbladet 2017), not far from what Thedéen (2015) had proposed. Mortgage firms using lower interest rates in their affordability tests also appear to have raised these somewhat, and a normal affordability-test interest rate (ATIR) is now 7–8% (online appendix B.1).⁷

3.1 The FI's theoretical framework for assessing macroeconomic risks associated with household debt

Many observers may believe that the FI has undertaken the credit tightening in order to improve *financial stability* in Sweden. But this is not so. As noted in Section 1, the FI's current assessment is that the risks to financial stability associated with household debt are relatively small (FI 2017d, p. 9). The FI's view is instead that household debt poses an 'elevated *macroeconomic risk*' (FI 2017d, p. 1, italics added):

The risks associated with household debt are [instead] primarily related to the possibility that *highly indebted households may sharply reduce their consumption in the event of a macroeconomic shock*. This development was *noted in other countries during the financial crisis in 2008–2009*. If many households reduce their consumption at the same time, *this can amplify an economic downturn*. Because loan-to-income ratios are high and rising among many mortgagors, they represent *an elevated macroeconomic risk*.⁸

⁷To determine how much the mortgagor may borrow, the mortgage firms apply affordability tests on their customers. According to these, the loan must not be greater than the mortgagor's being able to pay interest, amortization, operating and maintenance costs and moderate living expenses with his or her income after tax at a specified ATIR that is higher than the prevailing market interest rates.

⁸The same unrevised views have recently been displayed in FI (2019, p. 8). As late as February 2020, in an interview, the FI's Chief Economist, Henrik Braconier, stated that 'own and international studies [show] that the most indebted households reduce their consumption very much in an economic crisis. To avoid this, in 2018 the FI made the amortization requirement stricter' (Svenska Dagbladet 2020, my translation).

The FI's apparent theoretical framework about the macroeconomic risks of household indebtedness can be summarized as follows:

1. The consumption of highly indebted Swedish households – households with high LTV or LTI ratios – is more sensitive to housing price falls, interest-rate rises, and income falls than consumption by less-indebted households.
2. This means that highly indebted households may reduce their consumption more in the event of an economic downturn and thus reinforce the downturn. High indebtedness of many households therefore implies an elevated macroeconomic risk of deeper economic downturns.
3. Since the macroeconomic risk depends on household indebtedness, it can be reduced by reducing household indebtedness.
4. Amortization requirements are an appropriate means of reducing indebtedness. The first requirement reduces the LTV ratios, and the second requirement reduces the LTI ratios.
5. The purpose of the amortization requirements is thus to make household consumption less sensitive to housing price falls, interest-rate rises, and income falls and thereby increase the household's resilience to these three disturbances.

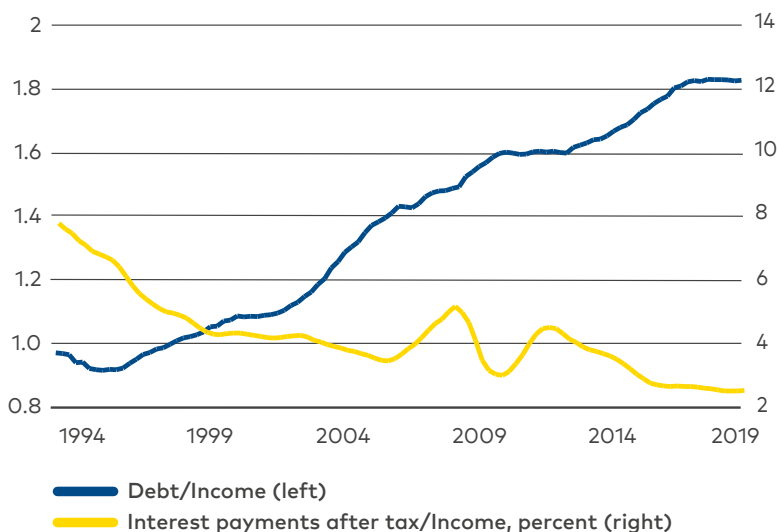
The crucial point is the first one, that the sensitivity of consumption to these disturbances increases with indebtedness. If this point is not correct, the other points in the framework are invalid. However, the FI has not presented a detailed description of the mechanisms by which household debt would affect the sensitivity of consumption to these three disturbances.

3.2 The interest-rate sensitivity of consumption:

The cash-flow channel

It is trivial that high debt and variable mortgage rates make households' cash flows and thus their consumption more sensitive to interest-rate changes. High debt and variable mortgage rates actually create a strong *cash-flow channel of monetary policy*, through which policy-rate changes quickly affect households' cash flow and consumption (Hughson et al. 2016, Flodén et al. 2018, Di Casola and Iversen 2019, Svensson 2019c, Gulbrandsen and Natvik 2020).

Figure 2 Household debt-to-income and after-tax-interest-to-income ratios, 1994–2019

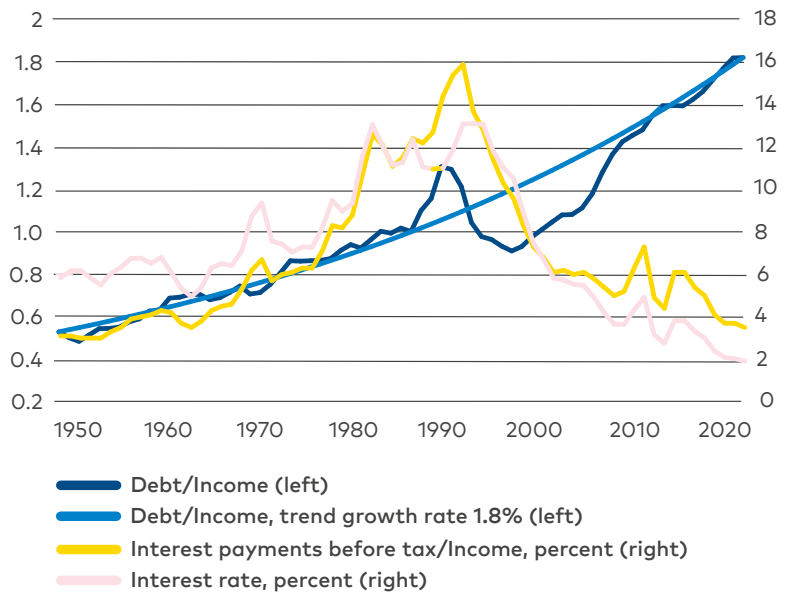


Source: Statistics Sweden.

The cash-flow channel makes monetary policy more powerful and makes it easier for the Riksbank to stabilize consumption and aggregate demand. With a floating exchange rate and flexible inflation targeting, the policy rate, and hence variable mortgage rates, will be low in a downturn – not high, as during the Swedish 1990s crisis with a fixed exchange rate. This reduces the interest payments of indebted households and makes it easier for them to maintain their consumption in case of income disturbances. Therefore, high debt and variable mortgage rates in practice provide a kind of insurance for homeowners against bad times. The cash-flow channel thus reduces rather than increases the risk of consumption falls and deeper downturns. From this point of view, variable interest rates are less risky than interest rates with long fixation periods, counter to conventional wisdom.

Against this insurance aspect of variable mortgage rates, it has been argued that some disturbances can increase the margin between mortgage rates and policy rates. However, as discussed

Figure 3 Household debt-to-income ratio, before-tax-interest-to-income ratio, and interest rate, 1950–2019



Note: The interest rate has been calculated by dividing the before-tax-interest-to-income ratio with the debt-to-income ratio.

Sources: Statistics Sweden and own calculations.

in Svensson (2019c), the Riksbank and the Swedish National Debt Office have effective tools for maintaining a normal interest-rate margin, which can be used if needed – and were used with great efficiency during the 2008–2009 crisis. Figure 2 shows that the interest-to-income ratio fell quickly during 2009, when the Riksbank lowered the policy rate dramatically. The interest-to-income ratio rose again during the Riksbank’s mistaken policy-rate hikes 2010–2011 (Svensson 2018b), but has since the Riksbank’s U-turn 2014 fallen to the lowest level since the 1960s (Figure 3).⁹

⁹ In contrast to the above reasoning, the FI believes – without any explanation – that interest rates could be high in a downturn: ‘... in a worsened economic situation – with, for example, substantially rising interest rates, falling asset prices, and a general economic downturn – ...’ (FI 2019, p. 8, my translation). The FI apparently does not believe that the Riksbank would lower the policy rate in an economic downturn or that the authorities can prevent the margin between mortgage rates and the policy rate from rising. The cash-flow channel of monetary policy is not even mentioned.

Figure 3 also shows that the household debt-to-income ratio has doubled from around 0.9 in 1995 to more than 1.8 in 2019. But the debt-to-income ratio has not risen enough to prevent the interest-to-income ratio to reach a historic low. Furthermore, Figure 3 shows that the household debt-to-income ratio during the last decade has grown at a rate equal to the average growth rate since 1950, and that a quite common focus on the period starting around 1995 – as in Figure 2 – may give a misleading impression.

Importantly, whereas household debt has risen to 1.8 times income, household total assets have risen to almost seven times income (excluding collective pension and insurance claims, amounting to about 1.7 times income) with real assets (owner-occupied housing: single-family houses, tenant-owned apartments, and second homes) rising to almost four times income, and financial assets almost to three times income. Stock-over-stock measures are normally more relevant than stock-over-flow ones. The household debt-to-real-assets ratio is on a downward trend and now below 50%. The household total-debt-to-total-assets ratio is relatively stable below 30%. If total and real assets grow faster than income, it is not strange if debt also grows faster than income. These aggregate measures do not look problematic (Svensson 2019c, Section 3 and Figures 3.1 and 3.2).

Getting back to the sensitivity of consumption to disturbances, we have thus noted that the increased sensitivity to interest rates is not a problem. Instead, the crucial issue is the sensitivity of consumption to housing-price and income falls. The FI has more generally referred to 'international experiences from the financial crisis of 2008–2009,' according to which highly indebted households in Denmark, the UK, and the US reduced their consumption more than less-indebted households. However, the FI has not explained by what mechanisms or channels this would have happened, and whether these mechanisms or channels are relevant to Sweden.

3.3 The housing-price sensitivity of consumption: The housing-collateral channel

In fact, research has shown that it was not high household indebtedness in itself that caused the fall in consumption in these coun-

tries. There were some highly indebted households that cut down their consumption more than others did, but the reason was that these households had before the crisis engaged in a mortgage-financed unsustainable overconsumption, resulting in an aggregate consumption boom. This overconsumption could not continue during the crisis but turned into a bust.¹⁰

The decisive research result was shown first for Danish microdata by Andersen et al. (2016, table 4). They showed that, for households with similar-sized mortgage debt *increases* before the crises, those with a *high* level of debt did *not* reduce spending more during the crisis than those with a low level of debt. But those with a *larger* increase in debt before the crisis cut spending by *more* than those with a small increase, even if they had *similar* debt levels before the crisis. Andersen et al. also showed that, for all years, among households with a large debt increase in that year, spending rose sharply the same year, only to drop equally sharply in the following year.¹¹

Altogether, these results imply that it was not the level of indebtedness in itself but the mortgage-financed overconsumption that caused the fall in consumption. Svensson (2020b) confirms the Andersen et al. results for Australian microdata that have been used by Price et al. (2019).¹² I have seen unpublished regression results that also confirm the results for UK microdata.

At the same time, increased mortgage loans for consumption purposes contributed to many households being highly indebted. Mortgage financing of overconsumption thus caused both the fall in consumption and to a certain extent the high indebtedness. This created a *correlation* between high indebtedness and subsequent consumption declines – but not a *causal* relationship between them.

Thus, there is a housing-collateral consumption-demand channel (Muellbauer 2012), through which housing prices – or, more precisely,

¹⁰ For details, see the discussion in Svensson (2019c, 2020b) of Bunn and Rostom (2015), Andersen et al. (2016) and Price et al. (2019).

¹¹ They call this phenomenon 'spending normalization'.

¹² I thank Benjamin Beckers for providing code and advice.

the *change* in housing prices – can affect consumption.¹³ As housing prices rose before the crisis, many households increased their mortgages (housing-equity withdrawal) to finance overconsumption relative to their disposable income. This showed up in a low household saving rate. When the crisis hit and housing prices stopped rising and began to fall, mortgages could no longer be increased. When the overconsumption ceased, consumption fell back to a more normal level in relation to disposable income and the saving rate rose. The housing-collateral channel – with housing-equity withdrawal used for consumption – was not only operating in Denmark, Australia, and the UK before and during the crisis, but also in the US.¹⁴

Do household-debt increases generally predict subsequent lower economic growth?

The microdata results discussed above point to the housing-collateral channel and debt-financed overconsumption causing a risk of future consumption falls. A much-noted summary of a result from Mian et al. (2017, abstract) using aggregate data is: 'An increase in the household debt to GDP ratio predicts lower GDP growth and higher unemployment in the medium run for an unbalanced panel of 30 countries from 1960 to 2012.' Does this result point to a *general* negative relation – independent of the housing-collateral channel – between household-debt increases and subsequent economic growth? If so, such a general negative relation could perhaps justify general macroprudential policies to reduce household-debt growth, including possibly the FI's amortization requirements.

However, interpreting the Mian et al. result as a general negative relation between household-debt growth and subsequent GDP growth is a misunderstanding of their results. First, the authors provide many robustness tests, and one of these shows that, for countries with flexible exchange rates and independent monetary policy – such as Sweden – household-debt increases do *not* predict a fall in subsequent economic growth. This is consistent with the discussion in Section 3.2: A strong cash-flow channel of

¹³ Berger et al. (2018) provide a detailed theoretical model of housing-price effects on consumption that includes the housing-collateral effect.

¹⁴ As noted by Guren et al. (2019, p. 1): 'In the mid-2000s boom and subsequent bust, housing wealth extraction through the mortgage market boosted consumption in the boom and reduced consumption in the bust (e.g., Mian and Sufi 2011, Mian et al. 2013).'

monetary policy – as in Sweden – may weaken or prevent a subsequent fall in consumption and GDP growth.¹⁵

Second, Mian et al. do examine and discuss different mechanisms for their result. In line with the summary of their results in Section 1 of this paper, they show that the debt increase finances a consumption boom and that the consumption-to-GDP ratio is positively correlated with the debt-to-GDP ratio (Table V). This gives a temporary boost to GDP, and subsequently consumption and GDP falls – what they call a debt-driven business cycle. Thus, they do emphasize the role of the housing-collateral channel. On average, it is active in their panel, and this causes the negative correlation between household-debt growth and subsequent GDP growth.^{16, 17}

No evidence of mortgage-financed overconsumption in Sweden

All this leads to the question of whether there is any evidence of an active housing-collateral channel and any mortgage-financed overconsumption of macroeconomic significance – an aggregate consumption boom – in Sweden. As Muellbauer (2012) emphasizes, the strength of this channel varies considerably between countries depending on differences in the structure of housing and mortgage markets as well as in customs and preferences.

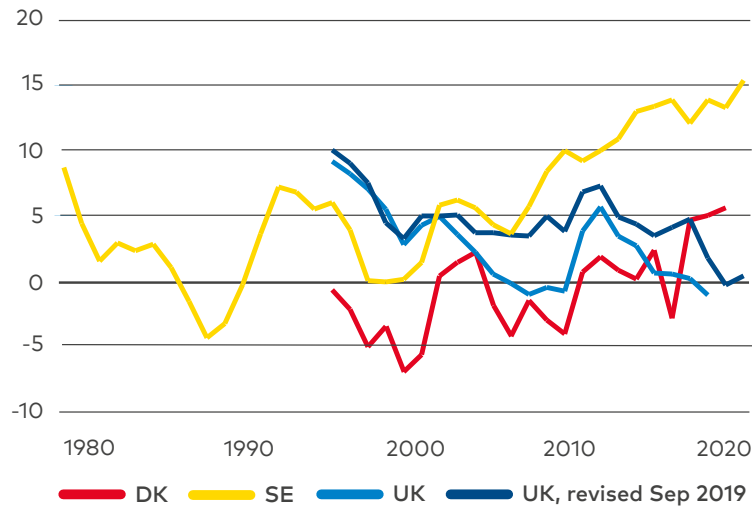
Overconsumption of macroeconomic significance – a consumption boom – would show up in a low household aggregate-saving rate, in line with the debt-driven business cycle of Mian et al. (2017). Denmark and the UK fit this story. Figure 4 shows that the Danish savings rate was low and even negative before the crisis but increased sharply during it, that is, consumption fell by more than disposable income. According to the unrevised UK saving rate (light blue line) this was also the case in the UK, but it is less pronounced after a substantial upward revision of saving rates in 2019 (dark blue line).

¹⁵ See Svensson (2019c, Section 4.5) on the real-time stress test of the Swedish 2008–2009 crisis, when the cash-flow channel of monetary policy and stable household consumption helped stabilize GDP when investment and export collapsed.

¹⁶ Mian and Sufi (2018) call it the 'credit-driven household-demand channel' and emphasize the role of a credit-supply shock initiating the U.S. boom before the Great Recession. Kaplan et al. (2019) argue that one also needs an upward shift in housing-price expectations to quantitatively reproduce the boom and bust.

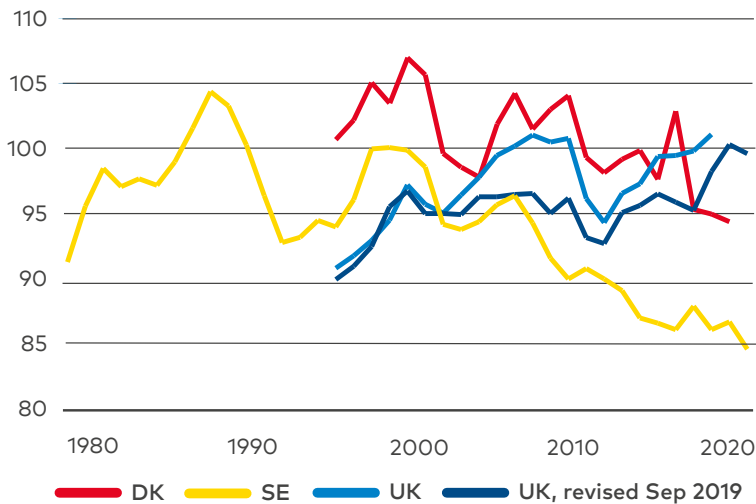
¹⁷ A new regression run by me with the Mian et al. (2017) online Replication Kit shows that the housing-collateral channel is weaker for countries with flexible exchange rates.

Figure 4 Household saving rates in Denmark, Sweden, and the UK, percent



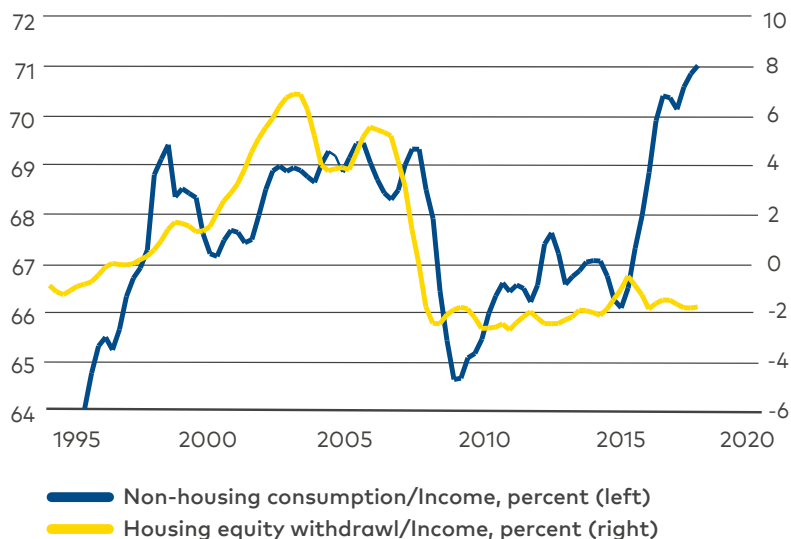
Source: OECD and Statistics Sweden.

Figure 5 Household consumption rates in Denmark, Sweden, and the UK, percent



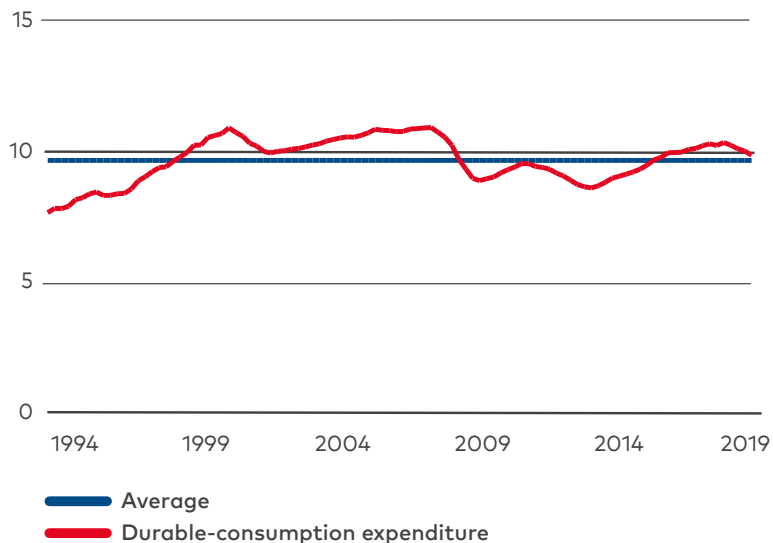
Source: OECD and Statistics Sweden.

Figure 6 Housing-equity withdrawal and non-housing consumption in the UK as a percentage of post-tax income



Source: Bank of England, Office of National Statistics.

Figure 7 Swedish household durable-goods expenditure as a percentage of total consumption expenditure



Source: Statistics Sweden.

However, for the UK, independent evidence is provided by the series of aggregate housing-equity withdrawal published by the Bank of England (Reinold 2011). Figure 6 shows the strong relation between equity withdrawal and non-housing consumption before and after the crisis.

In Sweden, in contrast, the saving rate was high before the crisis and has now risen further to a historically high level. Such a high saving rate is not compatible with overconsumption of macroeconomic significance. Neither is the rise in the saving rate consistent with the prediction of the debt-driven business cycle of Mian et al. (2017). Furthermore, Figure 4 shows that, during the crisis year 2009, whereas the saving rate *rose* in both Denmark and the UK, in Sweden the saving rate *fell*. This implies that consumption fell less than disposable income in Sweden. Figure 5 shows the corresponding consumption rates ($1 - \text{the saving rate}$). There has recently certainly been no consumption boom in Sweden.

We may note in Figure 4 that the Swedish household saving rate was quite low in the late 1980s, before the crisis in the 1990s, and that the net saving rate was even negative. It then jumped about eleven percentage points, corresponding to a large drop in the consumption rate. But the situation before and during the crisis in the 1990s was very different from today. With a fixed exchange rate, the Swedish economy became very overheated before the crisis and the Riksbank later defended the fixed exchange rate with extremely high policy rates.

Another indicator of possible debt-financed overconsumption is large expenditures on durable consumer goods, as these are often financed with loans. However, the share of household durable-goods expenditure in total household consumption expenditure is close to its historical mean (Figure 7), and the share in disposable income is below its historical mean.¹⁸ This also indicates that there is no mortgage-financed overconsumption of macroeconomic significance.

¹⁸ See FI (2017b, Figure 34).

No evidence of housing-equity withdrawal having been used for any extensive consumption

Thus, there are no indications from aggregate data of any mortgage-financed consumption boom. At the same time, microdata shows fairly extensive housing-equity withdrawals by existing mortgagors in Sweden (Emanuelsson et al. 2018). There are no broad-based Swedish microdata studies on the relation between housing-equity withdrawal and consumption, but existing studies, cited below, give no indication that mortgage loans would finance any overconsumption of macroeconomic significance.

As discussed further in Svensson (2019c), the withdrawals appear to have been used instead for purposes such as renovations, purchases of summer homes, and assistance to children to buy their own home. Mortgagors may also have raised their mortgages to be able to pay future amortization (Svensson 2016a, Hull 2017) or to invest in financial assets and build up a liquidity buffer, which increases the resilience to disturbances. In a recent survey, an overwhelming majority of mortgagors said that they had substantial savings and did not use their mortgage for consumption purposes (SBAB 2019a).

Li and Zhang (2018) show that housing-equity withdrawals have been used to pay off previous high-interest consumer loans – a form of private debt restructuring – and to finance new small businesses. Sodini et al. (2017) investigate households that made a large capital gain when their rental apartments were converted to tenant-owned apartments ('bostadsrätter'). The authors show that those that sold and moved – and thus cashed in the capital gain – increased their consumption, but those that stayed did not. Among other things, they used equity withdrawals to stabilize consumption in the event of income disturbances, thereby increasing their resilience to these disturbances.

All in all, the conclusion is that housing-equity withdrawals have not been used for any extensive consumption but for residential investment and other purposes, some of which may have increased household resilience to disturbances.

3.4 The income sensitivity of consumption: credit and liquidity constraints

The question of the income sensitivity of consumption remains. Baker (2018) has shown that household indebtedness has no direct impact on the income sensitivity of consumption. Instead, it is credit and liquidity constraints that make household consumption more income-sensitive. This is a very intuitive result, completely consistent with the permanent-income hypothesis of Friedman (1957). If households have access to credit or liquid assets, they can better maintain their consumption in the event of a fall in income. Thus, whether higher indebtedness increases or decreases the sensitivity of consumption to income does not depend on the indebtedness itself, but on whether the indebtedness entails greater or lesser credit and liquidity constraints.

Households that are credit- and liquidity constrained are prevented from their preferred consumption-smoothing over time. In particular, they are restricted to underconsume and oversave compared to what they would prefer. Their marginal propensity to consume out of current net income will be very high. They may indeed be hand-to-mouth consumers with a marginal propensity to consume equal to unity (Campbell and Mankiw 1989, Kaplan et al. 2014, Ampudia et al. 2018). Because amortization requirements increase debt service and reduce cash-flow margins, amortization requirements imply that mortgagors become more credit- and liquidity-constrained and that their consumption becomes more sensitive to their current income.

3.5 Is the above evidence enough?

Is the research and evidence discussed above enough to conclude that there is little macroeconomic risk today from household debt in Sweden?

The research discussed has shown that consumption and GDP busts have been preceded by rising housing prices and debt-driven aggregate consumption booms. Here, a conspicuous fact is that household debt and housing prices have been increasing in Sweden (Figures 2, 3, and A.1b), but there has *not* been any consumption boom with a fall in the saving rate and a corresponding boost to GDP. Instead, the saving rate has risen dramatically. The consumption rate has by definition fallen equally dramatically,

and consumption has not given a boost to, but reduced, GDP (Figures 4 and 5).

Thus, there has been no debt-driven consumption boom in Sweden. Could there still be a risk of a subsequent consumption bust? According to the understanding of the booms and busts from the work of Mian et al. (2017) and Mian and Sufi (2018) without a consumption boom, there is hardly any risk of a consumption bust.

A possible objection is that there are not enough data available about individual households to precisely assess whether and to what extent individual households use mortgages to overconsume. That is correct, but a macroeconomic risk requires an *aggregate* consumption boom, and an aggregate consumption bust, of *macroeconomic significance*, that is, of a few percentage points of aggregate disposable income. It is unlikely that there would be a hidden mortgage-financed overconsumption by some households resulting in such a large aggregate overconsumption. In order to be consistent with an aggregate consumption rate falling to a historic low, this would require a hidden even larger aggregate underconsumption and oversaving by the remaining households, without anything of this somehow showing up in the available microdata and existing microdata studies.

Neither are there enough data on households' liquid assets to more precisely assess individual households' liquidity buffers and thereby consumption-smoothing capacity. The latter depends on the households' access to credit and liquidity, as discussed in Section 3.4. In particular, this matters for what fraction are hand-to-mouth consumers and have a marginal propensity to consume out of income close to unity. However, the new borrowers' cash-flow margins – excluding any contribution from liquid assets – can be assessed from the data in the FI's annual mortgage-market survey. The average new borrower had a cash-flow margin of 41% of disposable income in 2017. 'Household margins are sound,' and 'stress tests indicate healthy margins,' according to FI (2018b). Any liquid assets add to those margins. As mentioned, in a recent survey, an overwhelming majority of mortgagors said that they had substantial savings (SBAB 2019a).

Importantly, the FI's credit tightening reduces access to credit. The amortization requirements increase debt service and reduce cash flows. This reduces households' consumption-smoothing capacity and thereby their resilience to a fall in income. Thus, limited consumption-smoothing capacity is not an argument for credit tightening. It is an argument for increased access to credit and liquidity.

In summary, the existing research and available evidence indeed seems sufficient for the conclusion above. As always, this does of course not exclude that new data and research may modify the conclusion, although it seems unlikely.

3.6 A more realistic, research-based framework for assessing macroeconomic risks associated with household indebtedness

The above review shows that the crucial first point of the FI's framework for assessing macroeconomic risks associated with household debt (Section 3.1) is incorrect. Then the other points in the framework are invalid. This means that a more realistic, research-based framework is required for handling the macroeconomic risks associated with household indebtedness in Sweden:

1. The macroeconomic risk of large consumption falls from household debt depends on how household debt affects the nature and magnitude of the sensitivity of consumption to disturbances – primarily housing price falls, interest changes, and income falls.
2. The housing-price sensitivity of consumption is mainly determined by the housing-collateral channel and the extent of mortgage-financed overconsumption. The level of indebtedness in itself has little effect on the sensitivity to a fall in housing prices. A lack of an active housing-collateral channel and mortgage-financed overconsumption means that the consumption of highly indebted households is no more sensitive to housing price falls than the consumption of less-indebted households.
3. The interest-rate sensitivity of consumption increases with household debt. Then the cash-flow channel of monetary policy is stronger, and it is easier for the central bank to stabilize consumption and aggregate demand. In a downturn, interest rates will be lowered. This will improve the cash flow of highly indebted households and make it easier to stabilize consumption.

4. The income sensitivity of consumption does not depend directly on indebtedness but on the extent of credit and liquidity constraints. The effect of indebtedness on income sensitivity is therefore determined by whether higher indebtedness entails greater or lesser credit and liquidity constraints.
5. The macroeconomic risk of large consumption falls can be reduced by reducing credit and liquidity constraints. To the extent that these depend on indebtedness, the macroeconomic risk may be reduced by reducing this dependence, while at the same time ensuring sufficient debt-service capacity and resilience to disturbances of indebted households. This can, for example, be achieved through improved mortgage contracts, including interest-only loans with a credit line.¹⁹

According to this framework, increases in household debt can increase the macroeconomic risk of a large consumption fall through essentially two channels. One channel is via an active housing-collateral channel and a mortgage-financed consumption boom. This makes consumption sensitive to housing-price falls – or even to a break in a steady rise in housing prices. The other channel is through more household debt inducing tighter credit and liquidity constraints.

In either case, there is no need for amortization requirements. They have no demonstrable benefits and may become counter-productive and increase the risk of deeper economic downturns. If the FI is concerned about the risk of deeper downturns, it should abolish the amortization requirements.

First, the amortization requirements increase households' debt service and deteriorate their cash-flow margins. The debt service becomes strongly frontloaded, thereby increasing credit and liquidity constraints. This increases the sensitivity of consumption to income falls (see Section 6 and online appendix B.6 and B.7).

Second, the first amortization requirement's dependence on the LTV ratio implies that the sensitivity to a housing-price fall may increase. A fall in housing prices increases the LTV ratio.

¹⁹ See Section 7.

Thus more mortgagors end up with an LTV ratio above the 50% and 70% thresholds. Then mortgage firms have the right to demand increased amortizations, in which case the mortgagors' cash flows deteriorate and they may have to consume less.²⁰ The perceived risk of amortization requirements may in itself induce some precautionary saving and a consumption fall.

Third, the second amortization requirement's dependence on the LTI ratio means that the sensitivity to an income fall may increase. A fall in income increases the LTI ratio. Then more mortgagors end up with a mortgage above the 4.5 threshold for the LTI ratio, in which case mortgage firms have the right to demand higher amortizations and the mortgagors must consume less.²¹ Again, the perceived risk of this may in itself induce precautionary saving and a consumption fall.

In summary, based on the more realistic framework there are no demonstrable benefits of the credit tightening. But, as we shall see in Section 6, the individual and social costs are substantial.

4. International organizations on Swedish housing prices and household debt

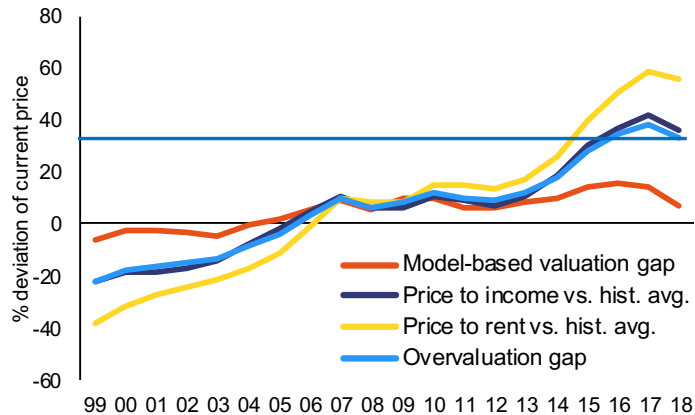
The FI (for example, FI 2017d) and other Swedish authorities have often referred to the fact that several international organizations – such as the European Commission, the ESRB, the IMF, and the OECD – have called attention to the high housing prices and large Swedish household debt and recommended the FI to take action. The organizations have also supported the FI's amortization requirements.

The organizations have also suggested that housing is overvalued by 30–40% – or even up to 60% – with reference to high price-to-income and price-to-rent ratios (ESRB 2019, OECD 2019, Euro-

²⁰ The mortgage firms are not allowed to re-evaluate the collateral more often than every five years, except if the value changes for reasons other than the general development on the residential property market (FI 2016).

²¹ The mortgage firms may revise the LTI ratio any time, with the gross income defined as the most recently assessed earnings income according to the Income Tax Act and other income that is assured and permanent (FI 2017d).

Figure 8 Estimated housing-price valuation gaps based on different indicators



Source: European Commission (2020, Graph 4.2.3), horizontal line added.

pean Commission 2020). In contrast, the FI now seems less worried about housing prices (Thedéen 2019).²²

4.1 Evidence of overvaluation?

In a recent assessment the Commission states that ‘The Swedish economy still faces macroeconomic imbalances related to high private debt and overvalued house prices’ (European Commission, 2020, p. 19). Swedish housing is claimed to be overvalued by more than 30%, based on the average of three indicators: a price-to-income valuation gap (PTI), a price-to-rent valuation gap (PTR), and a model-based valuation gap. (European Commission, 2020).²³

The PTI and PTR ratios are used as indicators of the affordability of owner-occupied housing and its attractiveness relative to rental housing, respectively (Philipponnet and Turrini 2017). But, as discussed in Svensson (2020b), they are misleading, in

²² Svensson (2020a) provides a detailed scrutiny of the Commission’s assessment of the risks to Swedish financial and macroprudential stability from housing prices and household debt (see also Svensson 2019c, Section 5). Boije (2019) has previously criticized the Commission’s analysis and recommendations for Sweden.

²³ With reference to the PTI gap and an econometric model, ESRB (2019, p. 124) concludes that Swedish housing is overvalued, ‘with various estimates ranging from 20% to 60%.’

particular as they do not account for the fact that housing prices depend on interest rates.

More appropriate affordability indicators are instead the housing-payment-to-income and the user-cost-to-income ratios.²⁴ The user cost matters for home buyers without credit and liquidity constraints. For home buyers *with* such constraints, the affordability is determined by the size of the one-time down payment and the regular housing payments – the debt service on the mortgage as well as operating and maintenance costs – relative to the income. The PTI ratio is irrelevant.

In contrast, two recent studies by staff of the Riksbank (Dermani et al. 2016) and the National Debt Office (Bjellerup and Majtorp 2019) do not indicate any overvaluation and find prices to be consistent with fundamentals. The latter study finds that the rise in real house prices during 1996–2017 is well explained by the fall in the real after-tax interest rate and the rise in real disposable income.

Evidence from housing prices, user costs, and housing payments in Stockholm

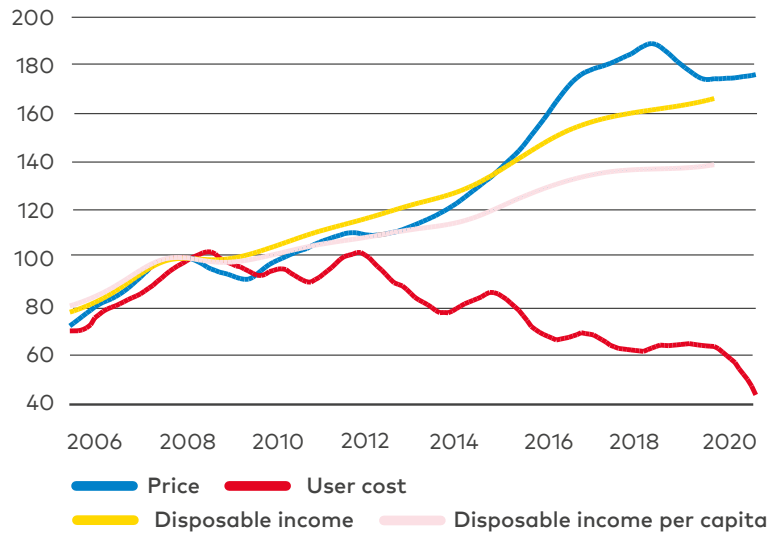
Stockholm has the highest housing prices in Sweden. It is therefore instructive to assess whether housing prices are overvalued there. As in Svensson (2019b, 2019c), the average Stockholm tenant-owned studio (one-room apartment) in 2017 can be used as an example, with assumptions and data as in Table A.1 and Figure A.1.

Figure 9a shows the levels of Stockholm owner-occupied housing prices, disposable income, disposable income per capita, and user cost of housing (excluding capital gains). The variables are indexed to 100 in June 2008, when a substantial reduction in the property tax can be assumed to have been capitalized in housing prices. Figure 9b shows the ratios of price and user cost to disposable income per capita (PTI and UCTI, respectively). We see that, from 2008 to

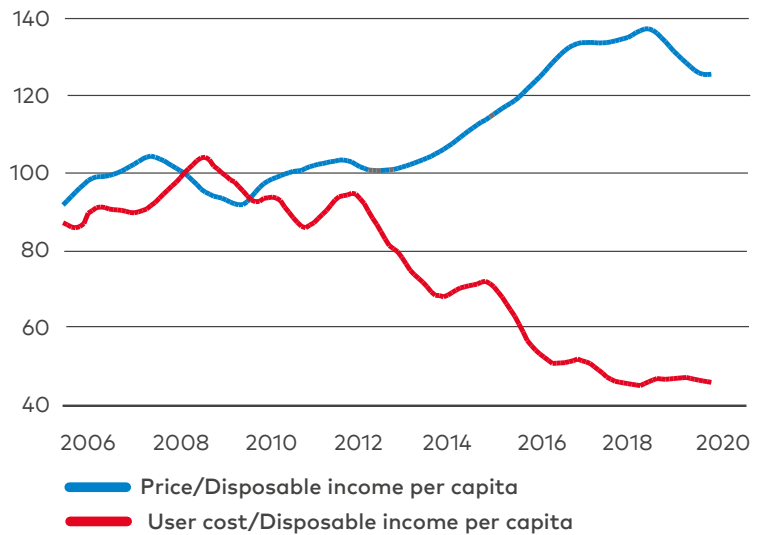
²⁴ The housing payment is the sum of the operating and maintenance cost (OMC) and the mortgage debt service (interest and amortization payments). The user cost – the imputed rent – is the sum of the OMC, the real after-tax mortgage interest, and the real cost of housing equity, less the (expected) real after-tax capital gain.

Figure 9 Stockholm Municipality apartment price, user cost, disposable income, and disposable income per capita

a) Levels (index)

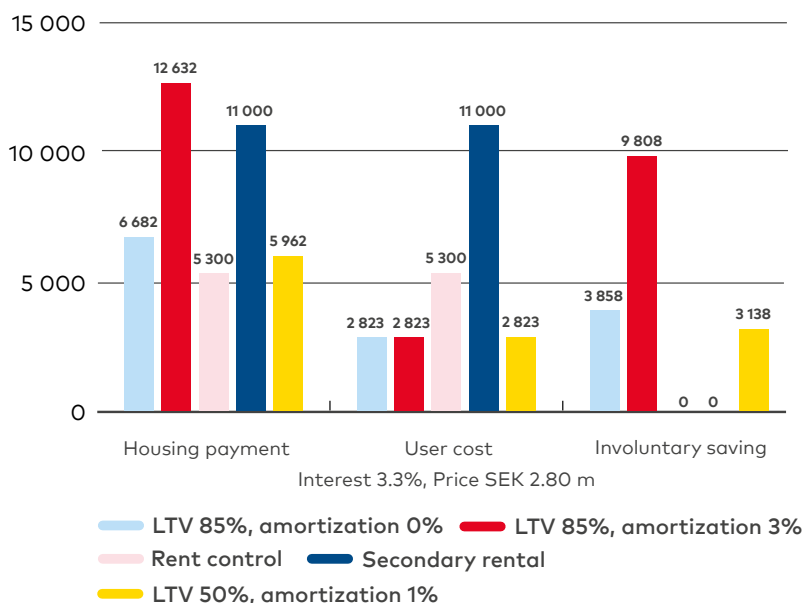


b) Ratio of price and user cost to disposable income per capita (index)



Sources: Valueguard (2019), Statistics Sweden, and Svensson (2019c).

Figure 10 Monthly housing payment, user cost, and involuntary saving for five housing alternatives, SEK



Note: The average Stockholm studio 2017.

Sources: Table A.1, Stockholm Housing Agency 2018, and own calculations.

2017, the PTI ratio rose by about 35%, whereas the UCTI ratio fell by about 50%.²⁵

Under the assumption of well-functioning markets, Cobb-Douglas preferences, and most home buyers not being credit- and liquidity-constrained, the UCTI ratio should have been roughly constant after 2008, instead of falling by about 50%. That the UCTI has fallen so much since 2008 is hardly consistent with housing being overvalued in Sweden. If housing was not overvalued in 2008, it might even be substantially undervalued in 2017 and later.

Figure 9b allows a *relative* comparison of UCTI ratios between different years. Figure 10 shows an *absolute* comparison in SEK of the user cost and housing payment for owner-occupied and rental hous-

²⁵ The fall in the user cost is due to the fall in the real after-tax ten-year mortgage rate.

ing for the year 2017. It summarizes the monthly housing payment, user cost (excluding capital gains), and involuntary saving (housing payment minus user cost) for five housing-occupancy alternatives: owner-occupancy with an LTV ratio of 85%, without amortization (light-blue bars) and with 3% amortization (both amortization requirements) (red), respectively; a rent-controlled rental (light-red); a secondary rental (dark-blue); and owner-occupancy with an LTV ratio of 50% and 1% amortization (only the second amortization requirement) (yellow).

The fact that the user cost for the owner-occupied studio is close to half the controlled rent and about a quarter of the secondary market rent is hardly consistent with owner-occupied housing being overvalued. If anything, it is undervalued.^{26, 27}

Overvaluation, fundamentals, and expectations

Even if housing prices are consistent with fundamentals, they may change fast, if fundamentals change fast. Thus, an assessment of the risks of a housing price fall requires an assessment of how robust and stable the fundamentals are. In particular, large policy changes may have large effects on housing payments, mortgage credit availability, and user costs, and thereby on housing prices. A recent example is the second amortization requirement that was debated and decided upon in the fall of 2017 and accompanied by a price fall from August to December 2017 of about 11% for apartments in Stockholm and Sweden (Figure A.1b). Another example is the 1991 tax reform when tax deductibility of mortgage interest was reduced from approximately 50% to 30%.

Furthermore, housing prices are affected by household expectations of future housing prices and interest rates, and overoptimistic expectations may lead to overvaluation. As discussed in Svensson (2019c), there is no evidence of overoptimistic household mortgage-rate or housing-price expectations in Sweden.

²⁶ Other aspects of Figure 10 are discussed in Section 6 and in online appendix B.2.

²⁷ Flam (2016) compares owner-occupied user costs to 'presumption rents' in newly constructed rentals in Stockholm's inner city, the hottest housing market in Sweden. He finds that presumption rents exceed the user cost and thus do not indicate overvaluation even in this hot market.

Overvalued housing may induce an unsustainable construction boom of residential real estate and generally too large a construction sector. A housing-price correction may bring this boom to a sudden stop, with grave consequences. Because of the structural and institutional barriers to increased housing supply and the structural housing shortage, the risk of such a scenario seems small in Sweden. Furthermore, the indicators of such a scenario would be rather conspicuous.

4.2 Risks from household debt?

What about any risks associated with household debt levels? Regarding these, the Commission seems to be concerned about a similar 'elevated macroeconomic risk' as the FI:

High household debt coupled with high house prices are a risk for the Swedish economy... If incomes were to fall due to an external shock to the economy, or if there was a sharp rise in mortgage risk premiums – triggered, for instance, by a renewed housing market downturn or by higher bank funding costs as perceptions about their riskiness worsen – highly-leveraged households may need to reduce consumption to service their debt (European Commission, 2020, p. 35, italics added).

The OECD (2017, p. 26) has expressed similar concerns. Both the European Commission and the OECD refer to the interest-sensitivity of consumption. But they do not mention the endogeneity of interest rates and the issues discussed in Section 3.2, nor why the cash-flow channel of monetary policy and the authorities' tools to control the spread between mortgage rates and the policy rate may reduce the risk of consumption falls. Neither is there any discussion of the mechanisms through which housing prices and household debt may affect consumption – the housing-collateral channel, consumption booms, and the role of credit and liquidity constraints, discussed above.

In summary, the international organizations have not established that Swedish housing is overvalued. Furthermore, their assessment of macroeconomic risks from household debt suffers from the same weaknesses as the FI's assessment.²⁸

5. Sweden is not Denmark

The development in Denmark before and during the financial crisis – especially the large fall in consumption during the crisis – is sometimes used to justify the amortization requirements. The implication is that, without the introduction of these requirements, Sweden could in the future have suffered a similar fate as that of Denmark.²⁹ As far as I can see, those arguments are not convincing (Svensson 2019d).

Before 2003, *all* mortgages in Denmark were subject to amortization requirements. Denmark had been in a continuous period of expansion since 1995, with an average GDP growth rate of 2%. Saving was low (Figure 4). In 2003, interest-only loans were introduced and made available to *all*. They became very popular. By reducing the required debt service, this was a positive credit-supply shock. Housing prices rose, household consumption rose, and a consumption boom was financed by housing-equity withdrawals. A substantial construction boom also developed. There was overoptimism among households and other agents. The economy overheated, and – with a fixed exchange rate – monetary policy could not be used to prevent the overheating. With tight labour-market conditions, wage growth increased and competitiveness deteriorated. The development was arguably similar to the overheating in the Swedish economy during the late 1980s and in Ireland, Portugal, and Spain before the euro crisis. Eventually, the crisis came.³⁰

²⁸ The ESRB (for example, ESRB 2019) draws similar conclusions about the risks from Swedish housing prices and household debt as the Commission, and its analysis suffers from the same weaknesses.

²⁹ See, for example, the discussion in (Svensson 2019c, Section 1) of the director general's speech in the Riksdag's Finance Committee (Thedéen 2016). The FI has repeatedly referred to the Danish experience, as has the OECD (2017, p. 26).

³⁰ See OECD (2008), Dam et al. (2011), European Commission (2012), Rangvid (2013, 2020), and Bäckman and Khorunzhina (2019).

In Sweden, in contrast, saving was high and rising before the introduction of the amortization requirements and other credit tightening. In spite of rising housing prices, construction of new housing was too low – because of various structural barriers – and the housing shortage grew. Some mortgages were interest-only loans, some were being amortized. In contrast to what was the case in Denmark, the compulsory amortization requirements do not apply to *all*, only to *some* mortgagors. They apply to new mortgages, thus, to first-time buyers and mortgagors that need to move. They apply to mortgagors who need to borrow more and get higher LTV ratios, thus to those that have *less wealth*. They apply to those that have a higher loan-to-income (LTI) ratio, thus to those that have *less income*. The Swedish amortization requirements are not neutral – they are *regressive*, in the sense that they increase housing payments and reduce credit for households without high income or wealth. They are the ones that meet a negative supply shock and whose housing demand has had to fall. After the decision to introduce the second amortization requirement, housing prices did fall in 2017, after which construction also fell.

There is no reason why the abolishment of the compulsory amortization requirements in Sweden would trigger a development like that previously in Denmark, with an unsustainable consumption boom financed by housing-equity withdrawals, a construction boom, and general overheating. In contrast to the situation before the crisis in Denmark, household saving is at a historic high; the risk of overconsumption financed by housing-equity withdrawals is understood, indicators of it can be watched, and policy actions can be taken if needed. Structural barriers to construction prevent a construction boom, and monetary policy can prevent any overheating.

Importantly, abolishing *compulsory* amortization requirements does not mean that *all* amortization would be abolished. Many mortgagors would still prefer to amortize, and some mortgage firms may still require amortization or offer incentives in the form of lower interest rates to those that amortize.

6. The consequences and costs of the credit tightening

Section 3 examined the rationale for and possible benefits of the credit tightening – and found that there are none. This section summarizes the consequences and costs of the tightening, in particular, of the compulsory amortization requirements.³¹

The discussion of the credit tightening is simplified by representing the situation without the tightening – approximately corresponding to the situation in 2010–2011 – by an affordability-test interest rate (ATIR) of 6% and no amortization. The tightening is represented by an ATIR of 7% and the two amortization requirements, implying 3% amortization for a loan with an LTV ratio above 70% and a mortgagor with an LTI ratio above 4.5.^{32, 33}

Figure 10 shows the monthly housing payments, user costs, and involuntary saving for five housing-occupancy alternatives. The left set of bars shows the monthly housing payments for the alternatives. For a buyer that needs to borrow 85% of the price and is subject to both amortization requirements, the amortization of 3% increases the housing payment substantially, by almost SEK 6 000 (€600) (the light-blue and red bars). For a mortgagor that is wealthy and only needs to borrow 50%, but is subject to the second amortization requirement of 1%, the housing payment and involuntary saving is substantially lower (yellow).

The very different housing payments for an owner-occupied studio with the same user cost illustrate some of the distortions caused by amortization requirements.

The amortization requirements and the increase in the ATIR correspond to a substantial credit contraction. For households that are liquidity-constrained, 3% compulsory amortization is equivalent to a 4.3 percentage-point mortgage-rate increase and leads to a corresponding fall in *demand* for mortgages.³⁴ But amorti-

³¹ A more extensive examination is available in online appendix B and Svensson (2019b).

³² See online appendix B.1 for evidence and details.

³³ See footnote 7 for a reminder about the nature of the affordability tests. See also online appendix B.1 for evidence and a detailed argumentation.

³⁴ With a capital income tax rate of 30%, 3% amortization is equivalent to an interest rate increase of $3/(1-0.3) = 4.3$ percentage points.

zation requirements is a credit tightening that also directly contracts the *supply* of mortgages and constitute a negative credit-supply shock. This is because mortgage firms' affordability tests include the amortization requirements and thereby restrict the loan amount to borrowers subject to the requirements.

Without the credit tightening – with an interest-only loan and a 6% ATIR – according to mortgage firms' standard affordability test, the required minimum monthly gross income to get the above loan of SEK 2.38 mn (85% of the price of SEK 2.8 mn, €280 000) is about SEK 25 000 (€2 500). This was the median income for Stockholm 25–29-year-olds in 2017 – a cohort for which a studio would be a natural alternative. Thus, the top 50% of this cohort would qualify for a loan to buy the studio.³⁵

With the credit tightening – with amortization requirements and a 7% ATIR – the required minimum gross income is SEK 35 000 (€3 500). Only the top 20% of the 25–29-year-olds had at least that income. Thus, according to this measure, compared to a situation without the tightening, 30 out of 50 are excluded from obtaining the loan for the average Stockholm studio.

For a given gross income, the maximum loan allowed by the affordability test typically drops by a total of 47%, when both the higher ATIR and the amortization requirements apply.³⁶

The examples here and in Svensson (2019b) refer to young first-time buyers. But the amortization requirement and other tightening also affect older households – including the retired – who may want to move. The measures create lock-in-effects for existing homeowners, which limit housing-market efficiency, and they affect existing homeowners who want to extract equity. Requiring higher amortization payments also means saving in less-liquid housing equity and increases the reliance on the mortgage firms for accessing liquidity. This causes distortions as well as welfare and welfare-distribution losses.³⁷

³⁵ See online appendix B.3, Table B.1, and Figure B.7.

³⁶ Online appendix Figure B.6.

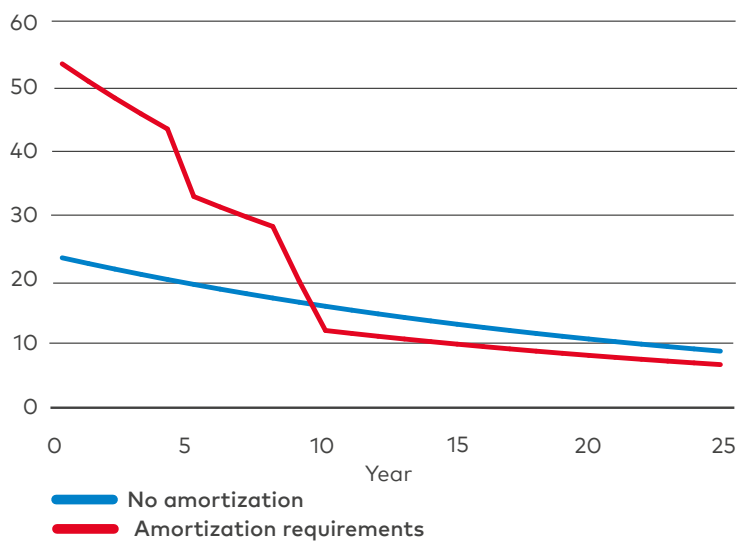
³⁷ Several of them are listed in online appendix Table B.3.

In a new report and op-ed (Olsén Ingefeldt and Thell 2019, Thedéen 2019), the FI maintains that the amortization requirements do not exclude the young from owner-occupied housing. The argument is that, of the young who bought housing in 2012, 85% would be able to buy the same housing in 2018 if they had been young in 2018. For Stockholm, however, the fraction is only 67%. But the effect of the compulsory amortization requirements are measured in a misleading way, resulting from the difference between the actual amortization rates of, on average, 2.2% in 2018 and the actual amortization rates of, on average, 1.8% in 2012. But the high actual amortization rates in 2012 were to a large extent the result of the mortgage firms' considerable tightening of lending standards since 2010–2011 – presumably in the vain hope of avoiding a regulation of compulsory amortization – and should be seen as part of the general credit tightening induced by the FI. Some of the amortization in 2012 was probably voluntary. With higher housing prices and larger loans in 2018, many young persons may have preferred to amortize less in 2018 than in 2012.³⁸

The report notes that the share of the young has increased among new borrowers. But the report – though not the op-ed – emphasizes that this does *not* imply that it has become easier for the young to buy a home (Olsén Ingefeldt and Thell 2019, p. 15). The rental market has become less accessible which has reduced the alternatives to owner-occupied housing and may have forced some of the young to take larger loans relative to incomes and the value of the property. It is also likely that the young, more than the old, have been restricted to buying housing with less attractive locations and smaller sizes. The increased share of young borrowers may also be due to parents' housing-equity withdrawals. In particular, data are not available on the fraction of young with *rejected* loan applications in 2012 and in 2018, in particular compared to a situation in which interest-only loans are available. The FI's database include only those that are granted loans.

³⁸ An arguably more relevant comparison of the situation for the young with and without the credit tightening – taking into account the total credit tightening achieved by the FI since 2010–2011 – is provided in Svensson (2019b, Section 5.2).

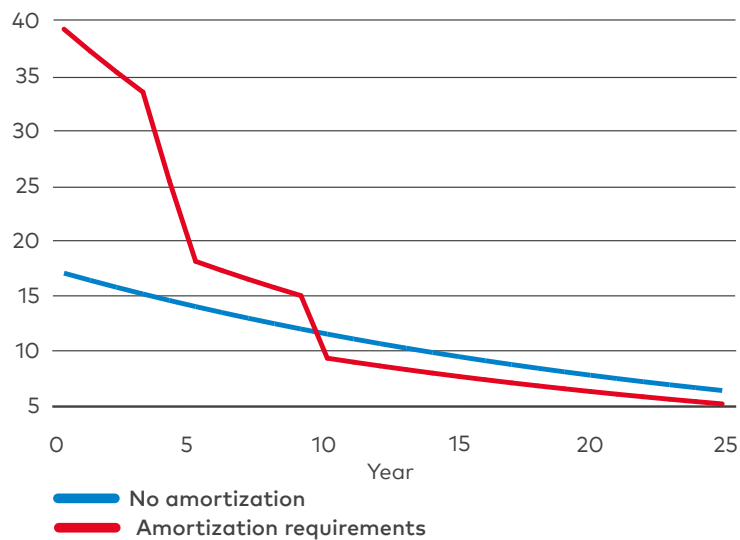
Figure 11 Debt-service-to-net-income ratio, without amortization and with amortization requirements, initial monthly gross income SEK 25 000, percent



Note: SEK/EUR ≈10.

Sources: Tables 2 and B.2 (in online appendix), and own calculations.

Figure 12 Debt-service-to-net-income ratio, without amortization and with amortization requirements, initial monthly gross income SEK 35 000, percent



Note: SEK/EUR ≈10.

Sources: Tables 2 and B.2 (in online appendix), and own calculations.

Meanwhile, more independent evidence of increasing difficulties for the young are accumulating in several reports (Evidens 2018, Ljung 2018, SBAB 2018, Ekvall 2019, Skandia 2019, Svensson 2019b).

6.1 Reduced resilience

As discussed in Section 3.4, the amortization requirements actually reduce household resilience, by increasing debt service, reducing cash-flow margins, and thereby increasing the sensitivity of consumption to income shocks. This is illustrated in Figures 11 and 12, for individuals with initial monthly gross incomes of SEK 25 000 and 35 000, respectively. This corresponds to the 25–29-year-olds that just passed the affordability test for the studio without and with the tightening, respectively.³⁹

The blue lines show the debt-service-to-net-income (DSTI) ratios for an interest-only loan. The nominal income growth of 4% results in an 'automatic' amortization of 4% per year, corresponding to a half-time of about 18 years for the DSTI ratio.⁴⁰

The red lines show the DSTI ratios under the two amortization requirements. They lead to a strongly frontloaded DSTI ratio compared with an interest-only loan. The DSTI ratios drop over time when the LTV and LTI ratios fall below the thresholds for amortizations. Importantly, it takes ten years before the DSTI ratio drops below that of an interest-only loan, and then it only drops a few percentage points below. Because the DSTI ratio for an interest-only loan is already small in year 10, it is difficult to see much benefit from a further reduction.

From an informal cost-benefit analysis, it is rather clear that the cost of a substantially higher DSTI ratio during the first nine years are larger than the possible benefits of a modest reduction of a relatively small DSTI ratio from year 10. More generally, the strongly front-loaded DSTI ratio under amortization requirements makes more mortgagors liquidity-constrained for many

³⁹ An underlying assumption is that incomes and housing prices grow by 4% (2% real growth and 2% inflation) (online appendix B.6).

⁴⁰ There is no reason to believe that a faster amortization rate would be better. Actually, as far as I know, there is no support for compulsory amortization at all in the research literature on optimal mortgage contracts (Section 7).

years, forces more mortgagors to oversave, and makes it more difficult or even impossible for mortgagors to smooth their consumption when shocks to their current income occur.

Thus, the mortgagors' consumption becomes more sensitive to current income, and the mortgagors become less resilient to shocks. This is further confirmed by the corresponding strongly backloaded cash-flow margins.⁴¹

The FI is aware of the problem that amortization requirements reduce households' resilience. Its response to this problem – indeed, contradiction – is to allow mortgage firms to make exemptions from amortization payments for mortgagors on 'special grounds' (FI 2017d). However, the special grounds the FI mentions refer to situations when individual mortgagors face *individual problems in fulfilling their debt service* and will not work when mortgagors fulfil their debt services but reduce their consumption below normal.⁴²

By reducing housing demand and housing prices, the credit contraction also reduces the already too low construction and make the structural housing shortage worse (Veidekke 2019 and online appendix B.9).

6.2 Many distortions

The tightening of lending standards, especially the compulsory amortization requirements, cause – or exacerbate – several obvious distortions (and some less obvious). These distortions cause

⁴¹ See online appendix B.7. Andersson and Aranki (2019) show that the LTI ratios for new mortgages have fallen after the second ('stricter') amortization requirement, which requires higher amortization for LTI ratios above 4.5. They interpret lower LTI ratios as implying 'fewer vulnerable households.' This does not follow, because the LTI ratio is not an appropriate indicator of vulnerability or resilience (Section 3). Instead, the amortization requirements reduce cash-flow margins and thereby reduce resilience and increase the number of vulnerable households. Aranki and Larsson (2019) show that housing-equity withdrawals have fallen after the introduction of the amortization requirements. This is a natural consequence of the tighter credit and liquidity constraints, especially since housing-equity withdrawal is considered a new mortgage that requires amortization on either the existing old mortgage or a higher amortization rate on the withdrawal part.

⁴² Online appendix B.8. In March 2020, the corona pandemic forced FI to adapt and to make a special recommendation: 'Loss of income due to the corona-virus [is] a cause for exemption from amortization' (FI 2020b). But borrowers have no right to an exemption; it is still the mortgage firm that decides. And the recommendation did not apply to those that have not yet lost their income. In April, the FI corrected the latter and stated that banks may grant all mortgagors amortisation exemption (FI 2020a). But the exemption is only in force until the end of June 2021. Bäckman (2020) has argued that it is better to simply abolish the amortization requirements.

efficiency (welfare) losses. They also cause equity (welfare distribution) losses in the form of increased inequality between insiders and outsiders of the owner-occupancy market and between insiders with and without high income and wealth.⁴³

7. Reforms for a better-functioning mortgage market and suggestions of additional monitoring by the FI

Several substantial reforms are required for the Swedish housing market to function better. Here, some suggestions on how the mortgage market can be improved are presented, as well as recommendations to the FI for additional monitoring of housing- and mortgage-market developments.

The compulsory amortization requirements should be abolished, and interest-only loans should be allowed. Mortgage firms should instead discuss individual amortization plans for mortgagors, but interest-only loans should not be excluded – in line with a good previous proposal from FI (2013).

As far as I know, there is no support for compulsory amortization in the research literature on optimal mortgage contracts. Instead, under reasonable assumptions of privately observed incomes, costly foreclosure, and a stochastic market interest rate, an incentive-compatible optimal mortgage contract is an interest-only loan with variable interest rate and a credit line (Piskorski and Tchisty 2010, Cocco 2013).

Interest-only loans are particularly advantageous for the young and for the retired, as they decouple the saving decision from the mortgage, and the housing payment does not necessarily have to be much higher than the user cost. Middle-aged mortgagors, who normally save much more, can freely choose the allocation of savings between housing equity and more liquid and diversified assets (Bäckman 2019, Bäckman and Khorunzhina 2019).

⁴³The distortions are examined and listed in online appendix B.10, table B.3, and in Svensson (2019c, Section 8).

Reverse mortgage loans (RMLs),⁴⁴ that is, mortgage products that allow older homeowners to borrow against their housing wealth without moving out of their home, should be encouraged. They can provide substantial advantages if they are well designed (Campbell 2016, Lindenius and Ferm 2017). From January 2019, the FI has allowed exemptions from the amortization requirements for RMLs (FI 2018c).⁴⁵

In the absence of compulsory amortization requirements, mortgage firms would be able to compete freely for mortgage customers. They could offer a menu of different contracts, with different mortgage rates and amortization options. One alternative may be interest-only loans up to an LTV cap, but with a higher interest rate for the portion of the loan exceeding, for example, 75%, combined with amortization over 10–15 years down to 75%. A mortgage with a credit line would give mortgage mortgagors a liquidity buffer to use when needed.

There is no reason for mortgage firms having internal LTI limits. They are superfluous and misleading and there should not be any implicit or explicit pressure on mortgage firms to maintain such limits. The LTV ratio and the affordability assessment – together with the mortgagor's financial assets – are normally sufficient to assess the debt-service capacity and resilience of mortgagors. Affordability assessments ensure that the mortgagor can manage the current debt service by a margin. An LTV cap ensures that the mortgagor can repay the loan by a margin when the home is sold.

However, for consumer loans and other non-secured loans, LTI ratios have some relevance for a simple affordability test, because such loans are normally repaid entirely out of income. But also then, debt-service-to-income ratios (including amortization) are arguably more relevant and informative.

Affordability-test interest rates (ATIRs) related to prevailing interest rates should be introduced. The FI should not subject mortgage firms to pressure to use inappropriately high ATIRs. There

⁴⁴ They are called 'seniorlån' and 'kapitalfrigöringskrediter' in Swedish.

⁴⁵ The Swedish market for RMLs does not seem to work well presently, but a well-functioning market would have substantial benefits (Lindenius and Ferm 2017).

is currently no rational reason for as high an ATIR as 7%. A more reasonable ATIR may be the current five-year mortgage rate plus a premium, for example, three percentage points. At present, this would give an ATIR of 5–6%.⁴⁶

The 85% LTV cap should be reviewed and probably raised. As long as the LTV ratio is less than 100%, the loan can be repaid when the home is sold. A lower LTV ratio requires a down payment and provides a margin against the risk that the home will have to be sold at a loss. This margin should be weighed against the barrier to entry and other drawbacks – such as an increase in unsecured loans – that a high down payment causes.

The 85% level was chosen in a rather arbitrary way when the mortgage cap was introduced in 2010.⁴⁷ Several countries have higher mortgage caps (Evidens 2018). The share of young individuals among new mortgagors fell sharply when the cap was introduced, from 13% in 2009 to 5% in 2010 (FI 2018b, p. 10). The LTV ratio falls over time also with an interest-only loan, if nominal housing prices increase. In growing big cities with limited land, housing prices may be expected to rise at least at the same rate as income. A temporary period with an LTV ratio of over 100% due to an unexpected fall in prices is problematic only if the home has to be sold due to a move or other reason.

The FI should monitor a number of indicators to ensure that no mortgage-financed overconsumption of macroeconomic significance arises and take appropriate action if justified. Since there is a risk that mortgage increases are used to finance overconsumption, it is important to monitor a number of indicators so that this does not entail a macroeconomic risk. In particular, a falling aggregate saving rate, or other indicators of a possibly beginning consumption boom, should trigger a search of the source of the boom.

⁴⁶ Evidens (2018) examines the effect of lower ATIRs and other easing of the credit restrictions. In the fall of 2019, SBAB and Skandia reduced their ATIRs to 6.5% (SBAB 2019c, Privata offärer 2019).

⁴⁷ The justification for precisely 85% is the following (FI 2010, p. 14, my translation): ‘Most mortgage firms in Sweden allow an LTV ratio for ‘bottom’ loans of between 75% and 90%, while some firms allow even higher LTV ratios. A limitation to 85% is deemed to be a proportional action to prevent an unhealthy development and will not imply an unnecessarily large effect on current lending practice and the housing market, at the same time as it will put a brake on the trend towards increasing LTV ratios.’

Mortgage firms have information on stated purposes for mortgagors' increased loans. These should of course be taken with a pinch of salt, but may be included in the FI's mortgage-market report and be verified to the extent possible. The report could be expanded with further indicators, including data on aggregate housing-equity withdrawals and non-housing consumption, as done by the Bank of England (Reinold 2011, Svensson 2019c).

The FI should develop some housing-economics expertise and monitor relevant indicators of housing overvaluation and household overoptimism. Even if Swedish housing is not overvalued now, it could of course become overvalued in the future. Relevant indicators include user-cost- and housing-payment-to-income ratios for Sweden as a whole and the major cities as well as indicators of household overoptimism, such as households' expectations of future housing prices and mortgage interest rates.

The above reforms would make the mortgage market function much better. They would increase the variety of mortgage contracts available and benefit many categories of households – young, middle-aged, and old. Mortgage access would be less regressive and discriminatory towards first-time buyers without high income and wealth – particularly the young. With additional monitoring by the FI – of the magnitude and use of housing-equity withdrawals as well as relevant indicators of housing overvaluation and household overoptimism – and a readiness to take action if warranted – risks to financial stability can be handled and kept limited.

8. Conclusions

The next crisis may not look like the last one. New disturbances may come from unanticipated directions. Such *general uncertainty* about the future can be handled by ensuring sufficient general resilience to disturbances. That is broad topic; the discussion here is restricted to issues related to household debt and housing.

For *financial* stability, in relation to household debt, this means mortgage firms having sufficient resilience to credit losses and

households having sufficient and resilient debt-service capacity, ensured by appropriate lending standards. This is examined and monitored in the FI's semi-annual financial-stability reports and its annual mortgage-market reports, which include stress tests on both banks and households.

For *macroeconomic* stability, in relation to household debt, this means households – in addition to sufficient and resilient debt-service capacity – having sufficient and resilient *consumption-smoothing* capacity. This requires sufficient cash-flow margins and sufficient access to credit and liquidity. This in turn requires a smooth debt service over time. In contrast, more front-loaded debt service reduces cash-flow margins and consumption-smoothing capacity. This also gives a role to mortgage contracts that smooth debt service over time and give access to credit and liquidity, such as interest-only loans with a housing-equity credit line.

In relation to housing and housing prices, macroeconomic stability also requires the monitoring of indicators of overvaluation, including expectations of future prices and interest rates of households, mortgage firms, developers, and other relevant agents.

Furthermore, a few more specific insights emerge from my discussion. It is not the size of household *debt* in itself, but the size of the *debt service* that matters. It is not *debt-to-income* ratios, but *debt-service-to-income* ratios that matter. The common focus on debt-to-income ratios as indicators of risk is mistaken. Debt service also includes the *repayment of the remaining principal*, for example, when the housing is sold. Here the LTV ratio matters, but mostly only when the mortgagors for various reasons voluntarily or involuntarily repay the principal. Therefore, it also matters whether housing is overvalued or not – and, if not overvalued, whether the fundamentals determining housing prices are robust or not. Put differently, it matters whether the collateral of the mortgages is sufficient and robust. More generally, households' balance sheets matter, including the ratio of household debt to assets – real and financial.

In addition, it matters for what *purposes* mortgages are used. The housing collateral allows the use of mortgages for other purposes than housing investment, such as purchase of durable goods – for example, cars – and for consumption smoothing, if income should fall. If the borrower has sufficient debt-service capacity, neither of these purposes need to be a problem. The debt service on the mortgage would be less than on a car loan, and consumption smoothing increases welfare and reduces the macroeconomic risk of consumption falls.

However, if mortgages are used to finance an unsustainable overconsumption of macroeconomic significance, there is an increased risk of a consumption fall of macroeconomic significance. Such a consumption boom requires a steady increase in mortgages, which in turn normally requires a steady increase in housing prices and thereby housing collateral. A break in the steady housing-price increase may then cause a consumption bust. Indications of such overconsumption and such use of mortgages thus matter a lot, and the FI should monitor the appropriate indicators.

Importantly, the macroeconomic risk concerns debt-financed aggregate consumption booms and busts of a few percent of disposable income. It is not a matter of a few mortgagors overspending. It is not a macroeconomic problem if some households overspend and others underspend. Overspending has to be large and widespread to be a macroeconomic risk, for example, showing up as a fall of a few percentage points in the saving rate and a corresponding rise in the ratio of aggregate housing-equity withdrawal to income.

In general, economic-policy measures should pass a cost-benefit test. The FI's amortization requirements and other credit tightening that it has undertaken fail even a most rudimentary cost-benefit analysis.

The credit tightening has no demonstrable benefits. It does not reduce the risks to financial stability, and it does not reduce the risk to macroeconomic stability. Instead, it actually increases the risk to macroeconomic stability by reducing the consump-

tion-smoothing capacity of households. It also has large individual and social costs.

The reforms of the mortgage market suggested in Section 7 would remedy or alleviate the costs of the tightening and make the mortgage market work better. But the experience of this mistaken macroprudential policy points to the need of a more substantial reform of the governance of Swedish macroprudential policy.

8.1 Need for governance reforms

First, the ambiguous clause added to the mandate of the FI at the end of 2013, which says that it is responsible for 'taking measures to counteract financial imbalances with a view to stabilising the credit market', should be deleted. This clause is ambiguous because it is not clear what is meant by 'financial imbalances'. Neither is it clear what is meant by 'stabilizing the credit market.'⁴⁸

The government may want to emphasize the role of the financial system and macroprudential policy in contributing to macroeconomic stability. Then it can just insert 'contributes to macroeconomic stability' in the mandate and, for example, rewrite the mandate quoted in Section 1 to be:

to ensure that the financial system is stable; *contributes to macroeconomic stability*; is characterized by a high level of confidence and has well-functioning markets that meet the needs of households and corporations for financial services; and provides comprehensive protection for consumers.

Furthermore, as discussed in Svensson (2018a), macroprudential policy needs a secondary goal, because there may be a trade-off between financial stability on one hand and efficiency, prosperity and equality on the other hand. One does not want the stability of the graveyard. This can be done by adding to the mandate above:

⁴⁸ Much belatedly, FI has provide a relatively long clarification FI (2019, p. 7, my translation): 'Financial imbalances in the credit market means situations in which large and rapidly growing debt and high risk-taking among households and non-financial firms may reinforce fluctuations in the economy and thereby involve macroeconomic stability risks.' Instead, the brief addition I suggest in the next paragraph is arguably sufficient, and also includes other possible sources of macroeconomic stability risks from the financial system.

Subject to that, to support the general economic policies of the government [, including its objectives for...].⁴⁹

Second, other parts of the governance needs improvement. Macroprudential policy is as important as monetary policy. Its governance can benefit from the experience of the governance of monetary policy. Macroprudential policy should be decided by a Macroprudential Policy Committee with internal members from the FI and external experts, with some similarities to the Financial Policy Committee of Bank of England (but without Riksbank representatives, in order to maintain the separation of monetary and macroprudential policy, in particular, the separate accountability).

The committee should be held accountable for its decisions and its proposals to the government regarding decisions for which the government's permission is required. The committee's policy decisions, including the government's permissions, should be regularly evaluated, for example, in an annual report by a new Macroprudential Policy Council, modelled on the Fiscal Policy Council evaluating Swedish fiscal policy.⁵⁰

Such a reform of the governance of macroprudential policy should improve the policy and reduce the risk of policy mistakes.

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⁴⁹ More specific secondary objectives may be included in the bracket, such as 'growth and employment' for Bank of England's Financial Policy Committee (Sunak 2020).

⁵⁰ I have previously recommended that the mandate and resources of the Fiscal Policy Council are extended to include monetary policy and that the name is changed to the Fiscal and Monetary Policy Council (Svensson 2016b).

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Appendix: Benchmark assumptions and data

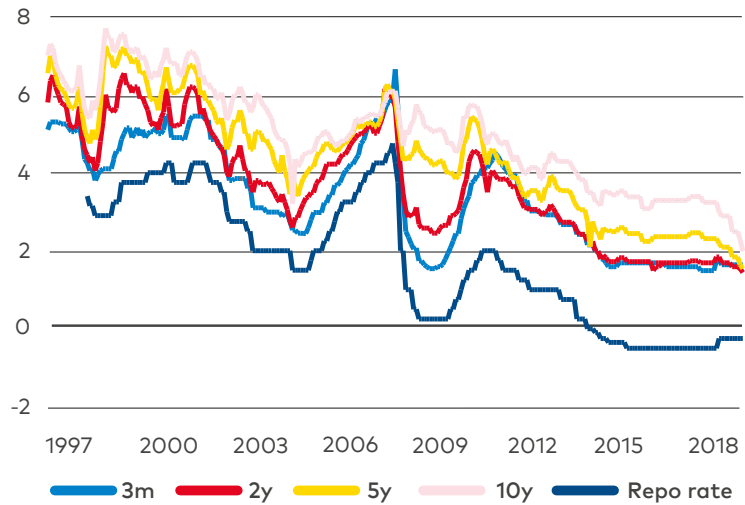
Table A.1 Benchmark assumptions for an average studio in Stockholm Municipality 2017

Price	SEK 2.8 mn
Size	31 m ²
Price/m ²	SEK 90 323
Monthly operating and maintenance cost (OMC)	SEK 2 100
Down payment, 15%	SEK 0.42 mn
Mortgage, LTV ratio 85%	SEK 2.38 mn
Interest rate	3.3%
Nominal capital-income tax rate	30%
Nominal capital-gains tax rate	22%
Expected inflation rate	2%
Real after-tax capital gain	0%
Monthly standardized (basic) (non-housing) living expenses	SEK 9 300
Monthly rent on secondary rental	SEK 11 000–13 000

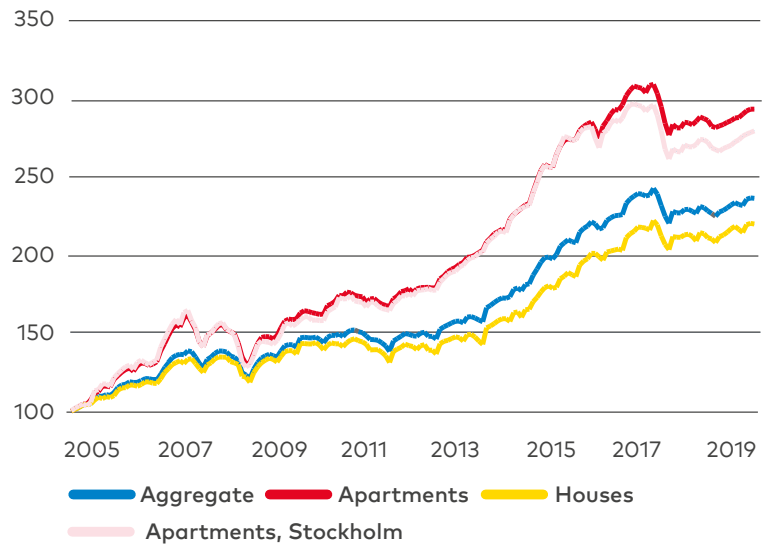
Source: Svensson (2019b).

Figure A.1 Data

a) Mortgage rates and repo rate, percent



b) Housing prices (index)



Source: SBAB (2019b), Thompson Reuters Datastream, Valueguard (2019).

Online appendix to “Macroprudential Policy and Household Debt: What is Wrong with Swedish Macroprudential Policy?”

Lars E.O. Svensson

<https://larseosvensson.se/2019/12/05/macroprudential-policy-and-household-debt-what-is-wrong-with-swedish-macroprudential-policy/>

Includes a complete reference list with hyperlinks.

B The consequences and costs of the credit tightening

Whereas section 3 has examined the rationale and possible benefits of and rationale for the credit tightening—and found that there are none—this appendix section examines the consequences and possible costs of the tightening, in particular, of the compulsory amortization requirements.

B.1 The credit tightening

I will simplify the discussion of the credit tightening by representing the situation without the tightening—approximately corresponding to the situation in 2010–2011—by an affordability-test interest rate of 6% and no amortization, that is, the availability of interest-only loans. The situation after the tightening will be represented by an affordability-test interest rate of 7% and the two amortization requirements, implying 3% amortization for a loan and a mortgagor with an LTV ratio above 70% and an LTI ratio above 4.5.

This representation of the lending standards without the tightening is justified as follows. First, FI (2013b, p. 12) reports that the affordability-test interest rates in 2012 varied from 5.7% to 8.0%. This is consistent with the availability of an affordability-test interest rate of 6%.¹

Second, regarding the availability of interest-only loans, Sveriges Riksbank (2011) was clearly worried about little or no amortization. “A distinguishing feature of the Swedish housing market in recent years has been that... amortisation payments have been small (p. 7).” One of the tasks of the inquiry was to analyze “what risks there are... with little or no amortisation (p. 8)”. It reports that “[t]he range of mortgage products has been widened including interest-only loans (p. 35).” Sveriges Riksbank (2014, table B1) reports that the *average* amortization rate among highly indebted mortgagors (with an LTV-ratio of 75%–80%) was only 1.3% in 2013. FI (2013b) reports that among new loans with a 76–85% LTV ratio, 21% in 2011 and 8% in 2012 were interest-only loans (diagram 9). Some banks offered “bottom” loans up to an 85% LTV ratio and least one bank did not have any requirement of amortization on the bottom loan in the affordability assessment (pp. 12–13). Sveriges Riksbank (2012, chart 3:7) reports that almost 60% of new mortgagors did not amortize in 2011. In particular, according to SBAB (2010):

¹ Among anecdotal evidence, according to Dagens Industri (2013), the then minister of financial markets, Peter Norman, reported that his mother was required to manage a 6% interest rate on her new mortgage in 2013. There are reports that Danske Bank used an affordability-test interest rate of 6% as late as October 2018, for example, Expressen (2018). However, in January 2019, Danske Bank (2019) reports that mortgagors should be able to manage an interest rate of 7%.

Before the [85%] LTV cap was introduced [in October 2010], [the bank] SBAB required amortization of the loan amount exceeding 85%—the loan amount in the range of 85–95% should be amortized in at most 10 years. [In November 2010,] after the introduction of the LTV cap [of 85%], [the bank] offers a supplementary loan product (Private Loan), that requires amortization.

Altogether, I interpret the above as being consistent with the availability before the tightening of interest-only loans up to an LTV ratio of 85% with an affordability-test interest rate of 6%.

B.2 Higher housing payment, unchanged user cost, and higher involuntary saving

So, what are the consequences of the tightening? What do compulsory amortization requirements do? Compulsory amortization requirements increase the *compulsory housing payment* (the sum of the operating and maintenance cost [OMC], the after-tax mortgage interest payment, and the compulsory amortization payment). They do not increase the *user cost* of housing (the implied rent—the sum of the OMC, the real after-tax mortgage interest, and the real cost of housing equity, minus the real after-tax capital gains on housing).²

Amortization does not increase the user cost because it is not an *expense*; it is *saving*, in the particular form of increasing the housing equity by reducing the mortgage. The compulsory housing payment minus the user cost is the *involuntary saving* associated with the housing. It equals the sum of the compulsory amortization and the reduction due to inflation of the real value of the mortgage, minus the real cost of housing equity.

Thus, compulsory amortization increases the housing payment and the involuntary saving associated with the housing but does not affect the user cost of housing. The mortgagor is forced to pay more and save more each month.

How does compulsory amortization compare to an interest-rate increase? From a *housing-payment and cash-flow point of view*, a 3% amortization is equivalent to a 3 percentage point increase in the after-tax interest rate on an interest-only loan. With tax-deductible interest and a 30% capital-income tax, this is equivalent to a substantial $3/(1 - 0.3) = 4.3$ percentage point increase in the mortgage rate. For *households that are liquidity-constrained (cash-constrained)*, it is the housing payment that matters and constrains the household, and then 3% amortization has the same effect as a 4.3 percentage-point mortgage-rate increase, a pretty substantial increase.

From a *user-cost point of view*, compulsory amortization and an interest-rate increase are different. As mentioned, compulsory amortization does not increase the user cost. But an interest-rate rise increases the user cost, by increasing the real after-tax interest. For *households that are not liquidity-constrained*, it is the user cost that matters. Then 3% compulsory amortization has little or no effect. For example, households that are not credit-constrained can simply borrow more, deposit the excess borrowing in a savings account, and pay the amortization from the savings account (Svensson, 2016a). Alternatively, they may substantially reduce the impact of the compulsory amortization by frequent refinancing (Hull, 2017).

As a concrete example, we may consider the average studio (one-room apartment) in Stockholm (Municipality) in 2017 (table A.1).³ For an interest-only loan of SEK 2.38 mn (€238,000)—

² The OMC here includes any property taxes. Sweden has a local property fee (“kommunal fastighetsavgift”) with a nominal tax rate of 0.75% of the tax-assessed value for most houses and 0.3% for apartment. However, the property fee is capped at a low indexed level (in 2018, SEK 7,812 [€781] and SEK 1,337 [€138] per year for single-family houses and apartments, respectively). For tenant-owned apartments, the property tax is included in the monthly fee to the tenant-ownership association.

³ Throughout the paper, Stockholm refers to Stockholm Municipality, which is substantially larger than the

corresponding to an LTV ratio of 85% (equal to the FI's mandated LTV cap of 85%, introduced in 2010)—the monthly housing payment, user cost, and involuntary saving are about SEK 6,700 (€670), SEK 2,800 (€280), and SEK 3,900 (€390), respectively.⁴

Figure B.1: Monthly housing payment, user cost, and involuntary saving: Without amortization.

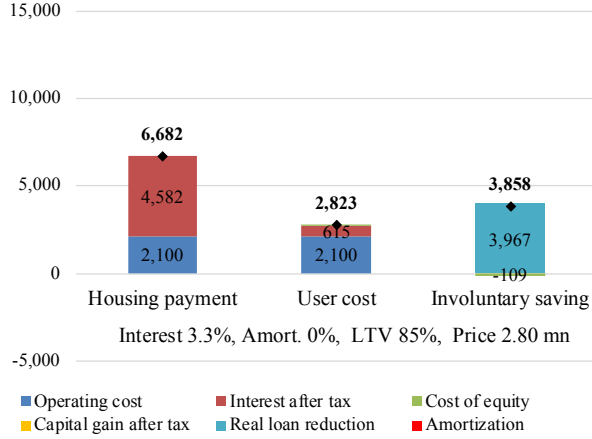
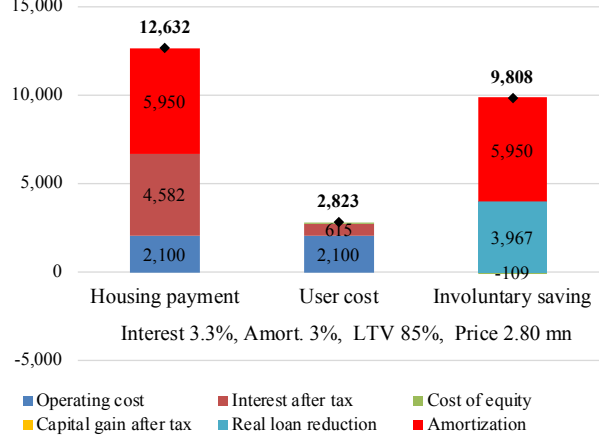


Figure B.2: Monthly housing payment, user cost, and involuntary saving: With amortization requirements.



Source and note: Own calculations. Assumptions as in table A.1. The housing payment equals the operating and maintenance cost plus the after-tax interest on the loan and the amortization. The user cost equals the operating and maintenance cost plus the real after-tax interest on the mortgage plus the real cost of equity minus the real after-tax capital gains. The involuntary saving equals the housing payment minus the user cost, which equals the reduction in the real value of the mortgage due to inflation plus the amortization plus the real capital gains minus the real cost of equity. The real rate of return on equity is set equal to the real after-tax interest rate. With amortization requirements, the amortization rate is 3% for a loan-to-value ratio above 70% and a loan-to-gross-income ratio above 4.5. SEK/EUR \approx 10.

For further concreteness, consider a Stockholm 25–29-year-old individual with monthly gross income of SEK 25,000 (€2,500), which happens to be the median income in 2017 for this Stockholm cohort (Statistics Sweden, 2019e). For brevity, this individual will be referred to as the 25K individual. The corresponding net income (income after tax) is about SEK 20,000 (€2,000). Assume that the individual can manage a down payment of 15% of the price of the studio and receives an interest-only loan for the remaining 85%. Then the housing payment, the user cost, and the involuntary saving are 34%, 14%, and 20% of net income, respectively. This makes this average Stockholm studio quite affordable for the median Stockholm 25–29-year-old. In particular, the user cost is quite small, both absolutely and relative to net income.

With amortization requirements, the amortization will be 3% of the loan amount at origination, adding SEK 5,950 (€595) to the monthly housing payment and the involuntary saving. Then the monthly housing payment rises to about SEK 12,600 (€1,260) and the involuntary saving to about SEK 9,800 (€980), whereas the user cost is unchanged.⁵

central city of Stockholm. I use an SEK/EUR exchange rate of 10, which was the approximate exchange rate during 2017–2018.

⁴ The average price of a Stockholm studio in 2017 was SEK 2.8 mn (€280,000) (the source is Svensk Mäklarstatistik [Swedish Real Estate Agent Statistics]). The interest rate is 3.3% (a 10-year fixation-period mortgage rate in 2017; the 3-month variable rate was about 1.5%). See table A.1 and figure B.1 for details.

⁵ The LTV ratio is above 75%, so according to the first amortization requirement at least 2% shall be amortized. The loan exceeds 4.5 times gross income, so according to the second amortization requirement at least an additional 1% of the loan shall be amortized. See figure B.2 for details.

As a result, the housing payment, user cost, and involuntary saving are now 64%, 14%, and 50% of net income, respectively. The compulsory amortization is a full 30% of net income, quite large. Clearly, the housing payment becomes prohibitively high, and the involuntary saving rate of 50% is extremely high—in particular, from a life-cycle perspective, for a 25–29-year-old. Furthermore, with such high amortization, the individual will not pass the mortgage firms’ affordability assessment and will not get the mortgage, as we shall see in more detail in section B.3.

Thus, the 25K individual will not be able to afford the average Stockholm studio, and the individual will miss out on the low user cost of the studio. What are the alternative housing options in Stockholm?

Stockholm is rightly infamous for its dysfunctional rental market—dysfunctional because of rent control. The average monthly rent for a rent-controlled Stockholm studio was about SEK 5,300 (€530) in 2017. But for such a rent-controlled studio, the median and average queuing time was about 11 years (Stockholm Housing Agency, 2018, and own calculations). Therefore, aside from those that can live with their parents in Stockholm, the practical alternative for the 25K individual is the secondary rental market. The average monthly rent for a secondary rental in the Greater Stockholm Area (much larger than the Municipality) in 2017 was about SEK 11,000 for a rented apartment and about 13,000 for a tenant-owned apartment (NBHBP, 2018, table 3.8). I will use the SEK 11,000 (€1,100) rent here. Such a rent makes the housing payment and user cost 56% of the 25K individual’s net income. Because the housing payment and the user cost are both equal to the rent, the involuntary saving is zero. With such a high rent, the 25K individual may not be able to save to make a future higher down payment to get out of the secondary-rental market. The individual may indeed be caught in a poverty trap.⁶

Thus, aside from those that can live with their parents in Stockholm (or have rich and helpful parents, see below), the amortization requirements force a 25K individual that needs to borrow 85% to spend 56% of net income on the rent in a secondary studio rental instead of enjoying a user cost of 14% of net income in an owner-occupied studio. The difference between “insiders” (those with owner-occupied housing) and “outsiders” (those without owner-occupied housing and without rent-controlled rental housing) is large in Stockholm.

The above concerns the fate of this 25K individual, who needs to borrow 85%. Consider another 25K individual that has own wealth—or rich and helpful parents—and therefore only needs to borrow 50%. Then there will be no amortization according to the first amortization requirement and only 1% amortization according to the second requirement (the loan still exceeds 4.5 times the gross income). The monthly housing payment will be about SEK 5,900 (€590), the involuntary saving about SEK 3,100 (€310), and the user cost is unchanged.⁷ Then the housing payment, user cost, and involuntary saving are, respectively, 30%, 14%, and 16%. Clearly, for a 25K individual that only needs to borrow 50%, the average Stockholm studio is eminently affordable.

Figure B.5 summarizes the housing payment, user cost, and involuntary saving for the five alternatives mentioned: owner-occupancy, without amortization and with amortization requirements, respectively; a rent-controlled rental with an 11-year queuing time; a secondary rental; and owner-occupancy with amortization requirement but an LTV ratio of only 50%. (Note the zero involuntary saving for the rental alternatives.) The difference between the low user cost of owner-occupancy and the high rent of the secondary rental is striking. Furthermore, this low user cost is calculated under the assumption of zero real after-tax capital gains. Svensson (2019b, section 6.5) shows the result of the alternative and realistic assumption of an annual nominal housing-price growth of 4%. This results in annual real after-tax capital gains of 1.12%. When the negative of these capital gains

⁶ NBHBP (2018) provides details on the secondary-rental market.

⁷ See figure B.3 for details.

Figure B.3: Housing payment, user cost, and involuntary saving for a studio, for an LTV ratio of 50% and 1% amortization according to the second amortization requirement.

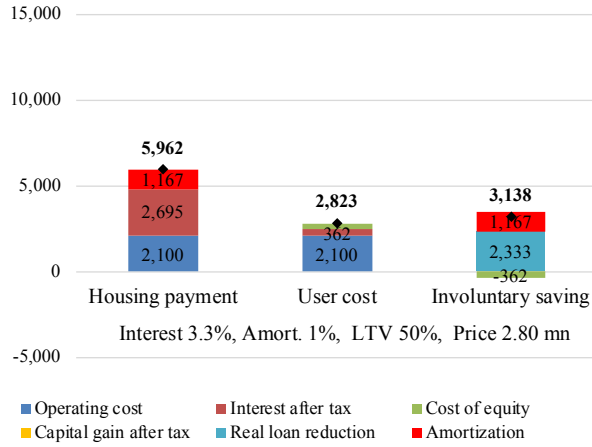
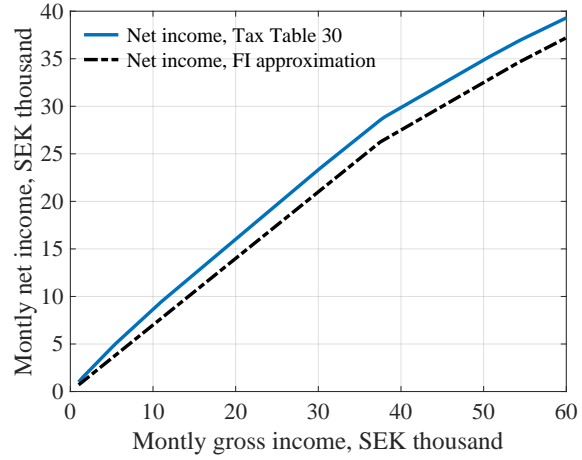
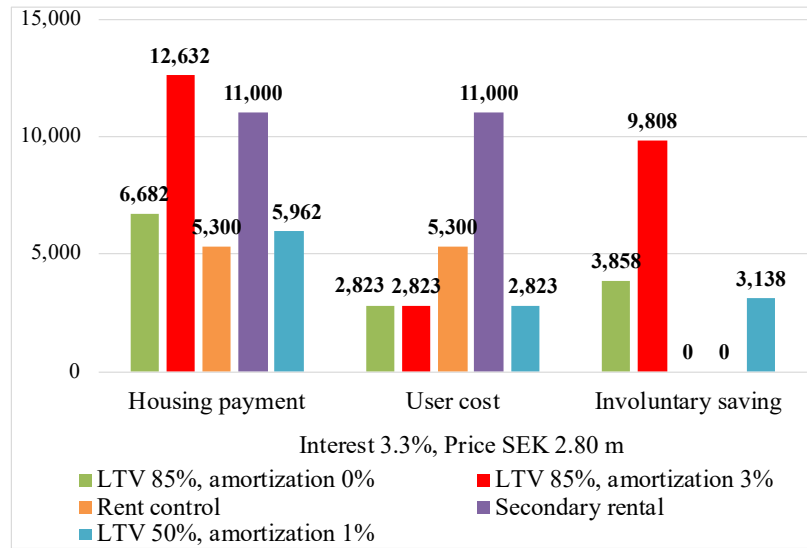


Figure B.4: Monthly gross and net income for a single adult: Tax Table 30 vs. FI approximation.



Source and note: Figure B.3, see note to figures B.1 and B.2. Figure B.4, Swedish Tax Agency (2017, Tax Table 30, column 1). Tax Table 30 is interpolated linearly with breakpoints SEK/month 0; 1,500; 5,400; 11,000; 30,200; 37,800; 50,600; 54,400; 80,000; and 208,000. Income is earned income. Thedéen and Braconier (2017, staff background calculations). The FI's approximation assumes that the marginal tax rate is 30% up to a monthly gross income of SEK 37,500, 50% in the interval up to about SEK 54,000, and 55% above. SEK/EUR \approx 10.

Figure B.5: Monthly housing payment, user cost, and involuntary saving: For an LTV ratio of 85% with zero and 3% amortization, respectively; for a rent-controlled rental; for a secondary rental; and for an LTV ratio of 50% and 1% amortization.



Source and note: The average Stockholm studio 2017 (table A.1, Stockholm Housing Agency, 2018, and own calculations). See note to figures B.1 and B.2. SEK. SEK/EUR \approx 10.

are included in the monthly user cost, it drops to only SEK 210 (€21), making the difference to the rentals even larger, and the difference in user costs between insiders and outsiders extreme.⁸

⁸ In order to be on the conservative side, most of the calculations in the paper nevertheless assumes zero real

Thus, amortization requirements lead to very unequal situations for the 25K individual who needs to borrow 85% and the one who only needs to borrow 50%. More generally, they lead to a very unfavorable treatment of borrowed capital compared with owned capital to finance housing purchases.

It follows that the credit tightening increases the barriers to entry into the market for owner-occupied housing for households without high income, wealth or rich and helpful parents. FI's policy favor housing buyers with high income or wealth and hurt buyers without high income and wealth.

B.3 A substantial credit contraction

For households that are liquidity-constrained and thus constrained by their housing payments, 3% compulsory amortization is equivalent to a 4.3 percentage-point mortgage-rate increase and leads to a corresponding fall in *demand* for mortgages. But amortization requirements is a credit tightening that also directly contracts the *supply* of mortgages.

In deciding how much to lend to mortgagors, Swedish mortgage firms use affordability assessments that include a stress test of whether the mortgagor can afford the mortgage for a given high interest rate—the affordability-test interest rate—that is substantially higher than prevailing interest rates. More precisely, the mortgagor's *cash-flow margin* (CFM) shall be nonnegative for the affordability-test interest rate. The CFM is defined as the mortgagor's net income minus the sum of the housing payment and standardized (basic) (non-housing) living expenses.⁹ As explained in section B.1, the lending standards before the tightening—also referred to as “without the tightening”—may be represented by an affordability assessment with an affordability-test interest rate of 6% and an interest-only loan.¹⁰

For such an affordability assessment *without the tightening* of lending standards, the required minimum monthly gross income to get the above loan of SEK 2.38 mn is about SEK 25,000 (€2,500), so the 25K individual would just pass the affordability test and get the mortgage.¹¹

After the tightening of lending standards, banks use a higher affordability-test interest rate of typically 7% and include the higher housing payment due to the compulsory amortization requirements in their affordability assessment.¹² For a given loan amount, this increases the required minimum gross income. For the above loan, the minimum monthly gross income required increases from SEK 25,000 to about SEK 35,000 (€3,500), that is, from the median income to 40% above the median income—which corresponds to the 80th percentile of the income distribution of Stockholm 25–29-year-olds (figure B.7). Of this increase of SEK 10,000 (€1,000), about SEK 8,000 (€800) is due to the amortization requirements and about SEK 2,000 (€200) is due to the higher affordability-test interest rate.¹¹

Figure B.6 summarizes the effect on the maximum loan of the tightening. The horizontal dashed black line shows the required loan, and the solid blue line shows the maximum loan for an interest-only loan and an affordability-test interest rate of 6%, as a function of monthly gross income. The intersection occurs at SEK 25,000. The dashed blue line shows the maximum loan for a higher affordability-test interest rate of 7%. The solid yellow line shows the maximum loan for the

after-tax capital gains.

⁹ See table A.1

¹⁰ Affordability assessments are also known as “discretionary-income calculations” and the CFM is also known as “discretionary income” (FI, 2017e, Glossary, p. 27). In Swedish, affordability assessments are called “Kvar Att Leva På (KALP) [Left To Live On]” calculations.

¹¹ See table B.1 for details.

¹² Some lenders even use 8%, but SBAB and Skandia recently reduced their affordability-test interest rate to 6.5% (SBAB, 2019c; Privata affärer, 2019).

Table B.1: Affordability calculations for an average Stockholm studio and a single individual, without and after the tightening of lending standards.

	Without	After	Increase
1. Price, SEK	2,800,000	2,800,000	
2. LTV ratio	85%	85%	
3. Down payment, SEK	420,000	420,000	
4. Loan, SEK	2,380,000	2,380,000	
5. Standardized living expenses, SEK/month (1)	9,300	9,300	
6. Operating and maintenance cost, SEK/month (2)	2,100	2,100	
7. Affordability-test interest rate	6%	7%	1 pp
8. After-tax interest in stress test, SEK/month (3)	8,330	9,718	1,388
9. Required gross income increase, SEK/month			1,945
10. Amortization rate	0%	3%	3 pp
11. Amortization, SEK/month (4)	0	5,950	5,950
12. Required gross income increase, SEK/month			8,337
13. Minimum net income, SEK/month = (1+2+3+4)	19,730	27,068	7,338
14. Minimum gross income, SEK/month	25,081	35,363	10,282

Source and note: Assumptions as in table A.1. “Without” (the tightening) is represented by an interest-rate stress tests with a 6% interest rate and no amortization. “After” (the tightening) is represented by a stress test with a 7% interest rate and 3% amortization rate (the amortization rate for an LTV ratio above 70% and an LTI ratio above 4.5). Gross (before tax) and net (after tax) income is related as in figure B.4, Tax Table 30, taking into account the increase in the marginal tax rate from 27% to 30% at the breakpoint SEK 30,200. Gross (before tax) and net (after tax) income increases are calculated using a constant average marginal tax rate of 28.633%, which equals the average marginal tax rate according to the 2017 Tax Table 30 for the interval between the monthly gross incomes of SEK 25,081 and SEK 35,363. SEK/EUR \approx 10.

first amortization requirement, and the dashed-dotted red line shows the maximum loan for both amortization requirements. The minimum gross income to get the required loan is SEK 35,000.¹³

For a given gross income, the maximum loan drops by 14% from the increase in the affordability-test interest rate from 6% to 7% and by a total of 47% when both amortization requirements apply.¹⁴

B.4 Measures of the credit tightening

One can consider several measures of the credit tightening. A *first* measure is that amortization of 3% is from a housing-payment point of view equivalent to a before-tax interest-rate increase of 4.3% on an interest-only loan. Thus, the tightening is equivalent to an increase in the affordability-test interest rate on an interest-only loan from 6% to $7 + 4.3 = 11.3\%$, an increase of 5.3 percentage points.

A *second* measure is the reduction in the maximum loan for a given income of the 25–29-year-olds who need to borrow 85%. The maximum loan falls by 14% because of the 1 percentage point increase in the affordability-test interest rate and by 33% because of the two amortization requirements. Thus, the total fall in the maximum loan is 47%.¹⁴

A *third* measure is the above 40% increase in the minimum required gross income caused by the

¹³ As noted in the beginning of section 3, some mortgage firms after the tightening also use internal LTI ratio limits, typically 5–6 times annual gross income, although the limits are not necessarily hard but advisory. A line corresponding to an LTI ratio limit of 5.5 in figure B.2 (not shown) by coincidence intersects the horizontal required-loan line close to SEK 35,000.

¹⁴ For the specific income of SEK 25,000, the maximum loan drops by a total of 43%, because of the barely visible tilt in the dashed-dotted red line, which in turn is caused by the second amortization requirement’s DTGI limit of 4.5 being the binding constraint before the full extra 1% amortization kicks in.

Figure B.6: Maximum and required loan for the average Stockholm Municipality studio 2017 and a single individual.

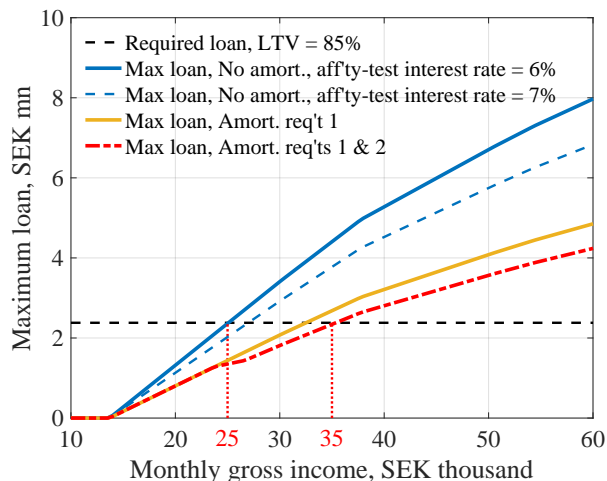
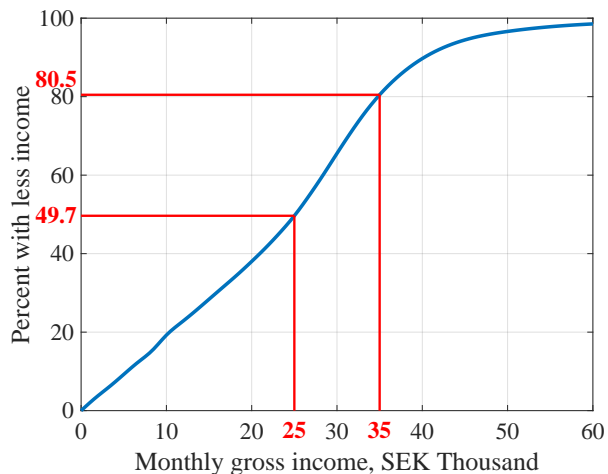


Figure B.7: Cumulative income distribution 2017 for individuals of age 25–29 years in Stockholm Municipality.



Source and note: Figure B.6. Table A.1 and own calculations. Figure B.7. Statistics Sweden (2019e) and own calculations. The blue line is a cubic spline. The vertical axis shows the percentage of individuals that have less gross income than the gross income on the horizontal axes. Individuals with zero gross income are excluded. The sample refers to individuals who lived in Sweden the whole year of 2017. The mean and median monthly gross income for individuals with positive income are, respectively, SEK 24,340 and SEK 25,120. SEK/EUR \approx 10.

tightening.

A *fourth* measure is the share of the Stockholm 25–29-year-olds that are excluded by the tightening. Without the tightening, the top 50% of the income distribution of such individuals had enough income to get the above loan. After the tightening, only the top 20% of the income distribution had enough monthly income. This is thus a credit contraction that excludes $(50 - 20)/50 = 60\%$ of those that would have qualified for the loan without the tightening.¹⁵

One can also consider a *rough measure of the fall in housing demand* of 25–29-year-olds caused by the tightening. By adding the down payment to the maximum loan, one gets the maximum price the individual can pay for the Stockholm studio. The percentage fall in the maximum price can be seen as a rough measure of the fall in housing demand. For the 25K individual, the maximum price has fallen by 37%.

For this individual to still be able to buy the Stockholm studio after the tightening, prices would thus have had to fall by 37%. Stockholm housing prices fell by about 10% from August 2018 to January 2018 and has since then recovered somewhat. Thus, the 25K individual is unable to buy the Stockholm studio by a wide margin and is in a considerably worse situation after the tightening.¹⁶

B.5 The FI and the government understates the effects of the tightening¹⁷

The FI and the government has given misleading statements about the consequences of the amortization requirements. The FI has stated, in proposing the second amortization requirement, that “Most borrowers [are] not affected” (by the second amortization requirement) (Thedéen and Bra-

¹⁵ See figure B.7 for details.

¹⁶ See Svensson (2019c, section 4.3) for details.

¹⁷ See Svensson (2019b, section 4.5) for details.

conier, 2017).¹⁸ The FI showed a figure and stated that the second amortization requirement would only affect single adults without a children with a monthly gross income exceeding a threshold of SEK 31,000 (€3,100). Of Stockholm 25–29-year-olds, 31% had a monthly gross income exceeding this threshold in 2017—which is a minority but still a substantial proportion.

However, the FI used an imperfect approximation of the income tax schedule in its background calculations (figure B.4). When the correct tax schedule Swedish Tax Agency (2017, Tax Table 30, column 1) is used, the threshold is only SEK 24,000 (€2,400). Of Stockholm 25–29-year-olds, 53% had a monthly gross income exceeding this threshold in 2017. Thus, a correct, rather different statement would be “*More than half of the borrowers are affected.*”

Thedéen and Braconier (2017) also stated that the second amortization requirement would only affect households with two adults and two children that had a combined monthly gross income exceeding a threshold of SEK 71,000 (€7,100). The government through the minister of financial markets, Per Bolund, has also repeated the statement “*Most borrowers [are] not affected*” and presented a figure with this result for such households (Bolund, 2017). However, this calculation also used the same imperfect approximation of the tax schedule. With the correct tax schedule, the threshold is only SEK 60,000 (€6,000).

Both the FI and the government were only talking about the second amortization requirement. They did not mention that the first requirement affects even more mortgagors, namely everyone that has to borrow more than 50% of the price of the housing.

Another apparently misleading statement by the FI is in an op-ed by the director-general, “*The young are excluded by ever higher housing prices—not by amortization requirements*” (Thedéen, 2018). The director-general maintained that the minimum monthly gross income required to buy an average Stockholm studio had increased by SEK 7,400 (€740) from 2012 to 2017. Of this increase, only a minuscule SEK 190 (€19) was supposed to be due to the amortization requirements, whereas SEK 6,700 (€670) was supposed to be due to higher housing prices. How can the effect of the amortization requirements be so small, when 3% amortization on the loan to finance 85% of the average Stockholm studio implied monthly amortization of about SEK 6,000 (€600), which in turn required an increase in the monthly gross income of about SEK 8,000 (€800).

Scrutiny of the calculation reveals several misleading assumptions (see Svensson, 2019b, section 4.5, for details). In particular, it is assumed that young mortgagors would (voluntarily) pay 1.75% amortization without the tightening and 2% with the tighten (disregarding the second amortization requirement). Thus, the amortization requirements only increase the amortization by 0.25 percentage points. Furthermore, the LTV ratio is assumed to be 75%, not 85%. When these are replaced by more reasonable assumptions—in particular, that interest-only loans would be available without the tightening, that both amortization requirements would apply with the tightening, and that the LTV ratio is 85%—a more correct calculation shows that the total increase in the minimum gross income from 2012 to 2017 is about SEK 14,400 (€1,440)—almost double that reported by the FI. Of this, the increase due to the amortization requirements is about SEK 8,300 (€830), much larger than the FI’s reported SEK 190 (€19), and the increase due to higher prices is about SEK 4,500 (€450), smaller than the FI’s reported SEK 6,700. Thus, a more correct statement is “*The young are excluded mainly by the amortization requirements and to a lesser extent by higher housing prices.*”

In a new report and op-ed (Olsén Ingefeldt and Thell, 2019; Thedéen, 2019), the FI is again maintaining that the amortization requirements do not exclude the young from owner-occupied housing. The argument is that, of the young that bought housing in 2012, 85% would be able to buy the same housing in 2018 if they had been young in 2018. For Stockholm, however, the

¹⁸ “Flertalet omfattas inte” in Swedish.

fraction is only 67%. But the effects of the compulsory amortization requirements are measured in a misleading way, as resulting from the difference between the actual amortization rates of, on average, 2.2% in 2018 and the actual amortization rates of, on average, 1.8% in 2012. But the high actual amortization rates in 2012 were to a large extent the result of the mortgage firms' considerable tightening of lending standards since 2010–2011 – presumably in the vain hope of avoiding a regulation of compulsory amortization – and should be seen as part of the general credit tightening induced by the FI. Some of the amortization in 2012 was probably voluntary. With higher housing prices and larger loans in 2018, many young persons may have preferred to amortize less in 2018 than in 2012.

The report notes that the share of the young has increased among new borrowers. But the report – but not the op-ed – emphasizes that this does not imply that it has become easier for the young to buy a home (Olsén Ingefeldt and Thell, 2019, p. 15). The rental market has become less accessible which has reduced the alternatives to owner-occupied housing and may have forced some of the young to take larger loans relative to incomes and the value of the property. It is also likely that the young, more than the old, have been restricted to buying housing with less attractive locations and smaller sizes. The increased share of young borrowers may also be due to parents' housing-equity withdrawals. In particular, data are not available on the fraction of young with rejected loan applications in 2012 and in 2018, in particular compared to a situation in which interest-only loans are available. The FI's database include only those that are granted loans.

Meanwhile, more and more independent evidence of increasing difficulties for the young are accumulating (Evidens, 2018a; Ljung, 2018; SBAB, 2018; Skandia, 2019; Svensson, 2019b; Ekvall, 2019).

Interestingly, in the op-ed (Thedéen, 2019), the director-general is no longer referring the main previous justification for the credit tightening, namely the “elevated macroeconomic risk” from high household indebtedness—for which risk there is no demonstrable evidence. One might wonder whether the FI has by now accepted that there is no demonstrable individual or social benefit from the amortization requirements and changed tactics, no longer repeating easily disproved arguments about benefits but instead focusing on detracting from the obvious and demonstrable individual and social costs.

Andersson and Aranki (2019) conclude in a report from the FI that the second (“stricter”) amortization requirement has led to “fewer vulnerable households.” They conclude this because the LTI ratios for new mortgagors have fallen, and they take for granted that a lower LTI ratio reduces vulnerability (increases resilience).¹⁹

That the LTI ratios have decreased after the second amortization requirement is natural. Amortization become larger for mortgagors with high LTI and by the affordability tests they get to borrow less for a given income (figure B.6). But, importantly, the LTI ratio is not an appropriate measure of household vulnerability or resilience (section 3). The best measure in this context is the cash-flow margin as well as access to credit and liquid assets. Because the amortization requirements result in both lower cash-flow margins and less access to credit, they result in higher vulnerability to income disturbances, not lower. The Andersson and Aranki conclusion is thus wrong, as is further explained in sections B.6 and B.7.

Aranki and Larsson (2019) show that housing-equity withdrawals have fallen after the introduction of the amortization requirements. This is a natural consequence of the tighter credit and liquidity constraints, especially since housing-equity withdrawal is considered a new mortgage that requires amortization on either the existing old mortgage or a higher amortization rate on the

¹⁹ The FI sometimes refers to “vulnerability,” sometimes to “resilience.” As far as I can see, the increased (decreased) vulnerability is the same as decreased (increased) resilience.

withdrawal part.

B.6 A strongly frontloaded debt-service-to-income ratio over time

With 4% annual growth of nominal incomes (consistent with 2% real growth and 2% inflation), nominal incomes will double in about 18 years. (For many young persons with a good education and making a career, incomes will grow faster.) For a given interest-only loan, the mortgagor's debt-service-to-net-income (DSTI) ratio for a constant interest rate as well as the loan-to-income (LTI) ratio will then fall gradually by about 4% per year and be halved in about 18 years. With also 4% growth of nominal housing prices, nominal housing prices will also double in about 18 years. Then the LTV ratio will also fall by about 4% and be halved in about 18 years. In 10 years, the LTV ratio would fall from the initial 85% to 57% in 10 years, thus corresponding to a substantial increase in housing equity from 15% to 43%.

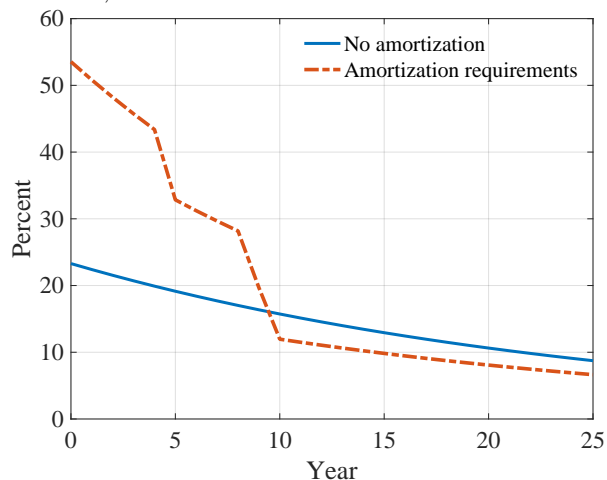
Table B.2: Additional benchmark assumptions.

Annual growth rate of nominal price, gross and net income, and OMC	4%
Annual growth rate of nominal standardized living expenses	3%
Annual growth rate of nominal rent on secondary rental	4%
Expected and actual inflation rate	2%
Real capital-gains after tax	1.12%

Source and note: OMC denotes the operating and maintenance cost. Expected inflation and nominal capital-gains tax as in table A.1. With 4% nominal capital gains and 2% real capital gains, the real after-tax capital gains are 1.12%.

Thus, for a given interest-only loan, 2% real growth and 2% inflation results in an “automatic” amortization of 4% per year, corresponding to a half-time of about 18 years. There is little reason to believe that an optimal amortization rate would be faster.

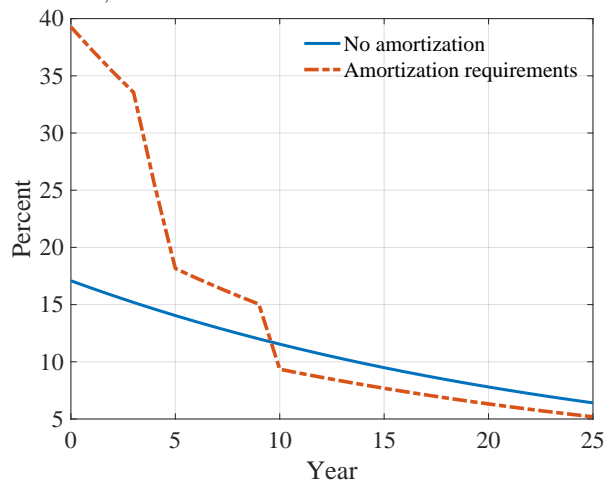
Figure B.8: Debt-service-to-net-income ratio ratio, without amortization and with amortization requirements. Initial monthly gross income SEK 25,000.



Source and note: Tables A.1 and B.2 and own calculations. SEK/EUR \approx 10.

In figure B.8, the solid blue line shows the DSTI ratio for the 25K individual for the above interest-only loan. The initial DSTI ratio would be 23%, and it would gradually fall to 16% in 10 years. The individual would easily manage the debt service on the interest-only loan.

Figure B.9: Debt-service-to-net-income ratio, without amortization and with amortization requirements. Initial monthly gross income SEK 35,000.



With amortization requirements, as noted above, the 25K individual will not pass the affordability test and will not get the loan, whereas the 35K individual will pass the test and get the loan. Nevertheless, the dashed-dotted red line in figure B.8 shows the DSTI ratio with amortization requirements, for the hypothetical case that the 25K individual would get the loan. The DSTI ratio starts at a very high 54%, falls rapidly over time, but it does not fall below that of an interest-only loan until year 10.

Figure B.9 shows the DSTI ratio for the 35K individual, for the two loans. For the interest-only loan, the DSTI ratio would have started out at 17% and fallen gradually to 12% in year 10. With amortization requirements, the strongly frontloaded DSTI ratio starts out at 39% and remains above that of the interest-only loan until year 10, when it drops to 9%, 3 percentage points below the one for the interest-only loan. For the cost of a higher DSTI ratio during the first 9 years, there is a gain of a 3 percentage point lower DSTI ratio from year 10. It is difficult to see that a reduction of 3 percentage points from the low DSTI ratio of 12% would have any significant benefit.

In summary, amortization requirements lead to a strongly frontloaded DSTI ratio compared with an interest-only loan. Importantly, the DSTI ratio remains higher than that of an interest-only loan for several years, and only drops a few percentage points below that of the interest-only loan when amortization ceases in year 10. Because, in year 10, the DSTI ratio for an interest-only loan is already small, it is difficult to see that there would be much benefit from the reduction of it.

From an informal cost-benefit analysis, it seems rather likely that the cost of a substantially higher DSTI ratio during the first 9 years are larger than the possible benefits a modest reduction of a relatively small DSTI ratio from year 10. More generally, the strongly front-loaded DSTI ratio under amortization requirements makes more mortgagors liquidity-constrained for many years, forces more mortgagors to oversave and underconsume, and makes it more difficult or even impossible for mortgagors to smooth their consumption when shocks to their current income occur.

The mortgagors' consumption becomes more sensitive to current income, and the mortgagors become less resilient to income shocks.

B.7 Reduced household resilience to income shocks

The FI's aim of the amortization requirements is to increase households' resilience to shocks (FI, 2017d, p. 1):

The aim of the measure[s] is to increase the Swedish households' resilience to shocks.

But a closer look reveals that amortization requirements actually reduce households' resilience.

As noted in section 3.4, the resilience in question is mainly the resilience of the households' consumption, more precisely, the households' capacity to smooth their consumption while fulfilling their debt service, when negative shocks to current income occur. This resilience can be measured by the households' CFMs. As mentioned in section B.3, the CFM is defined as the household's current net income minus the sum of the compulsory housing payment—the OMC plus the compulsory debt service (the after-tax interest plus the compulsory amortization)—and standardized (basic) (non-housing) expenses. The CFM shows the scope for actual non-housing consumption to exceed the standardized basic living expenses and the capacity to maintain a smooth normal non-housing consumption without having to draw on any liquidity buffer, when negative shocks to current income occur.

Amortization requirements increase the housing payment and reduce households' CFMs and thereby reduce households' resilience compared with an interest-only loan. A given interest-only loan results—with nominal income growth—in a gradually increasing cash-flow-margin-to-net-income (CFMTI) ratio; this is the mirror image of the gradually decreasing DSTI ratio for an interest-only

loan noted in section B.6. In contrast, amortization requirements result in a strongly *backloaded* CFMTI ratio; the mirror image of the strongly *frontloaded* DSTI ratio with amortization requirements. The relevant CFMTI ratios are shown in figures B.10 and B.11, including the CFTNI ratio for a secondary rental. The initial CFMTI ratio is thus much lower with amortization requirements than for an interest-only loan. The CFMTI ratio remains lower than that for an interest-only loan until amortization ceases in year 10, when the CFMTI ratio rise to slightly exceed the that for an interest-only loan; this is again the mirror image of the DSTI ratio with amortization requirements, which only after about 10 years slightly undershoots the DSTI ratio for an interest-only loan.

Figure B.10: The cash-flow-margin-to-net-income ratio over time, without amortization, with amortization requirements, and for a secondary rental. Initial monthly gross income SEK 25,000.

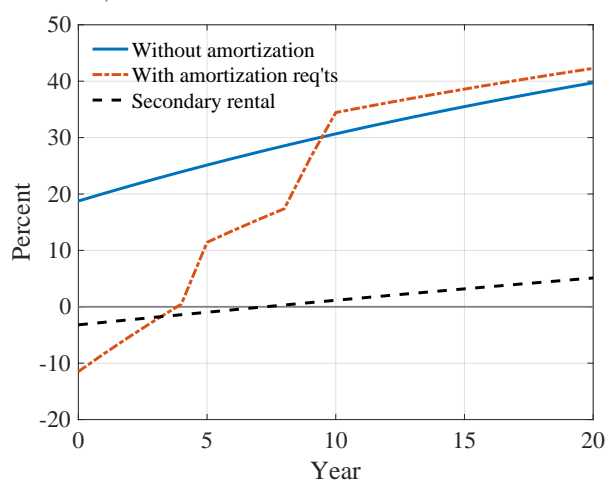
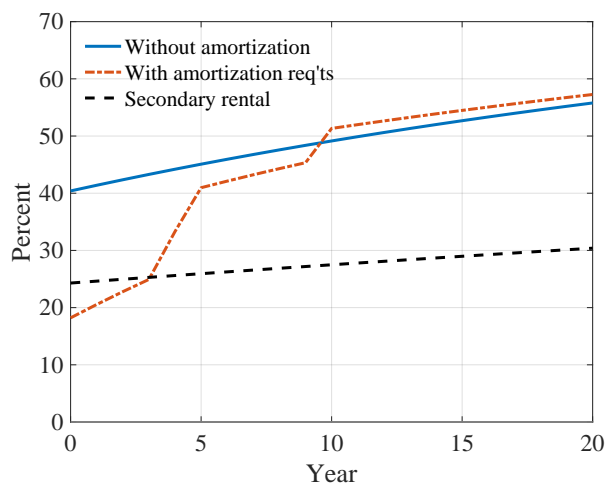


Figure B.11: The cash-flow-margin-to-net-income ratio over time, without amortization, with amortization requirements, and for a secondary rental. Initial monthly gross income SEK 35,000.



Source and note: Tables A.1 and B.2 and own calculations. SEK/USD \approx 10.

With amortization requirements, the cost of a substantially lower resilience during the first 9 years are likely to be significantly larger than the possible benefits of a modest increase in resilience from year 10. More generally, the marginal welfare loss from less resilience is likely to increase when resilience falls. The marginal welfare loss from a lower CFM is larger when the CFM is initially low than when it is initially high. This means that it is optimal to smooth the CFM over time, for the same reason why decreasing marginal utility of consumption makes it optimal to smooth consumption over time.²⁰

It follows that the FI's amortization requirements with its frontloaded CFM profile results in less resilience and a welfare loss compared with the smooth CFM profile for an interest-only loan. More intuitively, the more smoothly increasing CFMTI ratio for an interest-only loan makes mortgagors less liquidity-constrained and make it easier for mortgagors to smooth their consumption when shocks to their current income occur. Clearly, amortization requirements are a counterproductive way to increase mortgagors' resilience.

Furthermore, the secondary-rental outsiders—the individuals that are excluded from owner-occupied housing because of the credit tightening and have to resort to the secondary-rental market—end up having a lower CFM and a lower resilience to income shocks than if they had received the interest-only loan. This is because the secondary rent is higher than the housing payment for an

²⁰ It is easy to show that reasonable measures of the welfare loss display increasing marginal loss to less CFM. See Svensson (2019b, appendix E) for an example.

interest-only loan. In addition, the secondary-rental outsiders' CFMs do not benefit from lower mortgage rates in recessions.

Amortization requirements reduce the resilience of mortgagors in other more indirect ways. The high housing payment and low CFM prevent mortgagors from building up a liquidity buffer—or force them run down an existing liquidity buffer. They also prevent the mortgagors to invest in a more diversified portfolio. The mortgagors are forced to oversave and underconsume, and become liquidity-constrained. In particular, these households are prevented from their preferred consumption-smoothing over time. Their marginal propensity to consume out of current net income (MPC) will be very high. They may indeed be hand-to-mouth consumers with an MPC equal to unity (Campbell and Mankiw, 1989; Kaplan et al., 2014; Ampudia et al., 2018). Thus, amortization requirements imply that mortgagors' consumption is more sensitive to their current income.

Finally, as discussed in section 3.5, by *design* the amortization requirements make the amortization and associated involuntary saving inherently countercyclical, because the amortization rate rises when LTV and LTI ratios fall due to housing-price and income falls. This makes consumption inherently procyclical and increases the macroeconomic risk that FI wanted to reduce.

Thus, amortization requirements make it more difficult for mortgagors to smooth their consumption, when negative income shocks occur. Their consumption becomes more sensitive to income shocks, which may reinforce a recession. Amortization requirements may create and increase the macroeconomic risk that FI is trying to reduce.

B.8 The FI's exemptions on “special ground” do not solve the problem of reduced resilience

The FI's is aware of the problem that amortization requirements reduce households' resilience. Its response to this problem—and contradiction—is to allow mortgage firms to make exemptions from amortization payments for mortgagors on “special grounds” (FI, 2017d). However, the special grounds FI mentions refer to situations when individual mortgagors face *individual problems in fulfilling their debt service* for reasons such as “unemployment, long periods of absence from work due to illness and the death of a close relative.” There is no suggestion in the FI's discussion that mortgage firms might consider mortgagors' *consumption* or the *macroeconomic risk from a reduction in mortgagors' consumption*—the FI's official rationale for having introduced the amortization requirements. It difficult to believe that mortgage firms would exempt mortgagors from amortization on the ground that certainly they can fulfill their debt service, but they cannot maintain their normal consumption. The mortgage firms will most certainly be focused on any risk to their individual debt service rather than on any macroeconomic consequences. Thus, the FI has not provided any mechanism through which the exemptions to amortization payments would avoid the reduced resilience caused by the amortization requirements.²¹

B.9 A reduction in already too-low construction

As discussed in Svensson (2019c), the main problem with the Swedish housing market is a structural excess demand for housing in the major cities. Demand for owner-occupied housing has been growing, due to a downward trend in mortgage rates, a reduction of and low cap on property taxes,

²¹ In March 2020, the corona pandemic forced the FI to adapt and to make an unanticipated special recommendation: “Loss of income due to the corona-virus [is] a cause for exemption from amortization” (FI, 2020b). But borrowers have no right to an exemption; it is still the mortgage firm that decides. And the recommendation did not apply to those that have not yet lost their income. In April, the FI corrected the latter and stated that banks may grant all mortgagors amortization exemption (FI, 2020a). But the exemption is so far only in force until the end of June 2021. Bäckman (2020) has argued that it is better to simply abolish the amortization requirements.

increases in disposable income, urbanization and migration to the major cities, the dysfunctional rental market, and other structural factors. For several reasons, the supply of housing has not kept up with the growing demand. The reasons include restrictions on land use, building regulations, lack of regional planning, local special regulations, local permit handling times, limited competition, and so on. Given this, it is not surprising that housing prices and household debt have been rising.

The obvious solution to this problem of a structural excess demand for housing is to *increase the supply of housing*, through increased construction of new housing and more efficient use of the existing housing stock, including reforms of the rental market. In contrast, the FI’s tightening of lending standards and the resulting credit contraction has served to artificially *reduce the demand for housing, especially from households without high income and wealth* and thus lowered housing prices. This in turn has led to a substantial fall in the construction of new housing, in a situation when housing construction was already lower than socially optimal. This makes the structural housing problem worse.

B.10 Many distortions

It is clear that the tightening of lending standards, especially the compulsory amortization requirements, cause—or exacerbates—several obvious distortions (and some less obvious). These distortions cause efficiency (welfare) losses. They also cause equity (welfare distribution) losses between insiders and outsiders of the owner-occupancy market and between insiders with and without high income and wealth.

The FI’s compulsory amortization requirements increase the housing payment and cause a large difference between the housing payment and the user cost of housing and thereby a large involuntary saving. The large difference between the housing payment and the user cost of housing as well as the large involuntary saving cause several distortions compared with an interest-only loan. The amortization requirements also cause a strongly frontloaded time profile of the debt-service-to-net-income ratios as well as a strongly backloaded time profile of the cash-flow-margin-to-net-income. This causes distortions compared with the smoother time profiles resulting from an interest-only loan.

The distortions are examined and listed in [Svensson \(2019b, section 8\)](#). Table [B.3](#) provides a non-exhaustive summary of the distortions. In the table, “outsiders” denote individuals that are excluded from the market for owner-occupied housing by the credit tightening. “Insiders” denote individuals that are still able to buy the average studio after the tightening. “Secondary-rental outsiders” denote outsiders that have to resort to the secondary-rental market.

Table B.3: A non-exhaustive summary of distortions caused by the credit tightening, especially the compulsory amortization requirements.

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1. Households without high income or wealth face higher barriers to entry into owner-occupancy.
 2. The mobility within the market for owner-occupied housing is reduced.
 3. First-time buyers without high income or wealth are excluded from the owner-occupancy market in Stockholm Municipality and many have to resort to the secondary-rental market.
To prevent such exclusions, housing prices may have to fall by almost 40%.
 4. Less-than-high-income outsiders have higher housing user cost than high-income insiders.
 5. A less wealthy outsider has a higher user cost than a high-wealth insider with similar income.
 6. Mortgagors are forced to oversave and underconsume.
 7. Mortgagors' consumption becomes more sensitive to income shocks.
 8. Mortgagors have to save in illiquid housing equity instead of more liquid and diversified assets.
 9. Mortgagors are less resilient to shocks for many years, for a small gain in resilience later.
 10. Secondary-rental outsiders are forced to overpay, undersave, and underconsume.
 11. Secondary-rental outsiders' consumption is more sensitive to income shocks.
 12. Secondary-rental outsiders are less resilient to shocks, without any gain in resilience later.
 13. By design the amortization requirements make amortization and involuntary saving counter-cyclical, which makes consumption more procyclical and sensitive to income shocks.
 14. Reduced demand for and lower prices of housing reduce already too-low housing construction and exacerbates the structural problem of excess demand for housing.
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Sorce and note: [Svensson \(2019b\)](#), section 8) "Outsiders" refer to households excluded from the market for owner-occupied housing because of the credit tightening. "Insiders" refer to households still being able to enter the market for owner-occupied housing after the tightening. "Secondary-rental outsiders" refers to outsiders that have to resort to the secondary rental market, with very high rents.

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