Preliminary. Comments welcome.

# Housing Prices, Household Debt, and Macroeconomic Risk: Problems of Macroprudential Policy I*

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**Abstract**

This paper answers three questions about current Swedish housing prices and household debt: (1) Are housing prices too high? (2) Is household debt too high? (3) Does household debt pose an "elevated macroeconomic risk"? Finansinspektionen (the Swedish FSA) has argued that the answers to these questions are all *yes* and that this has justified a substantial further tightening of already rather tight lending standards, achieved through mandatory amortization requirements and in other ways. This paper argues that the answers to the questions instead are all *no*, in the following sense: Regarding questions (1) and (2), there is no evidence that housing prices and household debt are higher than what is consistent with their fundamental determinants. Regarding question (3), the "macroeconomic risk" refers to the risk of a larger fall in household consumption in a recession or crisis. There is indeed evidence from Denmark, the UK, and the US of a *correlation* between households' pre-crisis indebtedness and subsequent negative consumption responses during the financial crisis 2008–2009. But there is no evidence that high household indebtedness *caused* a subsequent larger negative consumption response. The correlation is instead explained by an underlying common factor that caused both high pre-crisis indebtedness and a large negative consumption response during the crisis. For Denmark and the UK, the evidence is that the common factor is debt-financed household overconsumption relative to income, more precisely overconsumption financed by housing equity withdrawals. There is also evidence of debt-financed overconsumption for the US. But there is no evidence of debt-financed overconsumption of any macroeconomic significance in Sweden. Therefore, there is no evidence of Swedish household debt posing an elevated macroeconomic risk. In summary, Finansinspektionen's tightening of lending standards lacks scientific support.

JEL codes: E21, G01, G21, G23, G28, R21

Keywords: Macroprudential policy, housing, loan to value ratio, loan to income ratio, mortgage equity withdrawal, housing equity withdrawal, debt-financed overconsumption

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# Contents

"The households' debt is still increasing faster than their income and housing prices are still high. Consequently, the need for action remains." (The director general of the Swedish FSA in an op-ed, November 2017)[1]

# 1 Introduction

Household debt serves an important role in the economy and provides crucial services to households. For example, instead of having to save for many years in order to pay for a home with cash, mortgages allow households to purchase a home and benefit from it much sooner and use future incomes to service the debt. This is especially important if—as in the major cities in Sweden—there is no functional rental market (due to rent control). Furthermore, owner-occupied housing provides collateral for future borrowing. This allows households to smooth consumption when subject to income shocks, as well as to diversify their assets from illiquid housing into a more balanced portfolios of financial assets, including liquidity buffers. This way households become more resilient to shocks. Thus, a mortgage provides long-maturity and safe financing not only of a household's home but also of its other assets, which typically are of shorter maturity than its mortgage.

However, household debt becomes a problem if households have difficulties meeting their debt obligations, that is, paying interest and any amortization during the loan and the remaining principal at the termination of the loan. Such payment difficulties may be caused by housing-price falls, interest-rate increases, and income falls. If households do not meet their payment obligations, lenders suffer credit losses, which, if too large relative to lenders' capital buffers, may be a threat to *financial* stability. This way, if household debt is such that there is a risk of significant payment difficulties and lenders' capital buffers are insufficient, household debt may pose a significant *financial-stability risk*.

Nevertheless, households facing unfavorable shocks may still choose to fulfill their debt service but instead cut down on their spending.[2] Such behavior does not pose a direct threat to *financial* stability, but it reduces aggregate demand and may add to an economic downturn, and thereby be a threat to *macroeconomic* stability. This way, if household debt is such that there is a risk of significant spending cuts, household debt may pose a significant *macroeconomic risk*.

High household debt is often suggested as a major factor behind the severity of the financial crisis 2008–2009. In particular, several papers have documented a negative correlation at the micro level between pre-crisis household indebtedness and subsequent spending growth. For example, this correlation has been established at the county and zip-code level in the US by Mian and Sufi (2010) and Mian, Rao, and Sufi (2013) and at the individual household level for the US, UK, and Denmark by, respectively, Dynan (2012), Bunn and Rostom (2014, 2015), and Andersen, Duus,

[1] Thedéen (2017, my translation).
[2] This is especially the case if the debt is full recourse (which it is in Denmark, Sweden, and the UK).

and Jensen (2016).[3]

Understanding the relation between household indebtedness and household spending decisions during financial crises or recessions is important for macroprudential policy. *If* high indebtedness makes household reduce their consumption more when the economy is hit by financial unrest or other negative shocks, macroprudential and other policies that limit household borrowing may have the benefit of reducing macroeconomic risks. *If not*, such policies may not have any significant benefits but still have significant welfare and distributional costs, for example, by making it more difficult for households with low to moderate income and wealth to find suitable housing.

The crucial issue here is whether higher indebtedness is not only *correlated with* but also *causes* a larger subsequent spending fall. Correlation does not imply causality. It could be that the higher indebtedness and the subsequent spending fall are both caused by some underlying common factor. If that factor is not present, any observed high indebtedness may have been caused by another factor that does not have any impact on the spending fall. A correct assessment of the possible risks from household indebtedness—and of whether the potential benefits from macroprudential policies limiting household indebtedness exceed the costs—requires that the source of the correlation is identified and understood.

The possible risks associated with household debt have been much discussed and debated in Sweden because housing prices and household indebtedness have risen. Figure 1.1 shows the levels of Swedish household debt-to-disposable-income (DTI) ratio, disposable income, debt and Swedish aggregate housing prices.[4]

Figure 1.2 shows the corresponding annual growth rates, as well as the 1950-2017 long-run mean of the annual growth rate of the household DTI ratio. In particular, we see that growth rate of the DTI ratio in recent years is not very different from its long-run mean. This is further discussed in section 3.1.

Finansinspektionen (FI, the Swedish Financial Supervisory Authority) has warned, not about any *financial-stability* risks, but about a *macroeconomic* risk from household debt. The Danish experience during the financial crisis has been particularly emphasized. Figure 1.3 (figure 1 in Andersen et al., 2016) shows that Danish aggregate household consumption grew rapidly until the first quarter of 2008. It then dropped by more than 6% within a single year, followed by a very slow recovery in the subsequent years. The crisis was preceded by a rapid increase in household debt. The figure shows that the aggregate household debt-to-disposable-income ratio increased from 2.1 in early 2003 to about 2.9 at the peak of the boom five years later. It continued to rise during

[3] At the macro level, Flodén (2014) has demonstrated a negative correlation between the pre-crisis level and growth of household debt and consumption growth during the financial crisis for OECD countries. Schularick and Taylor (2012) have shown that credit growth generally predicts financial crises, and International Monetary Fund (2012) and Jordà, Schularick, and Taylor (2013) have shown that above-trend credit growth predicts deeper financial crises. Bridges, Jackson, and McGregor (2018) find that previous credit growth is a better predictor of the severity of recessions than the level of indebtedness. Micro evidence is arguably necessary to identify and understand the mechanisms and any causality in the correlation between predictors and outcomes.

[4] Mortgages were 82% of the total loans to households from monetary financial institutions (MFIs) in July, 2018 (**?**).

Figure 1.1: The levels of Swedish households' aggregate debt-to-income ratio, disposable income, and debt, and of Swedish aggregate housing prices.

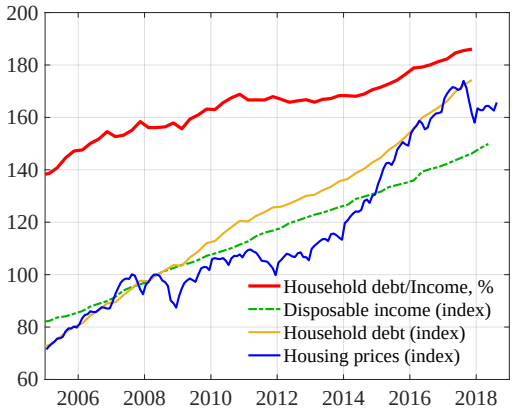
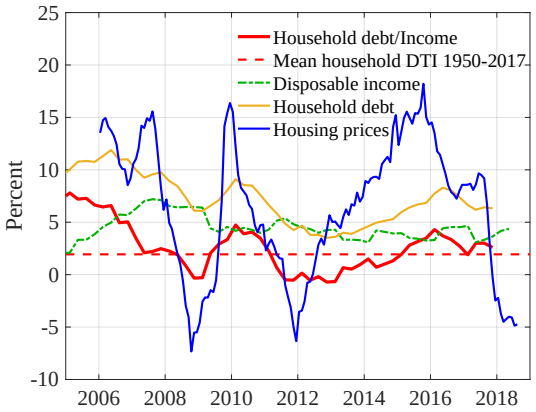



Figure 1.2: The annual growth rates of Swedish households' aggregate debt-to-income ratio, disposable income, and debt, and of Swedish aggregate housing prices.




Source and note: Statistics Sweden, Valueguard, Thomson Reuters Datastream, and own calculations. The figures show the levels and growth rates of Swedish household aggregate debt-to-disposable-income ratio and aggregate disposable income, debt (calculated as the product of the DTI ratio and disposable income), and Swedish housing prices. Debt, disposable income, and housing prices are nominal and indexed to 100 for June 2008. The dashed red line in figure 1.2 shows the mean of the annual growth rate of the DTI ratio from 1950, see figure 3.3.

the crisis, reaching a level above 3 in late 2009, followed by a slow decline in the subsequent years. (One may note that this is a substantially higher ratio than the current Swedish one of below 1.9 in figure 1.1.)

Figure 1.3: Danish households' aggregate debt-to-income ratio and consumption.

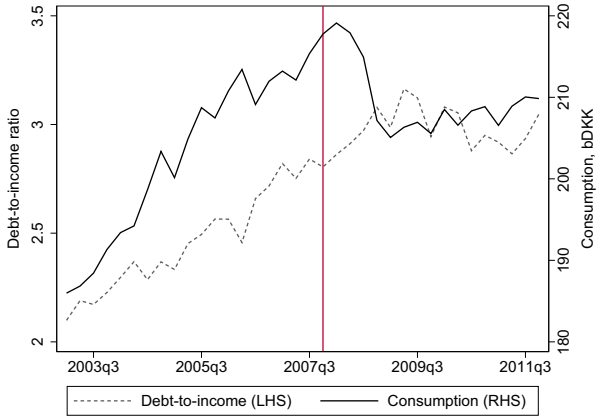
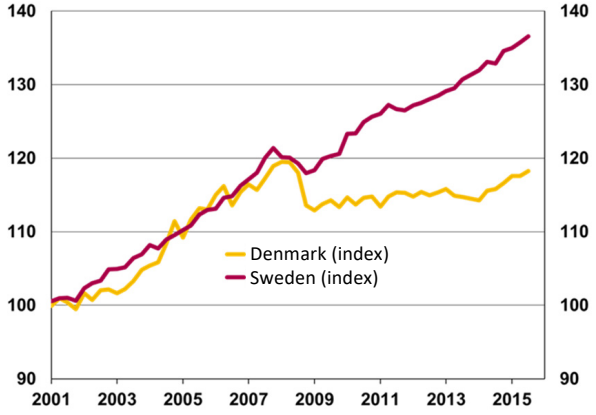



Figure 1.4: Danish and Swedish households' aggregate consumption.




Source and note: Figure 1.3, Andersen et al. (2016, Figure 1) and Statistics Denmark. Figure 1.4, Thedéen (2016), Statistics Denmark, and Statistics Sweden. Figure 1.3 shows Danish households' aggregate debt-to-disposable-income ratio (left axis) and aggregate seasonally adjusted quarterly consumption in 2010 DKK bn (right axis) (DKK/EUR $\approx 7.7$). The vertical line marks 2007q4. Figure 1.4 shows Danish and Swedish households' aggregate real consumption, indexed to 100 for year 2000.

The figure illustrates the aggregate correlation between high and rising pre-crisis household indebtedness and the subsequent spending fall in Denmark. In a speech to the Riksdag's Finance Committee (the Riksdag is the Swedish parliament), the director general of the FI showed a figure

showing Danish and Swedish household consumption (reproduced as figure 1.4) and warned about the risk of higher household indebtedness (Thedéen, 2016, p. 4; my translation; italics added):

> [T]he rapid increase in [Swedish] household indebtedness has more and more clearly emerged as a risk. And *not mainly as a risk to the financial system as such, but to the main economy.* In Sweden, the somewhat unusual situation has occurred that the financial system is stable at the same time as imbalances in the credit market are growing.
>
> Thus, the task is to prevent that an unbalanced development in the credit market—for example, in the form of too rapid an increase in indebtedness—eventually causes macroeconomic imbalances. And this could happen *when highly indebted households—because of rising interest rates, falling housing prices, or increased unemployment—are forced to reduce their consumption in order to manage interest and amortization payments and keep their housing.*
>
> In the countries that had a large increase in the debt-to-income ratio before the financial crisis—among others Denmark—there was also in many cases a larger decline in consumption when the bubble had burst.
>
> *The big problem today is thus that household indebtedness may contribute to or reinforce a recession.*

Although it is not clearly said, it seems that the director general considers that there is a causal relation between the *level* of household indebtedness and the consumption response to disturbances. The director general also says in the first paragraph of the quote that "the rapid *increase* in household indebtedness has more and more clearly emerged as a risk." It is not explicitly said that there is a separate risk from a rapid increase in household indebtedness; the second paragraph supports the interpretation that what is meant is just that a rapid *increase* in indebtedness will more rapidly lead to a high *level* of indebtedness, which is what causes an elevated risk.

Separately, displaying and referring to Danish and Swedish households' consumption in the figure could certainly by the attending members of the Finance Committee be interpreted as a warning of what might happen if the FI would not be able to prevent too high household indebtedness.[5]

## 1.1 Tighter lending standards and some consequences

In any case, in order to reduce the growth of household debt and counteract too high indebtedness, the FI has now for several years tried to gradually tighten lending standards through first encour-

[5] The implicit comparison between the Denmark and Sweden is arguably inappropriate to a large extent because the Danish economy, which has a fixed exchange rate, was overheating in 2006-2007, perhaps somewhat similar to the overheating of the Swedish economy with a fixed exchange rate before the crisis in the 1990s and the overheating of the peripheral eurozone countries before the eurozone crisis. As summarized by European Commission (2012, p. 6; italics added):

> The Danish economy recorded a period of almost continuous expansion between 1995 and 2008, with annual average growth rates of 2%. In 2006-2007, the economy experienced a period of *overheating* spurred by accelerating investment and private consumption growth on the back of a credit expansion and a surge in house prices of 54% between 2003 and 2007. Labour market bottlenecks and tight labour market conditions in general led to high wage growth while productivity growth rates were simultaneously falling or even negative. Since the mid-1990s, slow productivity growth and relatively high wage growth resulting in rising unit labour costs have contributed to a deterioration in competitiveness potentially connected with observed losses in export market shares.

See also OECD (2008).

aging and later regulating increased amortization. The Riksbank had previously argued rather intensely in favor in favor of increased amortization and amortization requirements for some time, for example in Sveriges Riksbank (2012). The Government commissioned the FI to strengthen the foundation of a "healthy amortization culture" ["sund amorteringskultur"] and investigate the conditions for appropriate regulation that would require mortgage firms to provide proposals for an individually tailored amortization plan for customers. In response, the FI in October 2013 published a report proposing that the banks should offer their customers individually tailored amortization plans (FI, 2013a), while also stating that it could introduce a regulation enforcing the proposal. Importantly, the proposal did not include a mandatory requirement for customers to amortize their mortgages.

Through several twists and turns—briefly described in appendix A—the FI eventually introduced a first mandatory amortization requirement that applies from June 2016 for new mortgages with loan-to-value (LTV) ratios above 50%. For LTV ratios between 50% and 70%, at least 1% of the loan amount at origination should be amortized per year; for LTV ratios above 70%, at least 2% of the loan amount at origination. The FI then introduced a second, "stricter" mandatory amortization requirement that applies from March 2018. For new mortgages above 4.5 times gross income (income before taxes), at least an additional 1% of the loan amount at origination should be amortized per year.

The FI has also encouraged the banks to tighten their lending standards in other ways. In November 2015, the new director general, Erik Thedéen, in an op-ed suggested a loan-to-income limit of 6 times disposable income (Thedéen, 2015). The banks—perhaps perceiving an implicit threat of regulation if not obliging—have introduced or lowered internal loan-to-income limits, now typically 5–6 times gross income (Svenska Dagbladet, 2017). The banks have also converged on a high interest rate in the interest-rate stress tests in their affordability assessments, typically 7% (thus no less than 5.5 percentage points higher than prevailing variable mortgage rates of about 1.5%).[6] As another indication that the FI has both encouraged and welcomed the tightening, one might also quote FI (2017a, pp. 2–3):

> [T]he tightening of the requirements and credit assessments in recent years is healthy. It can also be mentioned here that the turnaround in this regard has been fuelled by FI's actions. The measures themselves have been important, but the open debate FI has fostered about what needs to be done has played an important role in how banks and mortgagors act and think. The current [first] amortisation requirement was questioned before it was introduced. Today, amortisation is a natural element in the banks' and the customers' calculations and considerations. The same can be said about the mortgage [LTV] cap.

By tightening lending standards in this way, the FI has effectively reduced the supply of credit to households with low to moderate incomes and wealth, a category which includes many young

[6] For example, at the press conference presenting the mortgage market report 2018, it was clear that the director general of Finansinspektionen welcomed tighter lending standards of the banks in addition to the amortization requirements (FI, 2018b).

households and individuals. In line with this, European Commission (2018, p. 30) reports that Swedish "[d]emand-side policy action in the housing market has been focused on curbing mortgage lending via macroprudential measures." It also notes "increasing difficulties faced by lower-income households to obtain a mortgage at all" (p. 31).[7]

As a first simple measure of the magnitude of the tightening of lending standards, one can estimate the increase in the level of the interest rate in the banks' interest-rate stress tests used to assess the affordability of a borrowers' mortgage. As discussed in Svensson (2019a), one may interpret the lending standards before the tightening as the banks' requiring that borrowers should approximately manage a mortgage rate of 6% on an interest-only loan.[8] After the tightening, banks require that the borrower can manage a mortgage rate of 7%, an increase of 1 percentage point. Furthermore, households with a loan-to-value ratio of above 70% and a loan-to-income ratio of above 4.5 have to fulfill the FI's mandatory amortization requirement of a minimum amortization of 3% of loan at origination. With a 30% capital-income tax rate, this is equal to a $3/0.7 = 4.3$ percentage points increase in the before-tax mortgage rate on an interest-only loan. The tightening from the amortization requirements is thus 4.3 times the tightening from the interest-rate stress test. Measured in this dimension, the total tightening is equivalent to a $1 + 4.3 = 5.3$ percentage points increase in the mortgage rate on an interest-only loan. This is indeed a substantial tightening, with more than 80% of the tightening achieved through the mandatory amortization requirements.

Furthermore, regardless of the amortization requirements, the tighter lending standards with a 7% interest rate in the assessments stress tests correspond to a requirement that borrowers shall be able to manage an interest rate that is a full 5.5 percentage higher than the prevailing variable mortgage rates of around 1.5% (figure B.1a, 3 months).

As a second measure of the magnitude of the tightening of lending standards, one can look at the share of the income distribution of households that have sufficient income to pass the affordability assessment and obtain a mortgage to buy suitable housing. Svensson (2019a) uses 25–29-year-old individuals in Stockholm (Municipality) as an example. Before the tightening, the top 50% of the income distribution of such individuals had enough monthly before-tax income—about SEK 25,000 (EUR 2,500)—to borrow 85% of the 2017 price of the average Stockholm studio (a one-room

[7] Svensson (2019a) provides a detailed report of the consequences of the FI's amortization requirements and general tightening of lending standards, and the induced reduction in the credit supply. Svensson (2018, section 3.4) provides a summary of the consequences.

[8] FI (2013b, p. 12) reports that the interest rate used by the banks in their affordability interest-rate stress tests varied from 5.7% to 8.0%. Among new loans with the 76–85% LTV range, 21% in 2011 and 8% in 2012 were interest-only loans (FI, 2013b, diagram 9). Sveriges Riksbank (2012, chart 3:7) reports that almost 60% of new mortgage holders did not amortize in 2011.

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

This is consistent with the availability of loans with an affordability interest-rate stress test with a 6% interest rate and no amortization. Among anectodal evidence, according to Dagens Industri (2013) the then minister of financial markets reported that his mother was required to manage a 6% interest rate on her new mortgage in 2013. There are several reports that Danske Bank used an interest rate of 6% in affordability assessments as late as October 2018, for example, Expressen (2018). In January 2019, Danske Bank (2019) reports that mortgagors should be able to manage an interest rate of 7%.

apartment). After the tightening, only the top 20% of the income distribution had enough monthly income—about SEK 35,000 (EUR 3,500)—for this. This is thus a credit contraction that excludes $(50-20)/50 = 60\%$ of those that previously qualified for a loan.[9]

Furthermore, those excluded by the tightening can actually easily afford the monthly imputed rent—the user cost of housing—for this studio, which is only about SEK 2,800 (EUR 280).[10] This is only 14% of the after-tax income—about SEK 20,000—of the individual with before-tax income of SEK 25,000. For those excluded from borrowing, because–due to rent control—there is no functioning rental market in Stockholm; the alternative is mainly to either live with their parents or go to the secondary rental market, where leases are short-term and the monthly rent for a Stockholm studio easily is an exorbitant SEK 10,000 (EUR 1,000).[11]

Clearly, these simple numbers and measures of the tightening of lending standards provide some indication of the substantial welfare costs caused by the tightening. Furthermore, the Swedish government has long specified that the objective of Finansinspektionen is (Swedish Ministry of Finance, 2017; FI, 2014, italics added):

> to ensure that the financial system is stable and characterised by a high level of confidence and has *smoothly functioning markets that meet the needs of households and corporations for financial services, and provides comprehensive protection for consumers.*

It is difficult to see how preventing such a high share of young individuals from buying a home that they can easily afford (in the sense of easily affording the user cost) and thereby in many cases indirectly subject them to the exorbitant rents in secondary rental market can be consistent with meeting their needs for financial services and providing them with comprehensive consumer protection.

After the tightening of lending standards, housing developers have reported that demand for new housing fell dramatically during the fall of 2017. Housing prices in the major cities fell 6–9% from their peak in August 2017 to January 2018 but have since recovered somewhat and had by August 2018 fallen 5–7% from the peak (see figure 1.1b). Developers' plans for new housing production have fallen substantially (Veidekke, 2018a,b). The National Institute for Economic Research predicts housing investment growth to fall substantially from 12% in 2017 to 1% in 2018, −10% in 2019, −1.2% in 2020 (NIER, 2018, table A6). The National Board of Housing, Building and Planning predicts that, compared to 2017, the number of dwelling starts in Sweden will fall by 20% in 2018 and by another 6% in 2019. In the Greater Stockholm Area, the number of dwelling starts in 2018 are predicted to fall by 35% (NBHBP, 2018b, p. 2). All this when there is a large

[9] Table B.2 shows that the minimum monthly gross (before-tax) income required for a 6% interest-only loan is about SEK 25,000 (EUR 2,500) and that the minimum monthly gross (before-tax) income required for a 7% loan with 3% amortization is about SEK 35,000 (EUR 3,500). Figure B.6 shows the cumulative income distribution for 25–29-year-olds in Stockholm.

This calculation uses the actual tax table of the Swedish Tax Authority (figure B.2). A previous less precise calculation reported in a previous version of this paper used an approximation to the tax schedule from FI (2018d, footnote 24), which resulted in the slightly higher gross incomes of SEK 26,000 and SEK 36,000, respectively.

[10] See figures B.4 and B.5.

[11] See Qasa (2019).

structural excess demand for and lack of supply of housing in Sweden and, in particular, in the major cities.

### 1.2 Three questions

Against this background, this paper answers three questions about current Swedish housing prices and household debt: (1) Are housing prices too high? (2) Is household debt too high? (3) Does household debt pose an "elevated macroeconomic risk"? Whereas the FI has argued that the answers to these questions are all *yes* and that this justifies a substantial tightening of lending standards achieved through mandatory amortization requirements and other ways of tightening lending standards, this paper argues that the answers to the questions instead are all *no*, in the following sense: Regarding questions (1) and (2), as we shall see there is no evidence that housing prices and household debt are higher than what is consistent with their fundamental determinants. Regarding question (3), the "macroeconomic risk," as mentioned, there is indeed evidence from Denmark, the UK, and the US of a *correlation* between households' pre-crisis indebtedness and subsequent negative consumption responses during the financial crisis 2008–2009. But there is no evidence that high household indebtedness *caused* a subsequent larger negative consumption response. The correlation is instead explained by an underlying common factor that caused both high pre-crisis indebtedness and a large negative crisis consumption response. For Denmark and the UK, the evidence is that this factor is debt-financed household overconsumption relative to income, more precisely overconsumption financed by housing equity withdrawal (HEW)—in the literature also called mortgage equity withdrawal (MEW). There is also evidence of debt-financed overconsumption for the US.

The debt-financed overconsumption reflects the *housing collateral channel* (Muellbauer, 2012)—called "the credit-driven household demand channel" by Mian and Sufi (2018)—through which rising housing prices provides increasing collateral, which in turns makes it possible to finance overconsumption through HEW. But, importantly, there is no evidence of a housing collateral channel resulting in debt-financed overconsumption of any macroeconomic significance in Sweden. Whereas the household saving rate was low before the crisis in Denmark, the UK, and the US, it is at a historical high in Sweden. Furthermore, there is no evidence of any lender or borrower overoptimism.

In addition, high household indebtedness and the high share of mortgages with variable mortgage rates create a *cash-flow channel* for the transmission of monetary policy (Flodén et al., 2021; Hughson et al., 2016; Gustafsson et al., 2017; Cumming, 2018). Through the cash-flow channel, the Riksbank policy rate (the repo rate) via its effect on variable mortgage rates directly affects indebted households' cash flow. With a strong cash-flow channel, it is easier for the Riksbank to stabilize consumption, aggregate demand, and the business cycle; it can be done with smaller policy-rate movements. As long as the Riksbank conducts flexible inflation targeting, meaning stabilizing both inflation around the inflation target and employment around its maximum long-run

sustainable level, it will be stabilizing aggregate demand and not allow consumption to fall dramatically. Thus, the risk of a recession would seem to fall rather than rise. Because with flexible exchange rates and inflation targeting, interest rates will tend to be low in recessions—not high—and the cash-flow channel actually provides indebted households with insurance against recessions. In summary, there is no evidence that Swedish household debt poses a macroeconomic risk.

The paper is organized as follows: Sections 2 deals with the question of whether Swedish housing prices are too high; section 3 deals with the question of whether Swedish household debt is too high. Section 4 examines whether or not Swedish household debt poses a macroeconomic risk. Section 5 comments on statements and warnings made by some international organizations on the Swedish household debt and housing market. Section 6 concludes. An appendix contains some details and additional figures.

A companion paper, Svensson (2019a), examines the consequences of the amortization requirements and the general tightening of credit supply.

# 2 Are Swedish housing prices too high?

In order to assess the risks associated with household debt, it is necessary to examine household assets and, in particular, housing prices. This section attempts to answer the question: Are Swedish housing prices too high? More precisely, is housing overvalued in the sense of housing prices being higher than is justified by fundamental determinants of housing prices?

## 2.1 Structural problems in the Swedish housing market

As shown in figure 1.1, Swedish housing prices and household debt have been increasing. Demand for owner-occupied housing has been growing, due to a downward trend in mortgage rates, increases in disposable income, urbanization and migration to the major cities, and other structural factors. Also, after the election outcome in 2006, the new government replaced the state property tax with a municipality property tax with a fixed low cap, effective January 2008. Furthermore, due to rent control that keeps actual rents much below an equilibrium rent, there is no functioning rental market in the major cities. Therefore, all new demand has to be directed toward owner-occupied housing.[12]

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

[12] The Stockholm Housing Agency (Bostadsförmedlingen) is the main agent for allocating vacant rental apartments in the Stockholm region. The apartments are allocated on the basis of the time spent in the housing queue. To apply for an apartment, people must first register in the housing queue. The time spent in the queue before being allocated an apartment can be seen as an indicator of the shortage of rented apartments. For Stockholm, the median and average time until being allocated and a rented apartment in 2017 was about 11 and 12 years, respectively. For a studio, the median and average time was about 11 years (Stockholm Housing Agency, 2018, and own calculations). Donner, Englund, and Persson (2017) provide details on the structure of and interplay between the rent-controlled rental market and the market for owner-occupied apartments in Stockholm, as well as estimates of market rents if the rental market would be deregulated.

Figure 2.1: Completed dwellings in newly constructed buildings, population growth, and increase in dwelling needs, Sweden.

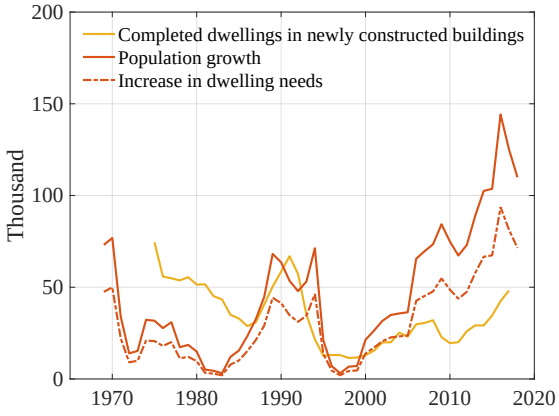
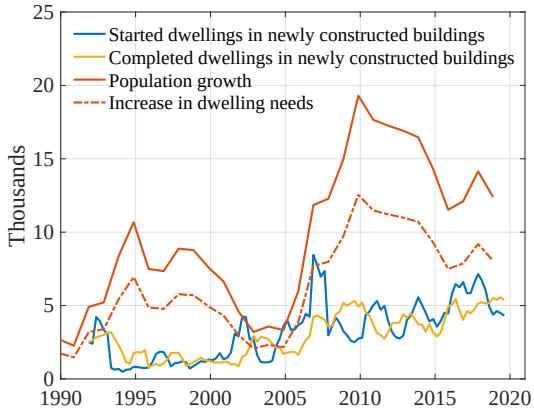



Figure 2.2: Started and completed dwellings in newly constructed buildings, population growth, and increase in dwelling needs, Stockholm.




Source and note: Statistics Sweden (2019a,c). Annually started and completed dwellings in newly constructed one-, two-, and multi-dwelling buildings in thousands of units. Annual population growth and increase in dwelling needs in thousands of individuals and units, respectively. The increase in dwellings is calculated with a household ratio of 0.65 individuals per household (NBHBP, 2018a, p. 55, uses a household ratio of 0.6–0.7).

regulations, local permit handling times, limited competition, and so on. Figures 2.1 and 2.2 show, for Sweden and Stockholm, the discrepancy between the population growth, increase in dwelling needs, and started (Stockholm only) and completed dwellings in newly constructed buildings for Sweden and Stockholm, respectively.[13] Altogether, this points to a fundamental structural housing problem in Sweden, namely rising demand and insufficient supply. Under these circumstances, it is not strange if housing prices and household debt increase.

Thus, one structural distortion is the insufficient supply of housing, that supply is not keeping up with the growing demand. Then the resulting structurally growing excess demand for housing will contribute to increasing housing prices. A second structural distortion is the lowering of the property tax, effective January 2008. This is an implicit subsidy to owner-occupied housing. When this subsidy was incorporated into housing prices, it caused a shift to a higher level of housing prices. However, after this level shift, counter to what is often said, it does not cause continued housing-price growth at a higher rate.

In many economies, when a subsidy leads to higher housing prices, those higher housing prices lead to more construction and a larger housing stock. The real distortion caused by the subsidy is then an inefficient resource allocation into too large a housing stock. Because of the first distortion mentioned above, the insufficient supply of housing in Sweden due to structural barriers, this distortion in the form of too much construction and too large a housing stock does not occur in Sweden. This furthermore means that the risk of a general oversupply of housing and a housing-

[13] Throughout this paper, "Stockholm" refers to Stockholm Municipality, which is considerably larger than the central city of Stockholm.

price fall for this reason is small and probably insignificant.[14]

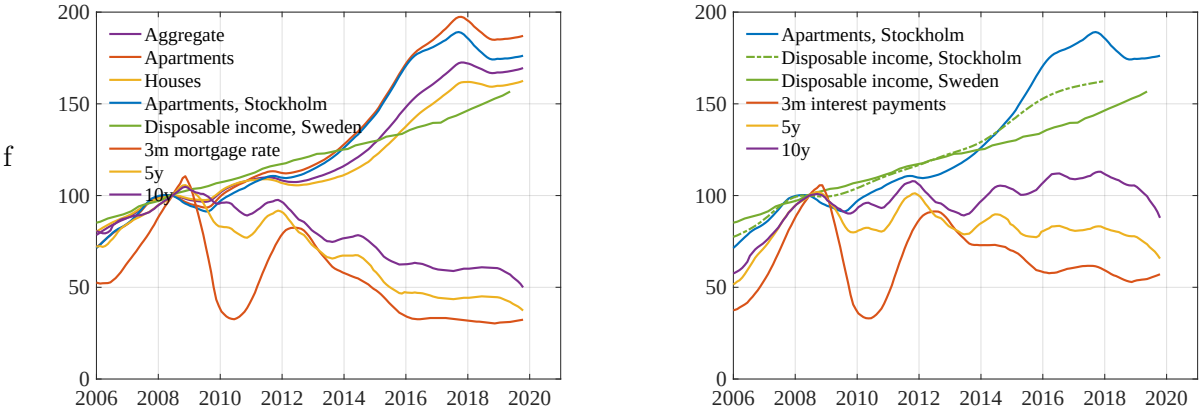
## 2.2 Housing prices, mortgage rates, disposable income, and user cost

Is housing overvalued in Sweden and, in particular, in Stockholm, where housing prices are the highest? Are housing prices excessive relative to what is consistent with fundamental determinants?[15]

Figure 2.3 shows Swedish housing and Stockholm apartment prices, Swedish disposable income, and mortgage rates for 3-month, 5-year, and 10-year fixation periods. All variables are indexed to 100 for June 2008, when the lower property tax can be assumed to have been incorporated in prices.[16] [17] During the last 10 years, Swedish disposable income has risen about 50%. Over the same period, housing prices have risen more than Swedish disposable income. We also see that mortgage rates have fallen substantially.

Figure 2.3: Swedish housing and Stockholm apartment prices, Swedish disposable income, and mortgage rates.

Figure 2.4: Stockholm apartment prices, Stockholm and Swedish disposable income, and Stockholm apartment interest payments.




Source and note: SBAB, Statistics Sweden, Valueguard, and Thomson Reuters Datastream. 3-month, 5-year, and 10-year mortgage rates. 12-month moving averages of prices, mortgage rates, and interest payments. Swedish disposable income is a trailing 4-quarter moving sum of quarterly nominal disposable income. Stockholm disposable income is available as annual data through 2016; figure 2.4 shows interpolated monthly data constructed with a cubic spline. Interest payments are the product of the mortgage rates and the housing price. All variables are indexed to 100 for June 2008.

Figure 2.4 shows Stockholm apartment prices and Stockholm and Swedish disposable income. We see that Stockholm disposable income has risen by about 60% at the end of 2016, substantially

[14] However, new construction in the luxury-housing segment of the market has apparently been hit by a substantial fall in demand and falling prices after the tightening of lending standards.

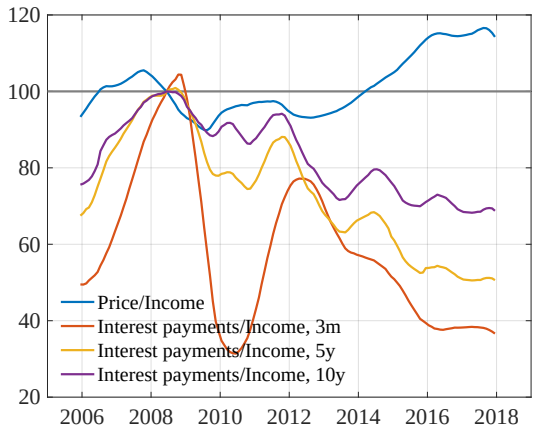
[15] Aggregate Swedish housing prices have been examined with different methods by, for example, Claussen (2013), Englund (2011), Sørensen (2013), and Turk (2015). Dermani, Lindé, and Walentin (2016) examine housing prices and user costs for Swedish municipalities.

[16] See figure B.1a for the actual mortgage rates.

[17] The reduction of the property tax was an election promise by the liberal-conservative government that won the election in 2006. The reduction and its low cap of the tax were announced by the government in april 2007 and effective from January 2008.

more than Swedish disposable income. Furthermore, instead of interest rates, the figure shows interest *payments* for Stockholm apartments. They are calculated as the product of mortgage rates and the prices of Stockholm apartments and correspond to interest payments for new mortgages at a constant LTV ratio, for instance 85%. They are also indexed to 100 for June 2008. Relative to Stockholm disposable incomes, mortgage rates have fallen substantially more than housing prices have risen. Therefore, interest payments have fallen substantially relative to disposable income. This is the case also when the interest payments are calculated for a 10-year mortgage rates, which if a term premium would be subtracted could be seen as the expectations of lenders of the average short mortgage rate over then next 10 years. Furthermore, with a 10-year fixation period, the interest payment will be locked in and constant for the next 10 years, whereas, if real growth and inflation would both be 2%, disposable income would rise by another 48%.[18]

Figure 2.5: Stockholm apartment price-to-income and interest-payments-to-income ratios.




Source and note: SBAB, Statistics Sweden, and Thomson Reuters Datastream. 3-month, 5-year, and 10-year mortgage rates. 12-month moving averages, index = 100 for June 2008, income is disposable income.

Figure 2.5 shows the corresponding Stockholm price-to-income (PTI) and interest-payments-to-income (IPTI) ratios. We see that prices have risen about 10% relative to disposable income, but interest payments has fallen by 30% or more.

Thus, given mortgage rates and disposable income, these simple figures hardly indicate that housing in Sweden and Stockholm is overvalued—at least relative to the valuation in 2008. An absolute valuation is presented in section 2.2.3.

### 2.2.1 Problems with PTI and DTI ratios

It is common to refer to the PTI ratio relative to its historical average as an indicator of a whether housing is over- or undervalued. But this involves the well-known but still very common mistake of comparing stocks to flows, the housing price being a stock variable and income being a flow variable. A more relevant comparison is stock to stock, as in LTV ratios, and flows to flows, as in

[18] Stockholm disposable income has grown at a higher rate than 4%.

debt-service-to-income ratios.

Given this, the IPTI ratio is a much more relevant measure of over- or undervaluation than the PTI ratio. The interest payment as calculated here, interest rate times price, can be seen as a simple capital-cost measure of housing or a simple debt-service measure of housing for constant LTV ratios. The PTI and IPTI ratios vary together only when mortgage rates are constant. But mortgage rates are normally not constant, and when they vary the IPTI ratio is the more relevant indicator. Furthermore, as discussed in section 2.2.2, the user-cost-to-income (UCTI) ratio is more relevant than the IPTI ratio.

It is sometimes argued that the PTI ratio is a relevant indicator of affordability of housing.[19] The idea seems to be that the price of a home should eventually be paid in full out of the owner's income. Then the PTI ratio would be roughly proportional to the number of years it takes to pay for the home out of income, and in this way the PTI ratio could be seen as some measure of affordability. However, that idea seems to be due to a misunderstanding. There is no economic reason why the price of the home always should be paid in full out of the owner's income.

In order to see this, note that normally the purchase of a household's home is financed by a down payment and a mortgage. *If* the mortgage is amortized and eventually paid down to zero out of the owner's income, the price of the house has in a sense been paid in full out of the owner's income.[20] But there is no economic reason why mortgages should always be paid down to zero out of the household's income. The principal of a mortgage should indeed eventually be paid back, but it need not be paid back out the household's income. The remaining principal of the mortgage can instead be paid back when the home is sold. Paying back the principal out of income is a form of saving. Paying back the principal from the sale of the home is an adjustment of the household's balance sheet without involving any saving. There is no economic reason why mortgagors should always be required to pay the principal out of income and thus to save in this particular form and amount.

However, the FI seems to think that mortgages should always be paid back out of the borrower's income. The chief economist of the FI has stated (Braconier, 2018, my translation and italics):

> I find it *natural to amortize on all loans*. It was the Anglo-Saxon-influenced world that stopped amortizing during about 15 years, from the middle of the 1990s until now. But in other countries, such as France, amortization is not strange at all. There the reasoning is that it in all times always has worked such that borrowed money shall be paid back.

But whether or not it is natural to repay a loan out of income depends on the nature of the loan. If the loan is an unsecured loan, in particular a loan for consumption, it seems natural that it is eventually repaid in full out of the borrower's income. But if the loan is a mortgage and thus

[19] European Commission (2018, p. 25; italics added) considers the PTI ratio "[a measure] of affordability ... of owner-occupied houses."

[20] To be precise, the price minus the down payment has been paid out of income. If the down payment is the result of previous saving, the whole price has been paid in full out of income.

has housing as collateral, there is no economic reason why the mortgage should always be repaid in full out of the borrower's income.[21]

In a life-cycle perspective, the assets and liabilities—and thus the net wealth— of an old individual at the end of her life depends on what net wealth she wishes to bequeath. There is no economic reason why an old individual that has chosen to live in owner-occupied housing should always bequeath a mortgage-free home (or why an old individual that wants to bequeath less should have to choose rental housing).

Similarly, there is no reason why a young household in owner-occupied housing with a mortgage should have to give priority to saving in the form of amortization of the mortgage. First, from a life-cycle perspective, a young household facing the typical hump-shaped income profile should generally not have to save too much. It is normally better off by doing most of the saving for old age in its middle age when its income is higher.

Second, saving in the form of amortization is saving in a very illiquid asset, housing, with the result that the savings are not easily accessible when needed. If the household has sufficient equity in its housing, the household is normally better off by instead building up a more balanced and diversified portfolio of liquid and illiquid, financial and real assets, including bank deposits, bonds, and stocks, as well as the equity it already owns in its housing. In particular, building up a liquidity buffer increases the resilience of the household to income shocks and helps in smoothing consumption. Interestingly, Piskorski and Tchistyi (2010) show, for a household with volatile and for the lender unobservable income in a setting with costly foreclosure and a stochastic market interest rate, that the optimal mortgage contract for both borrower and lender is an interest-only mortgage with a housing equity line of credit.[22]

Given this, the focus on DTI ratios by macroprudential authorities is somewhat difficult to understand. It may be that the DTI ratio is seen as a simple indicator of the capacity to repay the debt out of income. But, because mortgages can be repaid when the housing is sold, the DTI ratio is a misleading indicator of repayment capacity. Clearly the DSTI ratio, where the debt service includes interest payment and any amortization of the principal, is a much more informative indicator of repayment capacity. It can also be used for interest-rate stress tests of the repayment capacity.

The DTI ratio is further discussed in sections 3 and 4.

### 2.2.2 The user cost of housing

However, even more relevant than the interest payment is the user cost of housing. This is the imputed rent on owner-occupied housing. It consists of the sum of the operating and maintenance cost, the real after-tax mortgage payment, the cost of housing equity, and the negative of the expected after-tax real capital gain on housing. When a free market for rented housing is avail-

[21] Bäckman and Khorunzhina (2019) provide an insightful discussion of these and related issues.

[22] Cocco (2013) provides further discussion of alternative mortgage contracts. Bäckman and Khorunzhina (2019) provide a thorough discussion of the benefits and consequences of interest-only mortgages.

able, an equilibrium condition in the standard housing-price model is that the user cost should be approximately equal to the rent for a comparable rented housing.[23]

Without a market for rental housing, the equilibrium condition is less straight-forward. However, if households have approximately Cobb-Douglas utility functions, the equilibrium condition for a frictionless market for owner-occupied housing is that the total user cost (the user cost times the stock of housing) is a constant share of total consumption. If total consumption is a stable share of disposable income, then the total user cost would be approximately a constant share of disposable income. In addition, if the stock of housing due to supply restrictions—especially a fixed supply of land—is approximately constant, the user cost will be approximately proportional to disposable income.[24]

Figure 2.6: Stockholm apartment prices, user cost, and disposable income, total and per capita.

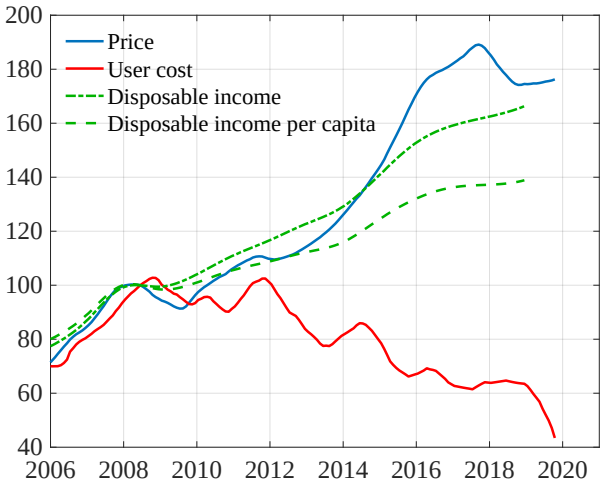
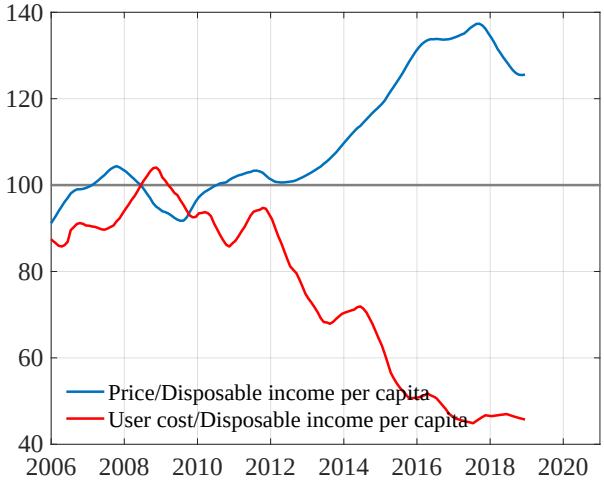



Figure 2.7: The Stockholm apartment price-to-income and user-cost-to-income ratios.




Source and note: SBAB (2021); Statistics Sweden (2019b); Valueguard (2021), Thomson Reuters Datastream, and own calculations in Svensson (2019a). The user cost is the sum of payments to the tenant-owner association and additional operating cost, real after-tax interest payments at an LTV ratio of 85%, and the cost of 15% equity for an average Stockholm studio at a 10-year mortgage rate and an expected inflation rate of 2%. The expected real after-tax capital gain is set to zero. Assumptions are summarized in table B.1. The price of the studio follows the Stockholm apartment-price index and is equal to that in the table for December 2017. Figures B.4 and B.4 show the user cost for December 2017. Income is Stockholm disposable income per capita. Index = 100 for June 2008.

Figure 2.6 shows the user cost for an average Stockholm studio, indexed to 100 for June 2008.[25] The user cost is calculated exclusive of any real after-tax capital gains. Figure 2.7 shows the corresponding PTI and user-cost-to-income (UCTI) ratios—where income is Stockholm disposable income per capita. We see that the UCTI ratio has fallen quite a lot relative to disposable income, providing a more specific indication of housing not being overvalued. Prices have not risen so much

[23] For details on the user-cost model of housing prices, see Poterba (1984), Englund (2011), and Sørensen (2013), for example.
[24] See Svensson (2019a) for details.
[25] See table B.1, figures B.4 and B.5, and Svensson (2019a) for details.

as to keep the user cost constant relative to disposable income.

### 2.2.3 Absolute vs. relative valuation: The user cost relative to net income is low

So far, the discussion has been of housing prices relative to those in June 2008, when the lower property tax, effective January 2008, can be assumed to have been incorporated in prices.[26] But the user-cost calculation in figures B.4 and B.5 can be used for a kind of absolute valuation. As an example, the current monthly user cost for an average studio in Stockholm is found to be about SEK 2,800 (EUR 280) (figures B.5 and B.5). The median monthly gross (before-tax) income for 25–29-year-old individuals with positive income in Stockholm in 2016 was SEK 23,350 (EUR 2,335), for which the monthly net (after-tax) income is about SEK 18,000 (EUR 1,800) (figure B.2).[27] This means that the user cost is about 16% of the net income. Such a low user cost for an average studio relative to the net income of a median young individual is hardly consistent with overvalued housing.

As a comparison, the average monthly rent in 2017 for a rent-controlled Stockholm studio was about SEK 5,300 (EUR 530) (Stockholm Housing Agency, 2018, and own calculations)—for which the median and average queuing time is about 11 years, see footnote 12. The average monthly market rent for a Stockholm studio on the secondary rental market is about SEK 10,000 (EUR 1,000) (Qasa, 2019).

## 2.3 Households' expectations of future housing prices

Some households might speculate in future capital gains on housing. An indication of such speculation would be that the user cost excluding capital gains would rise and be high relative to disposable income. But there is no evidence of any significant such speculation, because the user cost exclusive of capital gains has fallen substantially and is quite low relative to income.

Furthermore, there is no evidence that households' expectations of future housing prices are overoptimistic and excessive. Evidens (2018, 2019) report the result of a regular survey—similar to the survey reported by Case and Shiller (2003)—of Swedish households' housing-price expectations. In contrast to the very high expectations in the US reported in the Case and Shiller survey, households in November 2018 expected nominal housing prices in the major cities to rise over the next 5 years by about 5% per year. Such expectations are hardly excessive, given realistic expectations of the growth of disposable incomes. Given the increasing structural shortage in the housing market, they may even be on the low side.

## 2.4 Households' expectations of future mortgage rates

But what about households' expectations of future mortgage rates? Could households have overoptimistic expectations of future mortgage rates?

[26] See footnote 17.
[27] See Svensson (2019a) for details and examples of similar calculations.

Figure 2.8: Swedish households' expected future 3-month mortgage rates, expected average future 3-month mortgage rates with and without term premium, and SBAB lending rates for different fixation periods, December 2019.

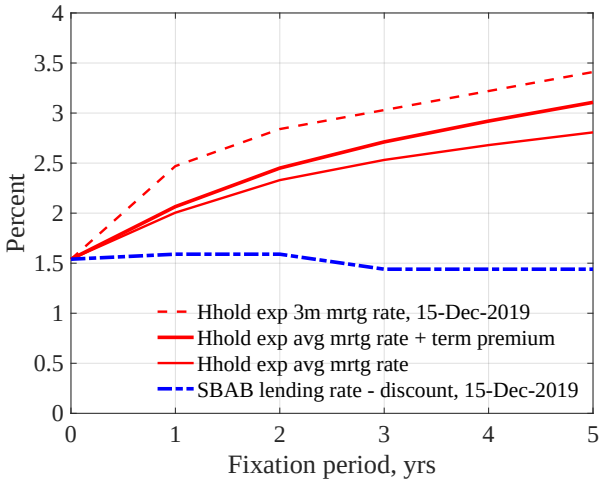
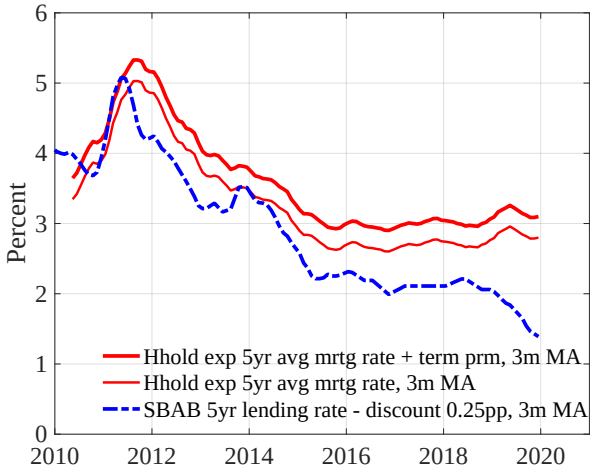



Figure 2.9: Swedish households' expected 5-year average of future 3-month mortgage rates, with and without term premium, and SBAB 5-year lending rate, 2010–2019, 3-month moving average.




Source and note: NIER (2019), SBAB (2021), Thomson Reuters Datastream, and own calculations. The term premium is assumed to be 0.5 basis points (bp) per month fixation period, so it is 30 bp for a 5-year fixation period. The discount on lending rates is assumed to be 10 bp for fixation periods 3 months and 1 and 2 years and 25 bp for fixation periods from from 3 to 5 years.

Figure 2.8 shows, for December 2019, Swedish households' expected future 3-month mortgage rates (dashed red), their expected *average* future 3-month mortgage rates (the households' implied "yield curve") with and without an added term premium (solid thick and thin red, respectively), and the SBAB lending rates for different fixation periods up to five years (the lender's "yield curve," dash-dotted blue). The households' implied yield curve corresponds to households' expectations of future 3-month rates; the lender's yield curve corresponds to the lender's expectations of future rates. We see that, in December 2019, households' expected substantially higher future mortgage rates than lenders. Because banks are likely to be better informed that households, this indicates that households do not have overoptimistic mortgage-rate expectations.

Figure 2.9 plots a time series of the households' expected 5-year average of future 3-month rates, with and without an added term premium, and of the SBAB 5-year mortgage rate. This indicates that since 2011 Swedish households have had substantially higher expectations of future mortgage rates than banks (perhaps with the exception of the winter 2013–2014).

Thus, there is no evidence that households would have overoptimistic expectations of low future mortgage rates, at least not compared to banks.[28]

[28] Previously, **?** and Österholm (2017)—by examining the time series and forecast errors, respectively, of the households' mortgage-rate expectations—have not found any evidence of Swedish households' mortgage-rate expectation being unrealistically low.

### 2.5 Summary: There is no evidence that housing prices are too high

In summary, during the last ten years, price-to-income ratios have risen, but interest-payments-to-income ratios have fallen much more. For Stockholm apartments, the PTI ratio have risen by about 13%, whereas the IPTI ratios has fallen by 30% or more. The more relevant user-cost-to-income ratio has fallen even further. For Stockholm apartments, the UCTI ratio has fallen by about 60%. Thus, prices have not risen so much as to keep IPTI and UCTI ratios stable. Furthermore, these interest payments and user costs are calculated with a 10-year mortgage rate, which after the deduction of a term premium can be seen as banks' expectations of average short mortgage rates during the next 10 years. In addition, the user costs are calculated under the assumption of a zero real after-tax capital gain. That they nevertheless have fallen substantially indicates that households are not speculating in future capital gains. There is thus no evidence that current housing prices are too high relative to what is consistent with their fundamental determinants and what they were in June 2008.

However, comparing with housing prices ten years earlier is a relative valuation. One can also make a more absolute valuation. As noted above, as an example, the user cost of an average Stockholm studio is only about 16% of the median net income of 25–29-year-old individuals in Stockholm. Also, the user cost is substantially lower than the average rent on rent-controlled rental housing and much lower than the market rents in the second-hand rental market. This indicates that housing prices are not too high in an absolute sense.

Finally, there is no indication that households have overoptimistic expectations of low future mortgage rates. Households expectations of future mortgage rates are substantially higher than banks' expectations. Neither is there any indication that households have overoptimistic expectations of future housing prices.

Altogether, there is no evidence that housing prices are too high and that housing is overvalued relative to levels justified by fundamental determinants.

## 3 Is Swedish household debt too high?

Is Swedish household debt too high? Is household debt excessive relative to fundamentals? How does household debt compare to household assets? Does household debt pose a threat to financial stability? These are the questions discussed in this section.

### 3.1 Household assets and debt

When housing prices increase faster than disposable income, it is not strange that also household debt increases faster than income. Because only a fraction of the housing stock is turned over during each year, after a rise in housing prices the stock of debt will be rising for many years. This is easy to show in the simple model of Svensson (2013a) and is shown in some detail in Emanuelsson, Katinic, and Spector (2018).

Furthermore, household debt should be compared to household assets. Figure 3.1 shows that household debt had increased to about 1.8 times disposable income in 2016. Households' real and financial assets had also increased. Real assets (owner-occupied housing and second homes) had increased to about 3.8 times disposable income, financial assets to about 2.9 times disposable income, and total assets (excluding households' claims on collective pensions and insurance) to about 6.7 times disposable income.

Figure 3.1: Swedish household assets and debt, ratios to disposable income.

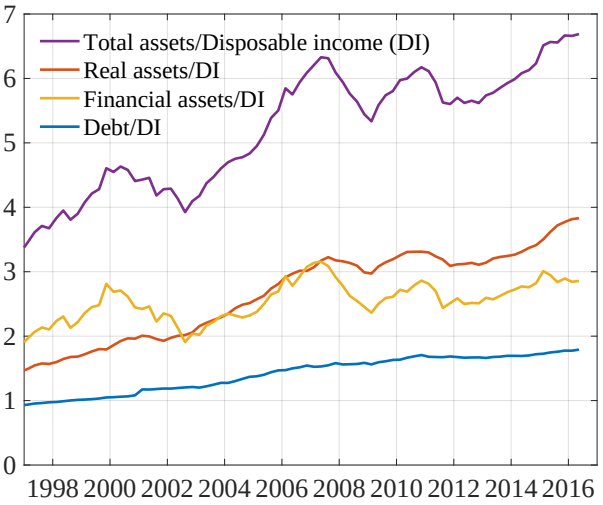
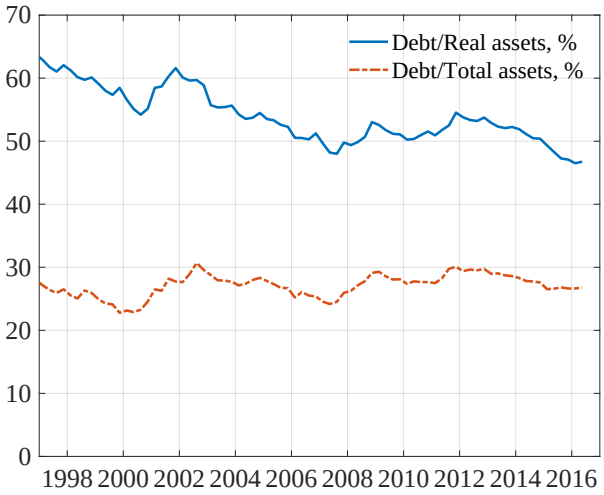



Figure 3.2: Swedish household debt to real assets and total assets.




Source and note: Sveriges Riksbank (2016, appendix, fig. A27). Total assets exclude collective pensions and insurance (amounting to 1.5–1.7 times disposable income). Real assets refer to single-family houses, tenant-owned apartments, and second homes. Financial assets refer mainly to cash, bank deposits, bonds, mutual funds and shares.

Figure 3.2 shows household debt-to-real-assets and debt-to-total-assets ratios, which are appropriate stock-to-stock comparisons. We see that the debt-to-real-assets ratio, a measure of the housing leverage, shows a downward trend in the last 20 years toward less than 50%, whereas the debt-to-total assets ratio is approximately flat below 30%.

Furthermore, we see that household assets have grown faster than income and that household debt has grown with household assets rather than with income. This means that household debt has grown faster than income. Figure 3.3 shows the growth rate of the DTI ratio in a longer perspective. As noted by Boije (2018), since 1950 household debt has grown on average almost 2% faster than income. In particular, this is not due to debt having grown particularly fast the last few years. Since 2010 the growth rate of the DIT ratio has been close to its historical average. In a longer perspective, it is normal that debt grows faster than income.[29]

The FI seems to think that it is a cause for concern if household debt should grow faster than incomes—as for example suggested by the quote from the director general of the FI at the top of

[29] As noted by Brunnermeier et al. (2019), in the long run credit aggregates tend to expand with GDP, and indeed expand faster than GDP, so that the ratio of GDP is larger in rich countries and tends to grow over time. In studies of economic development, the ratio of credit to GDP is sometimes used as a measure of "financial depth," which is thought to contribute positively to economic growth. A summary of the related literature is available in World Bank (2012, p. 23–25).

Figure 3.3: Swedish household debt, annual growth rate of ratio to disposable income.

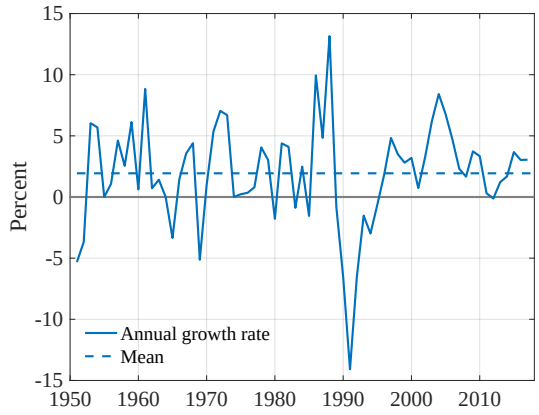
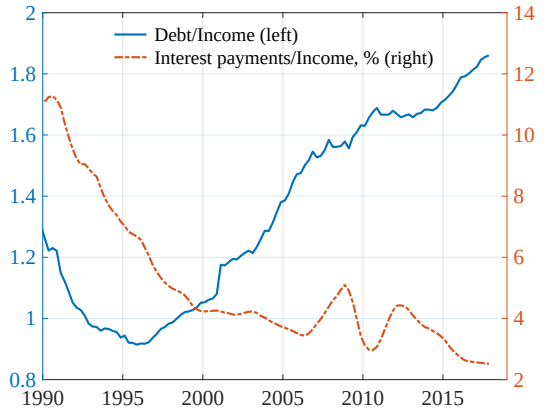



Figure 3.4: Swedish household debt, ratio to disposable income (left), and interest payments, percentage of disposable income (right).




Source and note: Figure 3.3; Macrobond and Statistics Sweden. Figure 3.4; Sveriges Riksbank (2018, charts 2.1 and 2.6). Interest payments are after tax relief.

page 1. But it is an error of thinking that debt should grow just at the same rate as incomes. It makes much more sense that debt grows with assets. If assets grow faster than income, it is reasonable that debt also grows that faster than income. This means that leverage—debt to assets, and total assets to capital—can be roughly constant.[30] If debt would grow faster than assets, there would be cause for concern, because capital buffers relative to total assets would be shrinking. But as seen in figure 3.2, debt to housing has been following a downward trend for the last 20 years.[31]

The view that the DTI ratio should be constant may follow from the view that debt should be fully repaid out of income. But, as noted above in section 2.2.1, this may be reasonable for unsecured debt for consumption, but not for secured debt that finances investment and housing. Consider housing financed by mortgages. It makes more sense that the mortgage is repaid in full only when the housing is sold. From both an individual perspective and macroeconomic-stability perspective, it is appropriate that households have a balanced portfolio of illiquid real assets, such as housing, and liquid financial assets, where the latter can serve as a buffer when needed. A too high saving into an illiquid asset through amortization is hardly optimal, neither for the individual nor society. As long as the housing is not sold, a not too high constant or a slowly decreasing LTV ratio is more reasonable than an LTV ratio that rapidly goes to zero.

In fact, with 2% real growth and 2% inflation, disposable income will grow by some 4% per year. Given supply restrictions on housing, housing prices may also grow by 4%, if not more. This means that a given interest-only loan is automatically amortized by about 4% per year relative to

[30] I believe it is unfortunate and causes confusion that that DTI ratio is often referred to as "leverage" and prefer that the term leverage is used in its original accounting meaning of the LTV or debt-to-total-assets ratio.

[31] More precisely, in a situation where the debt-to-total-assets ratio is stable and 25–30% (as in figure 3.2) and the stock of total assets grows faster than income (as in figure 3.1), the debt-to-income ratio will be increasing. Furthermore, if the rate of return on assets and the rate of interest on debt are constant and equal, gross capital income and interest payments will both grow faster than income capital. Furthermore, net capital income will be positive and also grow faster than income.

disposable incomes and housing prices. This mean that DTI and LTV ratios will fall by a half in 18 years. There is no reason why any optimal rate of amortization would be faster than that.

Furthermore, the debt-to-income ratio is a stock compared to a flow and thus a misleading indicator of interest payments to income unless interest rates are constant. If interest rates vary, the debt-service-to-income ratio is a more relevant indicator. The solid blue line in figure 3.4 shows the debt-to-income ratio from figure 3.1 in a larger scale. The dashed-dotted read line shows the Swedish households' interest payment as a percentage of disposable income. Even though the debt-to-income in figures 3.1 and 3.4 has increased, interest rates have fallen more, and the interest-to-income ratio in figure 3.4 is at a historical low.

We can note that the visual impression of the increase in the debt-to-income ratio in the larger-scale figure 3.4 is more alarming than when the debt-to-income ratio is compared with the assets-to-income ratios in the smaller-scale figure 3.1. Swedish authorities tend to show the time series of the debt-to-income ratio much more often than the time series of the assets-to-income ratio. The time series of the debt-to-asset ratios in figure 3.2 are rarely shown.

### 3.2 Some institutional characteristics

To this can be added some institutional characteristics of the Swedish housing and mortgage market. The lack of a functioning rental market in the major cities has already been mentioned. Furthermore, there is no speculative buy-to-let in Sweden, because there is no buy-to-let to speak of, only buy-to-live. A major reason is that tenant-owner associations severely restrict any subletting.[32] Neither is there any subletting of single-family houses to speak of. Thus, the main purpose of owning housing is to live, not to invest, even though housing is the largest and most important investment for most households.

Furthermore, mortgages in Sweden are full recourse. Thus, the true collateral of mortgages is really the debt-service capacity of the mortgagors. Put differently, the true collateral is the value of the housing plus the human capital, the present value of future earnings of the mortgagors.[33] That mortgages are full recourse reduces the risk of credit losses on mortgages for lenders. Indeed, during the severe financial crisis in the 1990s in Sweden, of the loan losses in the four major bank groups at the height of the bank crisis in 1992, only 6% came from the household sector (Sveriges Riksbank, 1998, pp. 15–16).

As a matter of fact, the FI has concluded that the financial-stability risks associated with household debt are small.

[32] The term tenant-owned apartment ("bostadsrätt" in Swedish) refers to a cooperative property ownership structure for an apartment building, where each resident is a member of the tenant-owner association and owns a share in the overall building together with a legal right to occupy a specific housing unit. This is the most common owner-occupancy model for apartments in Sweden. The tenant-ownership can be sold, but the buyer has to be approved by the tenant-owner association.

[33] A young household may work for 30 years with a rising earnings profile. With 4% nominal income growth and a relatively high nominal after-tax interest rate of 5%, the present value of 30 years of income is about 26 times current income. Even after subtraction of basic living costs, the human capital is many times the current income.

### 3.3 "The financial-stability risks associated with household debt are small"

First, we may note that the FI has taken a series of actions to strengthen the resilience of the financial system. It introduced an LTV limit of 85% for mortgages in October 2010. It raised the risk-weight floor for mortgages first in May 2013 to 15% and then in September 2014 to 25%, which is quite high given historical credit losses and the fact that mortgages are full recourse. It introduced the Basel III LCR regulation in January 2014. It introduced a Basel Pillar 2 add-on of 2% in September 2014 and a systemic buffer of 3% in January 2015 for the four largest banks. The Countercyclical Buffer was activated at level 1% in September 2015, raised to 1,5% in June 2016 and 2% in March 2017, and will be further raised to 2.5% in September 2019. The capital requirements in 2017 for the four largest and systemically important banks stood at 24% of risk-weighted assets. Their actual capital was 28% of risk-weighted assets (22% of risk-weighted assets for common equity tier 1 capital). Swedish banks are among the best capitalized in Europe and are very resilient in severe stress tests (FI, 2018c, diagrams 20 and 22).[34]

Second, regarding households and household debt, the FI introduced a special annual mortgage market report in February 2010. The report uses microdata on new borrowers collected from the banks and provides an extensive and detailed report of the volume and distribution of household debt. In particular, it reports the results of stress tests of the households, to asses the households' debt-servicing capacity and resilience to different shocks. This way, the FI is able to thoroughly monitor the development of households' debt-service capacity and resilience. 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 increases. Since then, the debt-service capacity and resilience to disturbances have improved steadily even further (FI, 2018d). Furthermore, the average LTV in 2017 was only 63% for new mortgages and only 55% for the total stock of mortgages. That is, the average housing equity for new borrowers is a substantial 37% of the value of the housing and very few new borrowers have less equity than the 15% consistent with the FI's (recommended) LTV limit of 85%.

Indeed, the FI has summarized the situation as follows (FI, 2017d, p. 9; italics added):

> *Finansinspektionen's current assessment is that the risks to financial stability associated with household debt are relatively small.* This is because mortgagors generally have good potential to continue paying the interest and amortisation on their loans, even if interest rates rise or their incomes fall. On average, households have comfortable margins with which to cope with a fall in house prices. Swedish mortgage firms are also deemed to have satisfactory capital buffers should credit losses still arise.

The FI's judgment is consistent with its heatmap of vulnerability indicators for the household sector, shown in figure 3.5. The considerable resilience of new borrowers is further illustrated in figure 3.6 (FI, 2016b, diagram 24): Consider a stress test in which housing prices fall by a full 40%.

[34] The Riksbank has sometimes accused the FI of having an "inaction bias," but there is clearly no ground for such an accusation.

Also, whereas new mortgagors can be assumed to be employed at the origination of their loans, assume that a full 10% of them thereafter become unemployed because of negative shocks to the economy. Because new mortgagors on average have better-than-average-education and safer-than-average jobs, for 10% of them to become unemployed, the unemployment in the economy has to increase by more than 10 percentage points. So the shocks to housing prices and to unemployment are quite large.[35]

The question then is, after these negative shocks, what share of the new mortgagors fail the stress test in the sense of suffering from the classical "double trigger" of distress: having negative housing equity and a cash-flow problem such that their reduced income when unemployed no longer cover their fixed housing payments and standardized living costs. According to figure 3.6, the answer is, only 2.5%. That so surprisingly few of the new mortgagors fail a stress test with such large negative shocks is strong evidence of their substantial resilience. Furthermore, this stress test refers to data from 2015, before the amortization requirements were introduced.

Figure 3.5: Vulnerability indicators for the household sector.

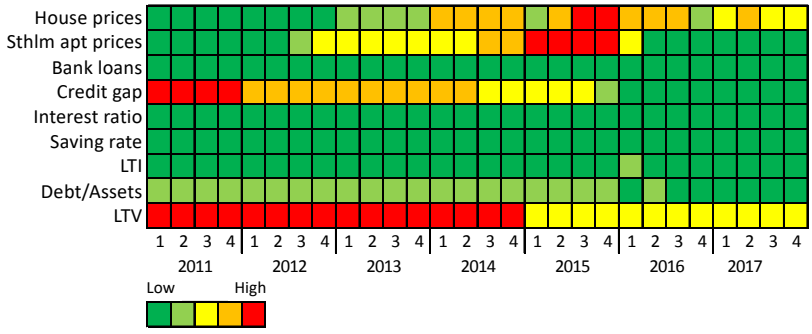
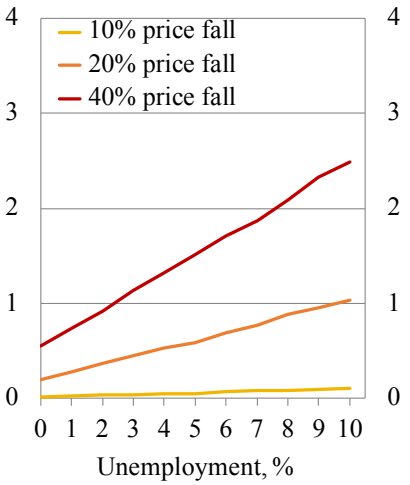



Figure 3.6: High unemployment and fall in housing prices: % of new mortgagors with negative equity and a cash-flow problem.




Source and note: Figure 3.5, FI (2018a, diagram 3; my translation from Swedish diagram 3); figure 3.6, FI (2016b, diagram 24; data corrected by the FI: the first 2016 Report by mistake showed diagram 24 from the 2015 Report). Figure 3.6 shows the share of new mortgagors with both negative housing equity and a cash-flow problem—such that their reduced income when unemployed no longer cover their housing payments and standardized living costs—as a function the fall in housing prices and their unemployment rate. (They are assumed to be employed at the origination of their mortgage.)

[35] During the 2008–2009 crisis, Swedish housing prices fell by 13% from a peak in May 2008 to a trough in December 2008 (figures 1.1 and B.1b). The seasonally adjusted unemployment rate rose by 3.5 percentage point from a trough of 5.6% in May 2008 to a peak of 9.1% in January 2010 (figure B.1c).

### 3.4 Summary: There is no evidence that household debt is too high

In summary, there is no indication that Swedish household debt is too high, given housing prices and the value of household assets. The household debt-to-assets ratio is stable, and the debt-to-housing ratio displays a downward trend. Nor is there any indication of household debt posing a threat to financial stability. With an LTV limit of 85%, an average LTV ratio of 63% for new borrowers, and an average LTV of 55% for the total stock of mortgages, households have on average ample housing equity. Furthermore, households have good and over time increasing debt-service capacity and resilience to disturbances in the form of housing price falls, interest-rate rises, and income losses. Thus, the risk of credit losses on mortgages is very small. Should they nevertheless materialize, banks have satisfactory capital buffers.

## 4 Does Swedish household debt pose an "elevated macroeconomic risk"?

In order to reduce the growth and level of household debt, the FI has implemented tighter lending standards by introducing mandatory amortization requirements. As noted in section 1.1, this substantially increases borrowers' debt service and increases the minimum income required to pass the interest-rate stress tests in bank's affordability assessments. There are also increasing indications that the FI has encouraged banks to tighten lending standards in other ways, such as using a higher interest rate in discretionary-income calculations and applying new—or lower existing—debt-to-income limits.[36] By tightening lending standards in this way, the FI has effectively and substantially reduced the supply of credit to households and individuals with low to moderate incomes and wealth, a group that includes those that need credit the most, in particular, many young households and individuals. In line with this, European Commission (2018, p. 30) reports that Swedish "[d]emand-side policy action in the housing market has been focused on curbing mortgage lending via macroprudential measures." It also notes "increasing difficulties faced by lower-income households to obtain a mortgage at all" (p. 31).

As discussed in section 2.1, it is pretty clear that the housing problem in Sweden is structural, namely a structurally growing demand and insufficient supply. It is difficult to see that the right policy then is to reduce the supply of credit to households by tightening lending standards, especially because any resulting housing-price fall then reduces the supply of new housing—as noted at the end of section 1.1—and makes the structural problem worse. The policy might be justified if the FI could show that the growth and level of household debt is "excessive" or "bad" due to a market failure, loose lending standards, and a threat to financial stability, or even the result of exuberance and overoptimism. But the FI has not provided any convincing case for this. As noted above, in the quote on page 22, Finansinspektionen even judges that the financial-stability risks to financial

[36] For example, at the press conference presenting the mortgage market report 2018, it was clear that the Director General of the FI welcomed the tighter lending standards of the banks (FI, 2018b).

stability associated with household debt are relatively small.

Instead, the FI has justified its policy by arguing that high and rising DTI ratios among many mortgagors pose an "elevated macroeconomic risk."

### 4.1 Finansinspektionen's argument for an elevated macroeconomic risk

After concluding in the quote on page 22 that the financial-stability risks associated with household debt are relatively small, the FI continues (FI, 2017d, p. 9; numbers and italics added):

> The risks currently associated with household debt thus primarily relate to the fact that highly indebted households may end up reducing their consumption if (1) interest rates rise, if (2) household income falls or if both of these happen at the same time, and that this, in turn, may intensify a future economic downturn.
> ...
> Despite the risks to financial stability being assessed as low at present, *the trend of high and rising loan-to-income ratios among many borrowers thus means that there is an elevated macroeconomic risk.*

Thus, the two arguments for an elevated macroeconomic risk are that highly indebted households' consumption would be more sensitive to (1) interest-rate rises and (2) income falls. Let me discuss these in order.[37]

### 4.2 The interest sensitivity of consumption: The cash-flow channel

The first argument, that highly indebted households may reduce their consumption substantially if interest rates rise, is plausible, because the households' cash-flows would be directly affected. But the FI here disregards that interest rates are not exogenous but endogenous. In particular, with flexible exchange rates and inflation targeting, recessions are associated with *lower* interest rates, not higher ones.[38] Households with high DTI ratios and variable mortgage rates then benefit *more* from interest-rate falls (their cash flows improve more) and their consumption would fall *less* in a recession that it would for households with lower DTI ratios. High debt and variable interest rates actually provide some general insurance against recessions for households; they work as an automatic stabilizer. However, the benefits of this insurance obviously do not extend to renters.

Indeed, household debt and variable interest rates create a *cash-flow channel* for the transmission of monetary policy (Flodén et al., 2021; Hughson et al., 2016; Gustafsson et al., 2017; Cumming, 2018). With a strong cash-flow channel, it is easier for the Riksbank to stabilize consumption, aggregate demand, and the business cycle; it can be done with smaller policy-rate movements. The risk of a recession would seem to fall rather than rise. Obviously, as long as the Riksbank conducts

[37] A more general criticism of the FI's arguments, including the risk of a return to something similar to the previous era of over-regulated financial markets, were provided in the Englund and Svensson (2017) consultation response to the FI. An early and preliminary version of the criticism was presented in Svensson (2014), at that time directed against similar arguments put forward by the Riksbank.

[38] It was different in the 1990s crisis and deep recession, when Sweden had a fixed exchange rate and the Riksbank was using very high interest rates to defend the krona against speculative attacks.

flexible inflation targeting, meaning stabilizing both inflation around the inflation target and employment around its maximum long-run sustainable level, it will be stabilizing aggregate demand and not allow consumption to fall dramatically. If required, it will set the lowest possible policy rate, including a negative one, to stimulate consumption.

Currently, the variable mortgage rate is very low, about 1.5% (figure B.1a), and households' interest payments to disposable income are at a historical low, about 2.5% (figure 3.4). Therefore, it is difficult to see that size of current interest payments could be a problem for households. Even so, the current policy rate of −0.5% is not the effective lower bound of the policy rate. If needed, the policy rate can certainly be lowered to −1.0%, probably to −1.5%. The effective lower bound is lower in Sweden than in other economies. The use of cash is very low and falling, and Swedish banks' funding consists to about a half by market funding, primarily in the form of securities issues. This means that banks' funding become cheaper when interest rates become lower and banks' profits can be maintained at lower interest rates.

Both the Danish (Rangvid, 2013, pp. 127–128) and the Norwegian financial-crisis commissions noted that high debt and mortgages with variable rates implied that low policy rates stimulated household spending more during the financial crisis 2008–2009. For example, the Norwegian crisis commission said (Norwegian Financial Crisis Commission, 2011, p. 13; my translation from Norwegian):

> Norwegian households have high debt relative to income compared with households in other countries. This is for one thing because most households own their housing. Furthermore, Norwegian households have mainly mortgages with variable mortgage rates. High debt and extended use of variable rates imply that interest-rate cuts have quicker and larger effects on households' [cash flow], and thereby also on their demand, than in other countries. The demand effects of the expansionary monetary policy was therefore likely larger in Norway than in many other countries.

Similarly, regarding the cash-flow channel in the UK, Muellbauer (2012, p. 99) noted:

> [I]n the United Kingdom the rise in interest rates in 1988–1991 was a powerful crisis trigger, but the ability of the Bank of England to cut rates rapidly in 2008–2009 and the large impact of these cuts on cash flows of indebted households, greatly softened the impact of the recent financial crisis. In this respect, monetary policy in the United Kingdom in 2008–2009 was more powerful than in the United States.

### 4.2.1 The margin between mortgage rates and the policy rate

The above follows if the margin between mortgage rates and the policy rate is relatively stable. However, the margin between mortgage rates and the policy rate might increase if banks' would have difficulties financing their mortgages. (This may be what the FI has in mind when it says in the quote above on page 25 that both income falls and interest rises could "occur simultaneously.") Some of the Swedish mortgages are financed by banks' issuing mortgage-backed bonds in both SEK and foreign currency. The foreign currency borrowing is then swapped to SEK to finance the

mortgages nominated in SEK. Foreign investors hold about a third of the mortgage-backed bonds, in both SEK and foreign currency (Sandström et al., 2013). If foreign investors would doubt the debt-service capacity of Swedish mortgagors, financing costs for the banks might increase and the spread between mortgage rates and the policy rate might go up.

However, because—thanks to the FI's macroprudential policy—the debt-service capacity of the mortgagors is so good (FI, 2018d) and the banks' capital buffers are satisfactory (FI, 2017c), this would clearly be a *liquidity* problem for the banks, not a *solvency* problem. The same would be the case if there were problems in the swap market making swaps from foreign currency to SEK difficult. Then this is a textbook case when liquidity support, "lending of last resort" against banks' mortgage-backed bonds as collateral, is the appropriate policy. It can be provided by the Riksbank or by the National Debt Office, and both did so during the 2008–2009 crisis.[39] Alternatively, a temporary bank guarantee would resolve the issue, before an information campaign directed toward apparently ill-informed international investors about the Swedish housing market, the quality of the mortgages, the debt-service capacity of the mortgagors, and the solvency of the banks would restore investor confidence. Furthermore, if he Riksbank or the NDO would buy underpriced mortgage-backed bonds, this would be an excellent deal for the taxpayers.

Indeed, during the 2008-2009 crisis, the margin between a 3-month mortgage rate and the policy rate rose rather moderately, from a minimum of about 0.9 percentage points to about 1.5 percentage points at the end of 2009 (figure B.1a). Now, with a negative policy rate, the margin has increased somewhat further, most likely because the banks are compensating themselves for not being able to charge negative retail deposit rates. But banks finance their lending by only about a half by retail deposits and instead to a large extent by wholesale borrowing. Banks thus benefit from low borrowing rates. Furthermore, the Swedish financial market is dominated by four major banks in a cozy oligopoly and these banks normally make sizable profits both in booms and recessions. Overall, as shown in Erikson and Vestin (2019), the pass-through of the fall of the policy rate into negative numbers have been more or less one-to-one into the relevant lending rates to households and non-financial companies.

### 4.3 The income sensitivity of consumption

The FI extends a bit on the argument about the income sensitivity of consumption in the part left out in the quote above on page 25, marked with an ellipsis. This part says (FI, 2017d, p. 8–9, incl. footnote 6; italics added):

> *A study from the United Kingdom* [Bunn and Rostom (2014)] *indicates that it is primarily highly indebted households that reduce their consumption in a crisis.* British households with mortgages that were more than double their gross income reduced their consumption by 17 per cent between 2007 and 2012, while households with lower

[39] Counter to conventional wisdom, central banks do not have a monopoly on lending of last resort. The Ministry of Finance or the National Debt Office (NDO) can also provide liquidity support at short notice. For instance, during the 2008–2009 crisis, the Swedish NDO provided immediate liquidity support to Swedish banks, by first issuing treasury bills to get cash and then lending the cash to the banks with their mortgage-backed bonds as collateral (Swedish NDO, 2008). Essentially, the NDO lent treasury bills to banks with bank's mortgage-backed bonds as collateral.

debts reduced their consumption by 11 per cent over the same period. High levels of household debt are deemed to have intensified the drop in consumption by two percentage points in the United Kingdom over this period. *Large and rising levels of debt is also deemed to have exacerbated the economic downturn during the financial crisis in countries such as the United States and Denmark.*[6]

6. E.g. Baker, S.R., "Debt and the Consumption Response to Household Income Shocks", working document, 2014, (issued by *Journal of Political Economy*) and Andersen, A.L., Duus, C., and Jensen, T.L., "Household Debt and Spending During the Financial Crisis: Evidence from Danish Microdata", *European Economic Review* 89, pp. 96–115, 2016.

It seems clear from this quote and the quote above on page 25 that the FI's view is that a higher *level* of household indebtedness (measured as the DTI ratio) causes a larger fall of household consumption in a crisis. More precisely, the view seems to be that there is a causal positive effect of the level of household indebtedness on the income-sensitivity of consumption, and that an increased income-sensitivity of highly indebted households' consumption leads to a larger consumption fall when these households' incomes fall in a crisis. Given this presumed causal relation between higher household debt and a larger consumption fall in a crisis, high household indebtedness poses an elevated macroeconomic risk. Policy actions that reduce household indebtedness would then reduce the macroeconomic risk.

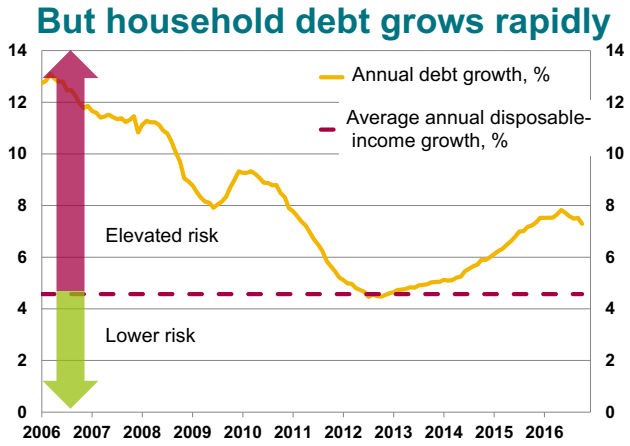
That the FI considers that there is a causal relation between household indebtedness is also evident in a slide shown at the press conference FI (2016a) for the November 2016 financial-stability report, reproduced as figure 4.1. However, this figure is somewhat open to interpretation. It shows the growth rate of household debt and the average growth rate of (disposable) income. First, the gap between the growth rate of household debt and the *average* growth rate of income is not exactly the same as the growth rate of the DTI ratio. Let me disregard this discrepancy and just consider the figure as showing the growth rate of the DTI ratio. Second, it is not quite clear whether a positive (negative) growth rate of the DTI ratio implies a higher (lower) *level* of risk or a positive (negative) *change* in the risk. It must be the latter, for a higher level of the DTI ratio to imply a higher level of the risk. Let me assume that it is the latter that the FI means, but keep the possibility in mind that the FI might mean the former.

Thus, according to the FI, the diagnosis—the problem—is high household indebtedness, because it is supposed to cause a larger consumption fall in a crisis. The proposed treatment—the solution—is amortization requirements and other tightening of lending standards, which are supposed to reduce household indebtedness.[40]

Furthermore, it is clear from the quote above and its footnote that the FI refers to Bunn and Rostom (2014) (BR14), Andersen, Duus, and Jensen (2016) (ADJ), and Baker (2018) (Baker) *for support* of its view. But the strange and remarkable thing is that all three of the studies, ADJ, which uses Danish micro data, BR14 (and the more extensive working-paper version Bunn and

[40] First, note that amortization requirements need not reduce borrowing, unless borrowers face credit constraints. Without credit constraints, the optimal borrowing policy is to borrow more, at the origination of the loan or through refinancing, and use the excess borrowing to finance the amortization requirements (Hull, 2017; Svensson, 2016). Second, the FI has also justified the amortization requirements by suggesting, somewhat contradictory, that they increase households' resilience. This suggestion is examined in Svensson (2019a).

Figure 4.1: "But household debt grows rapidly": Household debt growth, average income growth, and macroeconomic risk




Source and note: FI (2016a, my translation).

Rostom (2015), BR15), which uses UK microdata, and Baker, which uses US microdata, *explicitly contradict* the FI's view.

Thus, ADJ (p. 98; italics added) state:

> [O]ur results *do not support* any interpretation of the data that involves a negative *causal* effect of a high debt level on subsequent consumption growth.

Furthermore BR14, carefully note (p. 314):

> It is difficult to prove that those more highly indebted households who made large cuts in spending after 2007 did so specifically because of their debts.

BR15 more explicitly state (p. 7; italics added):

> [We] take care *not to interpret* the observed relationships [between the level of household indebtedness and subsequent spending adjustment] as being proved to be causal.

Finally, Baker (p. 1549; italics added) states:

> [D]ebt has *little or no independent relationship* with the [income] elasticity of spending when controlling for liquidity and the ability of households to access credit.

Thus, ADJ directly contradict the view that higher household debt *causes* larger consumption falls in a crisis, BR (meaning BR14 and BR15) actually do not claim causality, and Baker directly contradicts the view that household debt causes higher income-sensitivity of consumption. Furthermore, as we shall see, a close reading of BR reveals that their results are fully consistent with those of ADJ. Thus, *neither ADJ, BR, nor Baker provides any support for the FI's view.*

So what is going on? How can the FI apparently misunderstand these studies? The issue is the both crucial and elementary distinction between correlation and causality. ADJ, BR, Baker, and several other papers—for example, Mian and Sufi (2010), Mian et al. (2013), and Dynan (2012)—have found a *correlation* between pre-crisis household debt and consumption responses during the

financial crisis. But the crucial issue is whether higher household debt *causes* larger consumption responses.

A correlation does not imply causality. High debt and large consumption responses may both be caused by an underlying common factor that has increased both the debt and the consumption response. It follows that just observing high debt is not enough to conclude that the consumption response has increased, because the high debt might have been caused by some other factor that does not simultaneously increase the consumption response. Thus, the underlying factor or factors have to be identified in order to correctly assess whether or not the consumption response has increased and, by extension, whether or not any policy action is warranted.

Put differently, the possible mechanism through which the mortgage and housing markets might affect household consumption needs to be identified and confirmed for the correlation between household indebtedness and subsequent consumption responses to be correctly understood and explained.

### 4.3.1 The housing collateral channel

A possible mechanism, discussed by Duca et al. (2010) and Muellbauer (2012), through which housing prices and household debt may affect consumption is the so-called *housing collateral channel*—called "the credit-driven household demand channel" by Mian and Sufi (2018).[41] More precisely, housing provides collateral against which home owners can borrow. Rising housing prices then provide increased collateral. If existing homeowners use the increased collateral to increase their mortgages and, crucially, use the increased debt to finance additional consumption, overconsumption, there is a housing collateral channel operating through which housing prices and housing wealth affect consumption. In particular, rising housing prices and steadily increasing mortgages used to finance consumption allow households to steadily maintain the overconsumption—and undersaving—relative to their disposable income.

Such a process can come to an end for at least two reasons. First, if housing prices stop rising, the value of the collateral stops rising, and then mortgages can no longer be increased in the same way and used to finance overconsumption. Second, if lending standards are tightened, mortgagors may not be able to continue to increase their mortgages and finance the overconsumption.

The housing collateral channel can create a correlation between household indebtedness and subsequent consumption falls. If households are hit by negative shocks, households with debt-financed overconsumption will reduce their consumption more than households without such overconsumption. Furthermore, the households who have increased their debt to finance overconsumption will end up being highly indebted. This will create a correlation between indebtedness and subsequent consumption falls. The underlying common factor causing the correlation is the households' decision to increase their consumption and finance the increase through HEW.

[41] See also Bäckman and Khorunzhina (2019) on the relation between housing prices, mortgages, and consumption and the role of interest-only loans.

Importantly, as emphasized by Muellbauer (2012, p. 77; italics added), whether the housing collateral channel is operative or not varies across countries:

> This [collateral] channel played a central role in the US crisis. Indeed, in the Great Recession, the saving rate rose by 4 percentage points, as consumption fell by 4 per cent more than income, in sharp contrast to a rather flatter saving rate in prior US recessions. Consumption also plays a key role in upswings of the business cycle, where negative feedbacks become positive feedbacks. As suggested by the contrast between Spain and France discussed below, *recognising differences between countries in whether this channel is operative can substantially improve our understanding of whether a housing price boom is likely to be followed by an economic and financial crisis.*
>
> Countries where this channel is absent almost certainly include Germany, Italy, France, Japan and China [as is discussed in Duca, Muellbauer, and Murphy (2010)].

Furthermore, the housing collateral channel is relevant for the debate about the housing-wealth effect on consumption Muellbauer (2012, p. 91; italics added):

> There has been much disagreement among economists on whether variations in housing wealth matter for consumption. ... In a number of papers I have explained that classical theory, in which credit constraints and buffer stock saving play no role, suggests that there could be a small positive housing wealth effect on non-housing consumption but that the housing wealth effect was likely to be negative on the standard national accounts' concept of consumption, which includes imputed rent from housing. [A footnote mentions that this argument is easiest to follow in Aron et al. (2012); their elegant explanation is worth reading (pp. 401–402).]
>
> Moving beyond classical theory to take credit constraints into account, the conclusions are quite different: a liberal credit market tends to result in a positive effect of housing prices on consumption because collateral constraints on owners are relaxed and there is less need for the young to save for a housing deposit even at higher prices. However, in the long run, the accumulation of higher debt will eventually reduce consumption. With an illiberal credit market, the collateral effect is weak, while the need of the young to save for a housing deposit increases with higher housing prices. In the latter case, higher housing prices reduce consumer spending, as seems to have been the case in Italy and Japan. *Institutional differences between countries therefore matter greatly*, and so does properly controlling for changing credit conditions in econometric work.

Given this background about the possible collateral effect, let me discuss the studies and results of ADJ, BR, and Baker in turn. Let me start with ADJ.

#### 4.3.2 Andersen, Duus, and Jensen (2016)

The ADJ results are central for the argument here, but they are somewhat intriguing. Therefore, I will explain them in some detail. ADJ use household-level micro data from Danish administrative registers—which cover the total Danish population—to analyze the relationship be tween pre-crisis debt levels and the development in household spending over the course of the crisis. The balanced

sample eventually used in their analyses covers nearly 500,000 home-owning households in the years 2003–2011.[42]

Figure 1.3 on page 3 (ADJ, figure 1) shows that Danish aggregate household consumption grew rapidly until the first quarter of 2008. It then dropped by more than 6% within a single year, followed by a very slow recovery in the subsequent years. The crisis was preceded by a rapid increase in household debt. The figure shows that the aggregate household debt-to-disposable-income ratio increased from 2.1 in early 2003 to about 2.9 at the peak of the boom five years later. It continued to rise during the crisis, reaching a level above 3 in late 2009, followed by a slow decline in the subsequent years.

The issue examined in ADJ is what role the high level of household debt played in the severity of the crisis and the sluggishness of the subsequent recovery, in particular, if there is a causal negative effect of the level of household debt on the subsequent consumption fall. They measure indebtedness ("leverage") by the debt-to-income (DTI) ratio, where income is before-tax (total) income, which includes labor market income, capital income, and transfers from the government (ADJ, p. 101).[43]

Thus, ADJ explicitly and directly examine the mechanism that explains the correlation between the DTI ratio and subsequent spending falls. Their analysis and results can be summarized as follows:

(1) Highly indebted households (the top 25% in the DTI-ratio distribution) reduced their spending substantially from 2007 to 2009, whereas less indebted households reduced their spending much less (ADJ, figure 6, left panel, reproduced as figure 4.2, left panel). This illustrates the correlation between high debt and large subsequent spending falls, a correlation that several papers mentioned above have documented.

(2) The larger spending decline among highly indebted households reflects that they started from a higher initial spending level before the crisis than less indebted households, not that they spent less during and after the crisis. Highly indebted households spent about 10% more of their before-tax income than less indebted households (figure 4.2, left panel).

(3) In contrast to other literature on household debt and spending, ADJ examine the role of *changes* in the DTI ratios as well as levels. They note that the changes and levels are highly correlated, which is not surprising, because the level is the sum of previous changes. But when ADJ control for the change in the DTI ratio from 2006 to 2007, the level of the DTI ratio in 2007 is no longer correlated with the spending fall from 2007 to 2009. Instead, the

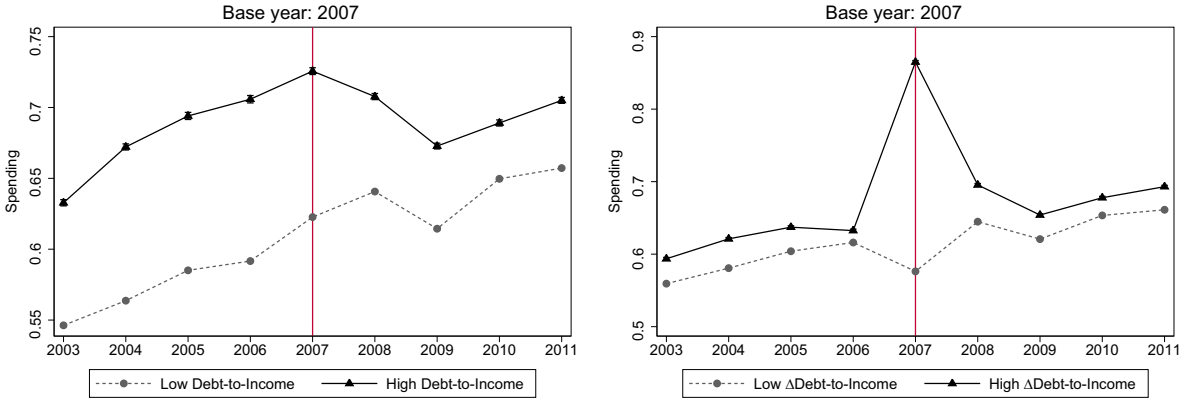
[42] Because register-based data on consumption or spending are not available at the household level, ADJ rely on a measure imputed from data on household disposable income, assets and liabilities. Spending in year $t$ is measured as disposable income in year $t$ minus the change in net nominal wealth from year $t-1$ to $t$. To exclude the effect of capital gains on housing, the sample is restricted to households that were not involved in real estate trade in any given year and housing wealth is excluded when summing over the change in the value of households' assets. The imputed measure of spending is a measure of out-of-pocket expenses in a given year on purchases of both non-durables and durables consumption goods. The consumption value of previously bought durables is excluded. The consumption value of housing is also excluded, because the sample includes only homeowners and no renters. See ADJ (pp. 100–101) for details how data and measurement issues, including regarding pension savings and stock prices, are handled.

[43] Regarding terminology, I prefer to use the term "leverage" for the traditional stock-to-stock measures such as debt-to-total-assets, loan-to-value, or total-assets-to-equity. Here, I use the term "indebtedness" for debt measured as the DTI ratio.

change in the DTI ratio is highly correlated with the spending fall. That is, for households with the same increase in the DTI ratio, spending of highly indebted households was not different from that of less indebted households.

(4) When ADJ examine the spending 2003–2011 of households with a high increase in their DTI ratio from 2006 to 2007, they find that their spending did not differ much from households without such an increase in their DTI ratio, except that their spending rose sharply in 2007, only to drop equally sharply in the following year (the right panel of figure 6, middle part, in ADJ and figure 4.2). Thus, the large temporary spending increase in 2007, more than 20% of the before-tax income in 2007, was financed by a debt increase from 2006 to 2007. ADJ show that the same pattern of large temporary spending financed by debt increases is also present in other years, what they call a "spending normalization pattern."

Figure 4.2: Danish households' spending and leverage [DTI ratio], base year 2007. The left panel shows spending 2003–2011 relative to before-tax income in 2007 for households with high and low levels of the DTI ratio in 2007; the right panel shows spending 2003–2011 relative to before-tax income in 2007 for households with high and low changes in the DTI ratio from 2006 to 2007.




Source and note: Andersen et al. (2016, figure 6, middle section). The figure presents the results from estimating Andersen et al. (2016, equation (1)) with base year 2007. [The original figure also shows results for base years 2004 and 2010.] The dependent variable is spending in a given year relative to before-tax income in the base year. Leverage is measured both in [DTI] levels (high and low Debt-to-income, left panel) and [DTI] changes (high and low ΔDebt-to-income, right panel), where "low" and "high" refer to households below and above the 75th percentile. The figure shows the average predicted values when [DTI or ΔDTI] is low vs. high, using actual values for the full set of other explanatory variables.

There is thus no evidence of any causal effect of the DTI ratio on the subsequent fall in spending during the crisis. Instead, the spending that fell during the crisis was caused by overspending, financed by debt increases. When the crisis came, households could not, or would not, maintain that debt-financed overspending, and spending of highly indebted households fell back to normal levels relative to income.

Thus, the housing collateral channel was operative. We can say that the underlying common factor that caused both high and rising household debt and a subsequent consumption fall was debt-financed overspending. The overspending was financed by debt increases and thereby caused high debt. Because the overspending could not, or would not, be maintained during the crisis, it

caused spending to fall back to normal levels.[44]

Observant readers may have noted in the quote on page 27, the FI says "Large or *rising debt* is also judged to have aggravated the downturn in countries such as the US and Denmark during the financial crisis", with reference to ADJ (italics added). Indeed, ADJ shows that it is debt increases *used to finance overconsumption* that has caused subsequent consumption falls in Denmark. But it does not follow that debt increases for other purposes would cause subsequent consumption falls.[45]

### 4.3.3 Bunn and Rostom (2014, 2015)

In the quote on page 27, the FI mostly refers to BR14 in support of their view. But do BR (meaning BR14 and/or BR15) contradict ADJ and establish a causal effect of household debt levels on later spending falls? The answer is clearly no. BR explicitly do not claim causality, as shown in the quote from BR15 on page 29 above. As far as I can see, their results are fully consistent with those of ADJ.

The development of aggregate household debt and spending in the UK before and during the crisis is quite similar to that in Denmark, as shown in a comparison of figure 4.3 for the UK with figure 1.3 for Denmark. As in Denmark, the pre-crisis period is characterized by a rapid increase in the household debt-to-income ratio, and consumption fell substantially during the crisis.

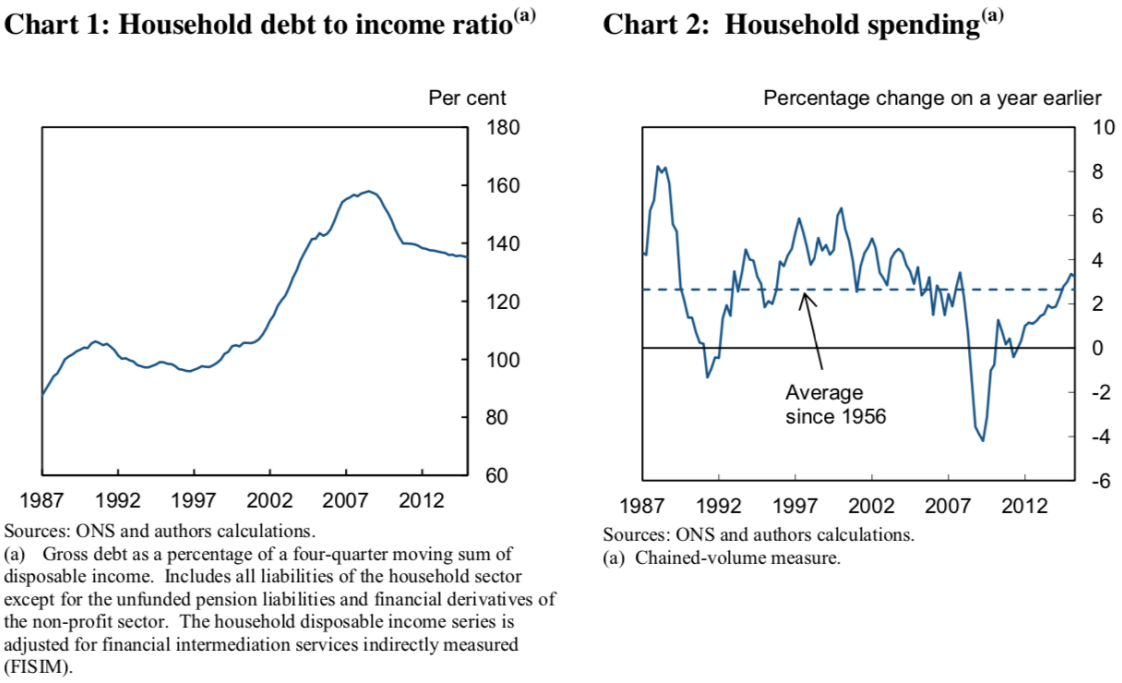
BR examine the relationship between household debt and consumption with the use of microdata from the Living Costs and Food (LCF) Survey. Whereas ADJ use a *panel of individual data*, an important limitation of the LCF data is that they are a *repeated cross-section* and *not a panel*. This means that the data do not show how debt and spending changed for individual households, because the households in the survey are different in each year. BR use two ways to try to address this shortcoming in the data. The first is to create a so-called synthetic panel—as suggested by Deaton (1985)—to look at how spending changed across birth-year cohorts. The second approach uses the repeated cross-sectional data to compare spending patterns of households with similar characteristics from one year to the next. But the two approaches can still only identify correlations, not causal relationships (BR15, p. 7; italics added):

> Both the pseudo panel and cross-sectional approaches face the drawback that *they can only identify correlations between levels of indebtedness and household spending*: they cannot prove that debt was the direct cause of those spending patterns. For example, households with more optimistic expectations of future income may be more willing to take on debt and consume more because of those expectations. But if the financial crisis led those households to realise that their expectations were unrealistic, more highly indebted households may have made larger spending adjustments afterwards with no

[44] The Danish Committee on the Causes of the Financial Crisis notes that optimistic households financed consumption by borrowing (Rangvid, 2013, p. 134; my translation from Danish): "Consumers' expectations of continued price increases in the housing market, including part of media coverage with overall optimism, resulted in, among other things, a considerable interest in mortgaging the rising housing wealth, for investment in housing improvements but also to support private consumption in the form of car purchases and travel, as well as investment in securities etc. in order to get a better return than on savings accounts. This interest in mortgaging was supported by credit institutions having access to ample liquidity during that period."

[45] Broadbent (2019) provides some discussion of the ADJ results.

Figure 4.3: UK household debt-to-income ratio and spending growth




Source and note: Bunn and Rostom (2015, charts 1 and 2)

.

> causal link [between debt and the spending adjustment] if debt was simply correlated with income expectations.

Thus, in the example mentioned in the quote, there is an underlying common factor, namely (over)optimism by some households, which led these households to increase their consumption and to debt-finance the (over)consumption before the crisis. This common factor then explains both the high indebtedness pre-crisis and the spending fall of highly indebted households during the crisis.

Toward the end of BR14, they summarize the results of their analysis, indicating a correlation rather than causality (p. 314; italics added):

> The microdata analysis presented in this article shows that highly indebted UK households made larger-than-average cuts in spending, relative to income, after 2007. This represents an unwinding of faster-than-average spending growth by this group before the crisis. Cuts in spending *associated with* debt are estimated to have reduced the level of aggregate private consumption by around 2% after 2007 (out of a total fall of around 5%).

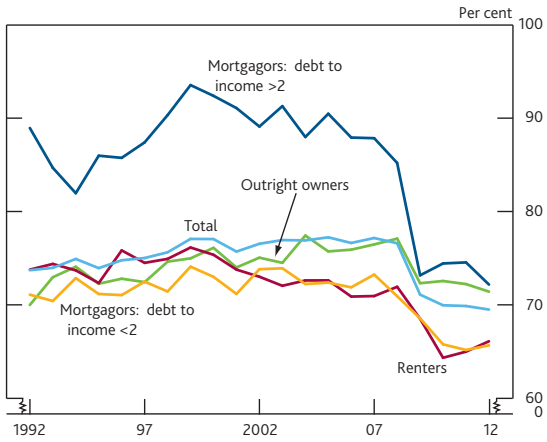
More specifically, in the middle of their article, BR14 have the following crucial results, completely in line with those of ADJ (BR, pp. 307 and 309):

> In the second half of the 1990s, households with mortgage debt to income ratios greater than 2 appear to have increased the share of their income spent on non-housing consumption by more than mortgagors with lower debt to income ratios (Chart 6) [reproduced as figure 4.4]. But higher debt mortgagors subsequently made larger-than-average

reductions in spending relative to income after the financial crisis. ... Disaggregating the data for mortgagors further, the largest adjustment in spending relative to income after 2007 came among households with a mortgage debt to income ratio above 4 (Chart 7) [reproduced as figure 4.5].

Figure 4.4: Chart 6 in Bunn and Rostom (2014)

**Chart 6** UK non-housing consumption as a share of income[a]

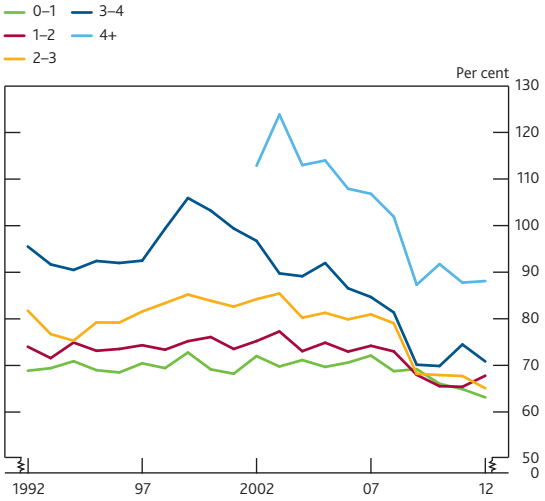



Sources: Living Costs and Food (LCF) Survey, ONS and Bank calculations.

(a) Non-housing consumption as a share of income net of mortgage interest payments. Data are scaled so that the total matches the National Accounts. Debt to income ratio is calculated using secured debt only.

Figure 4.5: Chart 7 in Bunn and Rostom (2014)

**Chart 7** UK mortgagors non-housing consumption as a share of income by debt to income ratio group[a]




Sources: Department for Communities and Local Government (DCLG), LCF Survey, ONS and Bank calculations.

(a) Data for 4+ not shown before 2002 as they are erratic and are based on a small sample. Non-housing consumption as a share of income net of mortgage interest payments. Data are scaled so that the total matches the National Accounts. Debt to income ratio is calculated using secured debt only.

Chart 6 (figure 4.4) indeed shows that mortgagors with higher DTI ratios (above 2) had increased their non-housing consumption to a much higher share of income, about 90%, which later fell back to the same share as other borrowers, 70–75%. Chart 7 (figure 4.5) shows that mortgagors with higher DTI ratios (above 3 and 4) had increased their non-housing consumption to even higher shares of income, 100–120%, that later fell back to more average levels. This is consistent with the fall in consumption mainly being due to debt increases having been used to finance a temporary and unsustainable overconsumption, not being due to high debt in itself.

The general similarity between charts 6 and 7 in BR14 (figures 4.4 and 4.5) and the left panel of figure 6 in ADJ (figure 4.2, left panel) is striking.

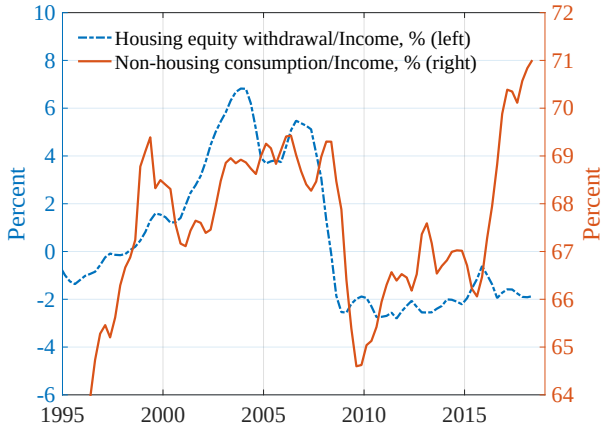
In particular, ADJ (table 4) report the result of a regression on their panel data that shows a significant negative correlation between the *level* of the Danish pre-crisis DTI ratio and the spending change during the crisis. BR15 (table 2) report the result of a similar regression on their synthetic panel data that also shows a significant negative correlation between the level of the UK pre-crisis DTI ratio and the spending change during the crisis. Furthermore, as mentioned in point (3) of the summary of the ADJ results on page 33, ADJ also show the result of a regression in which the *change* in the DTI-ratio before the crisis is added as an independent variable. Importantly, then

the level of DTI ratio in 2007 is no longer correlated with the spending fall from 2007 to 2009, whereas the change in the level of the DTI ratio is negatively correlated with the spending change during the crisis. Thus, the correlation of the level of DTI ratio and the subsequent fall in spending is entirely due to the correlation of the level of the DTI ratio with the change in the same ratio.

Given the similarity of between charts 6 and 7 in BR14 (figures 4.4 and 4.5) and the left panel of figure 6 in ADJ (figure 4.2, left panel) and the rapid increase in the DTI ratio in both countries before the crisis, it seems very likely that the same result about the level and the change in the DTI ratio holds for the UK data. But BR15 do not report the result of any regression in which the change in the DTI ratio is added as an independent variable. Absent such a regression with a different result than that of ADJ, the BR results seem fully consistent with the ADJ results.

In conclusion, BR do neither claim nor demonstrate a causality relation between the pre-crisis DTI level and the subsequent consumption fall, and the results of BR thus do not disprove the results of ADJ.

Figure 4.6: Housing equity withdrawal and non-housing consumption in the UK as a percentage of post-tax income




Source and note: Housing equity withdrawal (HEW), Bank of England (2018); non-housing consumption and post-tax income, the Office of National Statistics. Seasonally adjusted data; centered 3-quarter moving averages. HEW and household non-housing consumption as a percentage of post-tax income. The stock of housing equity can change in three main ways: (1) Changes in the stock of secured lending when households take out or repay debt; (2) changes in the stock of housing wealth, e.g. when new properties are built or improvements are made to existing properties; and (3) revaluations of the stock of housing wealth due to changes in house prices. HEW is defined as (1) less (2) in each period. That is, it excludes revaluations. When households, in aggregate, are withdrawing more equity than they are injecting, HEW is positive. When they are injecting more than they are withdrawing, HEW is negative. See Reinold (2011) for details.

Furthermore, Bank of England publishes a time series of aggregate HEW, defined as the change in stock of mortgages minus the change the stock of housing wealth exclusive of revaluations (Bank of England, 2018; Reinold, 2011). Figure 4.6 shows that this HEW relative to post-tax income.[46] The HEW was substantial before the crisis and fell to be negative during the crisis and after. The figure also shows household non-housing consumption relative to post-tax income. The figure

[46] Post-tax income is disposable income minus indirect taxes. Disposable income is gross income minus direct taxes.

indicates a rather close relation between HEW and non-housing consumption and is consistent with the HEW being used to finance overconsumption pre-crisis and this practice ceasing when the crisis started.[47]

Interestingly, the figure shows that HEW has moved about double the amount that non-housing consumption has moved, indicating that HEW has in the aggregate been used also for other purposes than non-housing consumption, perhaps for investment in financial assets, paying off high-interest unsecured consumption loans, or to finance start-up businesses.[48] Also, the figure shows that more recently non-housing consumption has increased relative to post-tax income, without HEW increasing.

#### 4.3.4 Baker (2018)

The FI also refers to Baker for support of the view that household debt causes household consumption to be more sensitive to income. Baker examines a recently available comprehensive set of linked-account US data from a large online personal finance website. The data consist of transaction and balance sheet data for millions of Americans. He discusses advantages and concerns arising from this type of data and match a range of distributional moments to external sources. As one application, he uses data from January 2008 to December 2013 to examine the elasticity of consumption with respect to income across households with varying levels and access to credit (Baker, p. 1505):

> I find that this elasticity [of consumption with respect to income] is significantly higher in households with high levels of debt, suggesting that results from previous empirical work examining more aggregated household data (often at county or state levels) do not substantially differ from individual household-level estimates.
>
> *While spending among more indebted households tends to respond to income shocks to a greater degree, I show that this heterogeneity can be explained almost entirely by credit and liquidity constraints. ...*
>
> This finding can help to outline the mechanism by which household debt has been found to affect consumption elasticities by Dynan (2012), Mian et al. (2013), and others. *The impact on real consumption decisions comes not from larger household balance sheets per se but from the diminished liquidity and borrowing capacity that tend to follow these inflated balance sheets.*

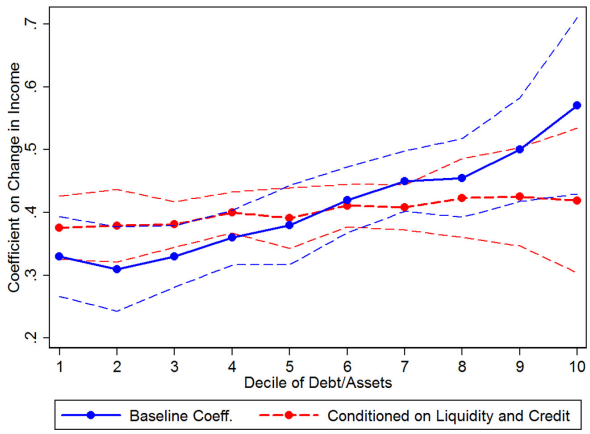
The results of the examination of the income elasticity is, most conveniently, summarized in a figure:

> Overall, ... figure 11 [reproduced as figure 4.7] show[s] that debt has little or no independent relationship with the [income] elasticity of spending when controlling for liquidity and the ability of households to access credit. ....

[47] See Hendry and Muellbauer (2018, section VI.iii) for an in-depth study of the UK consumption function.
[48] Mortgage increases are of course often used for home improvements, but—as explained in the note to figure 4.6 and in Reinold (2011)—home improvements increase the stock of housing wealth and are not HEW.

Overall, these results indicate that *the primary reasons consumption responses are higher among highly indebted households are credit and liquidity constraints.*

Figure 4.7: Consumption elasticity with respect to income across debt/asset deciles.




Source and note: Baker (2018, figure 11). Debt/asset is calculated as total household debt divided by total household assets. Households are divided into deciles by the 2008 value of debt/assets. Baseline coefficients represent coefficients on a panel fixed-effects regression of the change in log consumption on the change in log income, the change in log income interacted with decile of debt/assets, along with household and time fixed effects. Conditioning on liquid assets and credit scores coefficients runs the same regression including interactions of changes in income with liquid assets and the credit score and then assigning all households the average credit score and level of liquid assets for scaling. The sample is January 2008–December 2013.

Thus, the result is that the income-sensitivity of consumption is independent on the level of debt for households without any credit and liquidity constraints. Instead, the correlation between the consumption elasticity and debt is due to a correlation between debt and constraints on credit and liquidity. The cause of a higher income-sensitivity of consumption is constraints on credit and liquidity, not debt. This obviously contradicts the FI's view.

### 4.3.5 Amortization requirements increase the income-sensitivity of consumption

The result that the income-elasticity of consumption is independent of debt in the absence of credit and liquidity constraints is fully consistent with the standard permanent-income hypothesis. Without credit and liquidity constraints, households can optimally smooth consumption, and consumption will depend on permanent income, not on debt. In contrast, with binding credit and liquidity constraints, consumption becomes more dependent on current income; with sufficiently binding constraints, households even become hand-to-mouth consumers (Campbell and Mankiw, 1989; Kaplan et al., 2014; Ampudia et al., 2018), with a marginal propensity to consume out of income approximately equal to one.

It follows that a macroprudential policy that aims to reduce the income-sensitivity of consumption and increase the possibilities for households to smooth consumption when hit by income shocks—and thereby increase the resilience of households—would try to *loosen* (not tighten) credit and liquidity constraints. For example, interest-only mortgages with a credit line—the optimal

mortgage contract according to Piskorski and Tchistyi (2010)—would be beneficial from this point of view.

It also follows that amortization requirements, which tighten credit and liquidity constraints, will thereby increase the income-sensitivity of consumption. As shown in figures B.4 and B.5, amortization requirements substantially increase the monthly housing payment (operating and maintenance cost, after-tax interest payment, and amortization) and involuntary saving (the housing payment minus the user cost) associated with owner-occupied housing. If households are constrained to save substantially more than preferred, then their consumption is constrained to be substantially less than preferred, and the households will become hand-to-mouth consumers. Thus, amortization requirements are counterproductive as a way to reduce the income sensitivity of consumption. This is further examined in Svensson (2019a).

### 4.4 Is there any evidence of debt-financed overspending in Sweden?

Thus, the conclusion from a close reading of the ADJ and BR studies of household indebtedness and subsequent consumption falls in Denmark and the UK is that there is no evidence of a causal negative effect of pre-crisis household debt on subsequent spending growth. There is a *correlation* between the pre-crisis debt level and the subsequent spending fall, but there is no evidence of *causality*. Instead, the evidence is that the housing collateral channel was operative and that an underlying common factor caused both the high debt and the spending fall. There is considerable evidence that this common factor is debt-financed overspending before the crisis. The debt-financing made some households highly indebted. When the crisis came, households were unable or unwilling to continue the debt-financed overspending, for example because tighter credit access and falling housing prices made the debt-financing difficult or because a more pessimistic outlook for future incomes made it undesirable.

Thus, if there is substantial debt-financed overspending by a substantial part of the households, there is arguably an elevated macroeconomic risk of a future spending fall if—or when—the debt-financing of the overspending would stop. However, for this to be a macroeconomic risk, the debt-financed overspending must be macroeconomically relevant and thus rather large and widespread. In order to adequately assess the macroeconomic risk, it is then necessary to examine potential indicators of macroeconomically relevant debt-financed overspending. Which are the potential indicators?[49]

A general overoptimism, "exuberance," with overoptimistic household expectations of future incomes, housing prices, and interest rates will of course be conducive to debt-financed overspending, which might slow down and stop if expectations become more pessimistic. However, as noted in sections 2.4 and 2.3, there is no indication of households having overoptimistic housing-price or mortgage-rate expectations.

[49] Using HEW to finance non-housing spending has been referred to as "using housing as ATMs" (Chen, Michaux, and Roussanov, 2018). But in order for this to be of macroeconomic significance, it must be of a substantial magnitude. Anecdotal evidence is not enough.

Lender overoptimism as well as lower lending standards is also conducive to increased credit access that can be used to finance overspending. But according to the FI's annual mortgage markets reports—from the first, FI (2010), to the most recent, FI (2018d)—lending standards were arguably appropriately tight to start with, with borrowers having appropriate debt-service capacity and resilience to shocks in the form of housing-price falls, interest-rate rises, and income losses due to unemployment. Then lending standards have become tighter over time, and are now substantially tighter after the amortization requirements have been introduced and banks' have tightened lending standards in other ways.

Overspending here refers to spending relative to income. Thus, overspending is the same as undersaving. Therefore, any macroeconomically relevant debt-financed overspending should show up in a low (aggregate) household saving rate. Thus, the household saving rate is an obvious indicator. Another obvious indicator of debt-financed overspending is overspending on durable consumer goods, because purchases of large-item durable goods such as cars are frequently debt-financed.[50]

Importantly, there is no indication of any overconsumption and undersaving of macroeconomic significance by Swedish households. The household saving rate is actually at a historical high. In contrast, the pre-crisis household saving rates were very low in Denmark and the UK and relatively low in the US. In particular, the household saving rate rose in those crises rose considerably in Denmark and the UK but also significantly in the US. This is consistent with a substantial fall in previous over-consumption. In contrast, the household saving rate in Sweden was higher before the crisis and has by now risen to an exceptionally high level (figure 4.8).[51]

Such a high household saving rate—and low household consumption rate, figure 4.9—in Sweden is hardly consistent with any substantial and macroeconomically significant debt-financed overspending. Regarding the saving rate, and the other obvious indicator, spending on durable goods, the FI actually says itself in its financial-stability report that Swedish households are cautious, with high saving and moderate consumption of durables (FI, 2017b, p. 35).

> Despite optimistic expectations and high margins between income and expenses, households are currently being relatively cautious. The total household saving rate is high and has increased even more over the past few quarters (see Diagram 33). Household consumption of durable goods, which is an indicator of household optimism, is in line with the historical average (see Diagram 34). [Diagrams 33 and 34 are reproduced in figure 4.10.]

In passing, we may note in figure 4.8 and in diagram 33 in figure 4.10 (the latter with quarterly data of the 4-quarter moving-average saving rate) that the Swedish household saving rate was quite

[50] Indeed, ADJ (fig. 8, p. 113) show that the relation between car purchases and the level of and changes in debt looks very similar the for spending shown in figure 4.2. But only about 15% of the households that increased their debt in 2007 purchased a car, so most of the debt-financed overspending was by other households on other items.

[51] In September 2019, Statistics Sweden revised down the household saving rates from 1994 onward, shown by the dashed-dotted red line in figure 4.8. This shift does not affect the conclusions, as further discussed in Svensson (2019b).

Figure 4.8: Household saving rates in Denmark, the UK, the US, and Sweden.

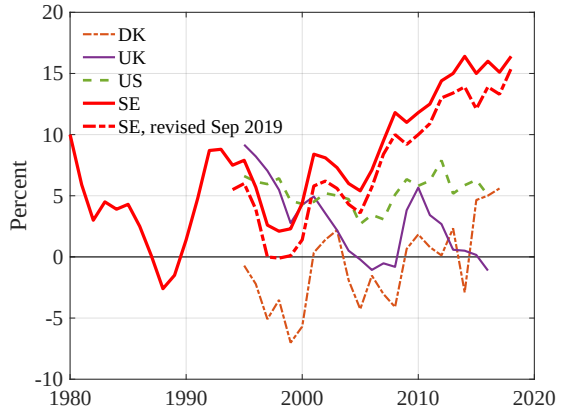
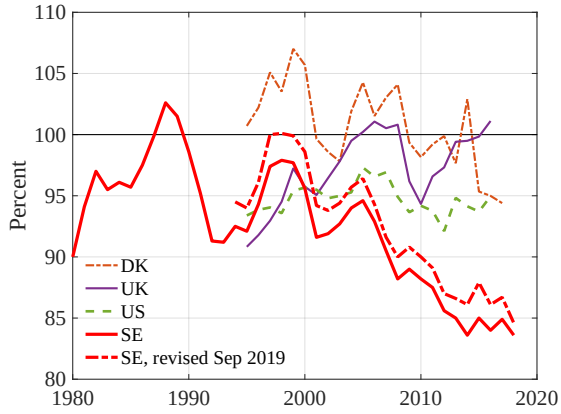
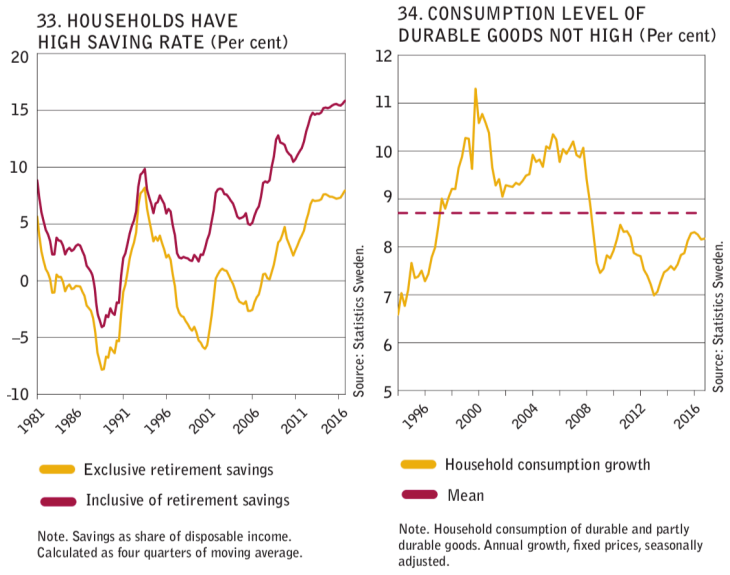



Figure 4.9: Household consumption rates in Denmark, the UK, the US, and Sweden.




Source and note: OECD and Statistics Sweden. Figure 4.8: Saving rates of households and non-profit institutions serving households. The household saving rate is defined as household saving including the change in pension entitlement of households divided by income defined as disposable income plus the net change in pension entitlement of households. In September 2019, Statistic Sweden revised household saving rates down somewhat. Figure 4.9: The household consumption rates defined as one minus the household saving rates.

Figure 4.10: Diagrams 33 and 34 in FI (2017b).




low in the late 1980s, before the crisis in the 1990s, and that the net saving rate was even negative. It then jumped about 15 percentage points from trough to peak during the crisis in the early 90s (11 percentage points in the annual saving rate of figure 4.9), corresponding to a large drop in the consumption rate, making consumption fall much more than income. But the situation before and during the crisis in the 1990s was very different in several important aspects, including that with a fixed exchange rate the Swedish economy became very overheated before the crisis and that the Riksbank defended the fixed exchange rate against speculative attacks during the crisis with

extremely high policy rates.

### 4.4.1 Microdata evidence

Li and Zhang (2018) use microdata to examine the use of individual HEW in Sweden. Interestingly, they find that it has mainly been used to pay off previously acquired unsecured consumer debt, thus used to improve the households' debt composition.

> In contrast to the findings in the United States that homeowners refinanced their mortgages for consumption purpose without paying down outstanding non-mortgage debt during the housing boom period 2002–2006 (Mian and Sufi, 2011; Brown, Stein, and Zafar, 2015), Swedish homeowners reoptimize their debt structure by substituting more expensive unsecured consumer debt using withdrawn home equity. This may be explained by the fact that Swedish households, unlike US households, are fully liable for personal debt and have difficulty obtaining discharges during the personal bankruptcy process. Therefore, they borrow less excessively and behave more conservatively when managing personal debt than US households during a housing boom. (p. 4–5)

They also find that some HEW has been used to financed starting businesses. They do not find any indication of HEW-financed overspending.

Sodini et al. (2017) examine a natural experiment in the form of a random conversion of public rental housing to tenant-owned housing, in which cases the new tenant-owners were able to buy their housing at a substantial discount. The new owners thus made substantial capital gains; many made the best financial deal in their life. Interestingly, Sodini et al. (2017) find that the new owners to some extent used HEW to smooth consumption: When tenant-owners suffered from income losses, they used HEW to smooth their consumption.

> To study the use of the house as a collateral asset, we analyze how households respond to a large labor income shock (a reduction of at least 25%). We find strong evidence for the housing collateral effect. Households who become home owners as part of the privatization experiment and receive an adverse labor income shock increase borrowing to smooth consumption. Households who were denied privatization do not have this possibility, and their consumption falls nearly as much as their after-tax labor income. The collateral effect is stronger the more housing collateral a household has, and it is robust to different definitions of the income shock. (p. 4)

They also found that households that sold their privatized apartments and moved did increase their consumption upon the realization of the windfall. But those who stayed in their privatized apartment and had the opportunity to tap into their housing wealth to increase their consumption nevertheless did so only to a small extent.

Interestingly, these examples point to welfare-improving uses of HEW in Sweden: It improves households' resilience by admitting a more efficient debt composition, it allows collateralized financing of potentially productive new entrepreneurial activity, and it also allows consumption smoothing in the face of negative shocks to consumption.

Emanuelsson et al. (2018) decompose the increases in Swedish household debt from 2011–2017. They show that the debt increase is composed of—in order of magnitude—(1) debt increases due to turnover of existing housing at higher prices, (2) existing homeowners' debt increases, (4) debt financing newly constructed housing, and (4) a small remaining residual. They thus in (2) report substantial net increases in existing homeowners' loans during 2011–2017. As they note, the increase in loans may have been used by households for for repaying consumption loans and for financing new businesses, as documented by Li and Zhang (2018).

The debt increases may also have been used for home improvements, purchases of second homes, and help to family members to buy a home. For example, it is easier to increase an existing mortgage on a first home than to obtain a new mortgage on a vacation home, the collateral value of which may be difficult to assess for the lender.[52] Also, there is considerable anecdotal evidence that parents have mortgaged their homes to a large extent in order to help their children buy a home. Higher housing prices, the 15% down payment (because of the LTV limit of 85%), increasingly unavailable rental housing, and—in particular—the tightening of lending standards have made children more dependent on their parents to obtain their own home. In both latter cases, the increase in the mortgage stock has ended up as an increase in existing homeowners' loans, but it has primarily been used to finance new housing purchases. In these cases, the increase in loans do not represent aggregate HEW as discussed in the context of figure 4.6. Homeowners may also have increased their mortgages in anticipation of tighter future credit conditions, in particular—as discussed by Hull (2017) and Svensson (2016)—to pay for future amortization. They may also have increased their debt to invest in liquid financial assets and to build up a liquidity buffer.

Some of the increase in loans by existing homeowners may have been used for consumption, although the fact that the debt increases have typically been large and not frequent indicate that they have mainly been for other purposes. But any such consumption can hardly have been overconsumption of any macroeconomic importance, because it has not shown up as a low and falling household saving rate, as it did in Denmark and the UK before the crisis. Instead, as shown in figure 4.8, from 2010 to 2017 the household saving rate has increased almost 4 percentage points, from an already high initial level, to its current historical high. Thus, there is no evidence that these increases in existing homeowners' loans have been used for any overconsumption of macroeconomic importance.

### 4.4.2 Summary

In summary, there is no evidence that there is any debt-financed overconsumption by Swedish households of any macroeconomic significance. If there were such debt-financed overconsumption, it would show up—as in Denmark, the UK, and the US—mainly as aggregate overconsumption and undersaving, that is, a low household saving rate. It would also most likely show up as high

[52] I have personal information about a bank that would much rather increase an existing mortgage on a Stockholm apartment than extend a new mortgage for the purchase of a vacation home on a small island in a distant part of the Swedish archipelago.

consumption of durables, overoptimism by borrowers, overoptimism and looser lending standards by lenders. There would also be some anecdotal evidence and media stories. But there are no such indications.

Furthermore, the existing microdata studies of existing Swedish HEW point to welfare- and resilience-improving uses of HEW: It is used to achieve a more efficient and resilient household debt composition by paying off high-interest unsecured consumer debt, used for consumption smoothing in the face of negative income shocks, and to finance startups. These examples point to HEW actually reducing the income-sensitivity of consumption.[53]

### 4.5 A real-time stress test: The 2008–2009 crisis.

The proof of the pudding is in the eating. Real-time stress tests provides highly relevant information and complement the standard (theoretical and hypothetical) stress tests. Swedish households were subject to a severe real-time stress test during the 2008–2009 crisis. Housing prices fell by 13% from a peak in May 2008 to a trough in December 2008 (figures 1.1 and B.1b). The seasonally adjusted unemployment rate rose by 3.5 percentage point from a trough of 5.6% in May 2008 to a peak of 9.1% in January 2010 (figure B.1c). How did households adjust their consumption? Did they make the recession deeper?

Figure 4.11: A real-time stress test: The 2008–2009 crisis

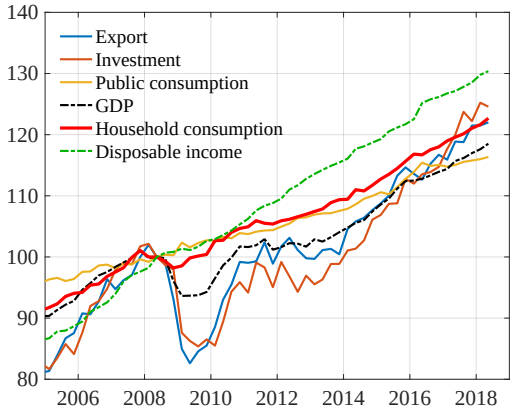
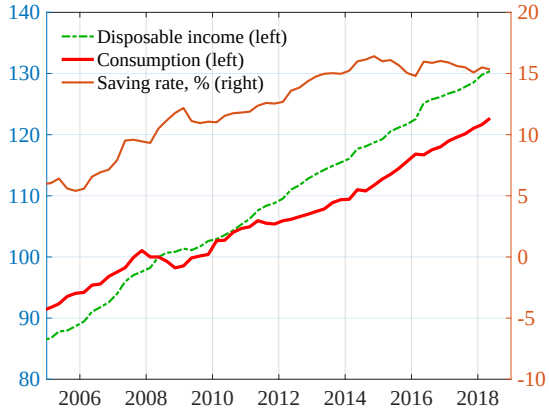



Figure 4.12: Household disposable income, consumption, and saving rate.




Sorce and note: Statistics Sweden. Disposable income is a trailing 4-quarter moving sum of quarterly real net disposable income. The saving rate is calculated as a trailing 4-quarter moving sum of quarterly net saving divided by a trailing 4-quarter sum of the sum of quarterly net disposable income and the adjustment for the change in pensions entitlements. Other variables are quarterly, seasonally adjusted, measured at constant 2017 prices, and indexed to 100 for 2008Q1.

[53] FI (2017d, p. 9–10), in response to Englund and Svensson (2017), says that "there is not sufficiently good data of households' assets, debt, and consumption to judge whether and to what extent highly indebted households use mortgages to finance overconsumption," and that "there are risks from waiting for better data." But the point is that the extent of the overconsumption must be such that there is *aggregate* overconsumption and undersaving—as in Denmark, the UK, and the US before the 2008–2009 crisis and in Sweden before the 1990s crisis—for it to be of macroeconomic relevance and a macroeconomic risk. Individual data are not necessary to observe aggregate overconsumption and undersaving. Furthermore, as noted above, existing microdata studies do not indicate any use of HEW for overconsumption.

As shown in figure 4.11, from the spring of 2008 to the summer of 2009, export and investment fell dramatically, by 18% and 15%, respectively. However, household consumption expenditures fell by only 2% from 2008Q2 to 2008Q4 and then recovered and was back in 2009Q2 at the same level as in 2008Q2. Public consumption expenditures rose only slightly. In the end, GDP fell by 6% and started to recover at end of 2009.

Thus, in spite of a severe shock to the economy, with a substantial fall in housing prices and rise in unemployment, household consumption fell rather little. The saving rate increased by about 1.5 percentage points from 2008Q2 to 2009Q1 but than fell back 1 percentage point in 2009Q2 (figure 4.12). The change in the saving rate was dramatically different in the 1990s crisis. As can be seen in figure 4.10, exclusive of retirement saving, it then rose by about 15 percentage point from 1990 to 1993.

In figures 4.11 and 4.12, we also see that disposable income did not fall.[54] Behind this was the fact that the Riksbank lowered the repo rate (the policy rate) by 4.5 percentage points from 4.75% in September 2008 to 0.25% in July 2009 and that also short mortgage rates fell, in particular the 3-months variable rate (figures 2.3 and B.1a).[55] Swedish banks had difficulties financing their mortgages, but the Swedish NDO and the Riksbank provided liquidity support and the government provided a bank guarantee. This prevented the spread between the variable mortgage rate (the 3-month rate) and the repo rate from increasing (figure B.1a). With a high share of mortgages having variable rates, interest expenditures fell and improved indebted households' cash flow. The aggregate after-tax interest-payments-to-disposable-income ratio fell by about 2 percentage points from 5.1% in 2008Q4 to 3% in 2010Q2, thus corresponding to a 2 percentage points increase in aggregate disposable income (figure 3.4).[56] [57]

In summary, the severe real-time stress test of Swedish households during the 2008–2009 crisis does not indicate that household indebtedness posed an elevated macroeconomic risk. Household consumption fell only a little, and the saving rate rose only a little. Indeed, household consumption helped stabilize the economy when export and investment collapsed.

Furthermore, according to the FI's financial-stability and mortgage-market reports, now banks are much stronger and have substantially larger capital and liquidity buffers now, and households debt-service capacity and resilience, which was high at the time of the first mortgage-market report in 2010, has steadily grown since then.

[54] As mentioned, disposable income in figures 4.11 and 4.12 is a trailing 4-quarter moving sum as a simple seasonal adjustment. See figure B.3 for seasonally adjusted quarterly disposable income and its trend calculated with the method X-11. Seasonally adjusted quarterly income was above trend in 2008Q2, on trend in Q3, and slightly below trend in Q4. Else, during 2006–2012, it was on trend.

[55] At the July 2009 Riksbank policy meeting, I dissented in favor of lowering the policy rate to 0%, warned about an existing "zero interest rate mystique," and argued that the lower bound for the policy rate was not zero but negative. (I was a deputy governor and member of the Executive Board during May 2007–May 2013.)

[56] Interest expenditures are negative capital income, and reduced interest payments increase disposable income.

[57] The 3-month mortgage rate fell by about 4.5 percentage points from about 6% in 2008Q3 to about 1.5% in 2009Q4, which is $0.7 * 4.5 = 3.2$ pp after tax (figure B.1). For an indebted household with a variable interest rate and debt equal to 3 times disposable income, this implies an increase in disposable income of almost 10%.

## 4.6 Summary: There is no evidence that Swedish household debt poses an elevated macroeconomic risk

In summary, there is no evidence that Swedish household debt poses an elevated macroeconomic risk. The cash-flow channel implies that the cash-flow of highly indebted households with mortgages with variable rates is more sensitive to interest rates. But this makes monetary policy more powerful and makes it easier for the Riksbank to stabilize consumption by policy-rate cuts in a crisis, as it did during the 2008–2009 crisis. In particular, the cash-flow channel implies that highly indebted households benefit more than less indebted and, especially, renters from the low interest rates associated with recessions.

There is no evidence that there is a causal effect of household indebtedness on subsequent consumption falls in a crisis. The studies of ADJ and BR do not provide any evidence of such a causal effect. Instead, there is strong evidence that the correlation between high indebtedness and subsequent consumption falls in Denmark, the UK, and the US is explained by the housing collateral channel and debt-financed overconsumption that could or would not be maintained when the crisis come.

That the common factor is debt-financed overconsumption implies that the correlation between the level of indebtedness and subsequent consumption falls is due to the correlation between the level of indebtedness and previous debt-increases. It does not imply that rapidly rising household debt causes subsequent consumption falls. Only if the rapidly rising debt is used to finance overconsumption can it be said to cause subsequent consumption falls. Above in section 4.3, with reference to the two possible interpretation of figure 4.1, I noted the possibility that the FI might mean that rapidly *rising* household debt would cause subsequent consumption falls. But this is not generally the case, it must be the case that the rising household debt is specifically used to finance overconsumption.

In particular, there is no evidence that the housing collateral channel is strong in Sweden and that there is debt-financed overconsumption to any extent that would be of macroeconomic significance. In contrast to what was the case in Denmark, the UK, and the US before the recent crisis—and in Sweden before the 1990s crisis—the Swedish household saving rate is at a historical high. Also, the consumption of durables is moderate.

Microdata studies of existing HEW in Sweden show that it has been used to pay off high-interest unsecured consumer loans rather than for overconsumption, and thus to achieve a more efficient and resilient household debt composition. It has also been used to finance startup businesses. There is also evidence that it has been used to smooth consumption in the face of income shocks during the crisis. HEW seems to have been used to increase resilience and reduce the consumption response in the crisis rather than the other way.

Furthermore, in the severe real-time stress test of Swedish households that the 2008–2009 crisis provided, household consumption fell only a little, and the saving rate only rose a little. Indeed, household consumption helped stabilize the economy when export and investment collapsed. This

experience does not provide any evidence for Swedish household indebtedness posing a macro economic risk.

# 5 International organizations on Swedish housing prices and household debt

The FI—for example, FI (2017d)—has 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 amortization requirements that the FI has introduced.

Several international organizations have warned not only about high and rising debt but also about housing being substantially overvalued. For example, ESRB (2016b) issued a warning to Sweden about high and rising housing prices and household debt and, especially, that housing appeared to be overvalued. The background paper for this warning referred to an ECB estimate that housing would be overvalued by no less than 24% (ESRB, 2016a, p. 117).[58] More recently, in its "in-depth review" of Sweden, European Commission (2018, p. 3; italics added) writes, in its Executive Summary:

> The continued increase in household debt and bank exposure to residential mortgages is a growing risk to macroeconomic stability. Despite gradual policy action, mortgage debt continues to increase further. *With the housing market still appearing overvalued*, even after recent declines, rising indebtedness means there is the growing risk of a disorderly correction. This could culminate in a rapid deleveraging process, with an adverse impact on the real economy and potentially the banking sector.

The view that housing is overvalued seems not to have been the result of any detailed and thorough analysis but seems to based on the observation of high and increasing price-to-income and price-to-rent ratios and their comparison to historical averages. In the text, European Commission (2018, p. 25; italics added) states:

> In spite of recent declines, valuation indicators suggest that house prices remain higher than seems justified based on fundamentals. ... [*O*]*ver time valuations appear to have become disconnected from fundamentals. In particular, price-to-income and price-to-rent ratios (measures of affordability and return-on-investment of owner-occupied houses) are respectively about 40 % and 60 % above their long-term averages* ... These estimated valuation gaps are among the highest in the EU ... While such indicators are inevitably subject to some modelling uncertainty, they do underscore the vulnerabilities linked to the Swedish housing market.

OECD (2017, p. 25; italics added) also emphasizes price-to-income and price-to-rent ratios.

> Real housing price increases in Sweden have been among the strongest in the OECD ... This increase is all the more worrying as the global financial crisis of 2008 had only

[58] It also refers to more modest suggested overvaluations of between 5.5% and 12.5% suggested by Turk (2015).

> a modest effect on Swedish housing prices, which are now well above historical peaks. *Price-to-income and price-to-rent ratios are also well above their long-term averages* ... These ratios are crude indicators of housing price overvaluation, especially because they fail to capture the evolution of financing and supply conditions, but *they have tended to return to their long-term averages in the past across OECD countries*, albeit after protracted periods.

However, as noted in section 2 above, PTI ratios are quite misleading as indicators of overvaluation when there is a downward trend in mortgage rates and there is a structural increase in excess demand. The interest-payment-to-income and user-cost-to-income ratios discussed in section 2 are more relevant, and give very different answers for Sweden and Stockholm than the PTI ratios. Furthermore, the fact that housing markets are local generally requires a more regional and granular analysis, taking into account local fundamental determinants, as in the brief analysis of the Stockholm housing prices in section 2.2.

Price-to-rent ratios have the same general problems as price-to-income ratios. In a situation with a free rental market, the user-cost-to-rent ratios are more relevant. With an efficient and well-functioning rental and housing market, an equilibrium condition is that user costs and rents for similar owner-occupied and rented similar housing should be approximately equal and thus the user-cost-to-rent ratio approximately equal to unity. However, given the lack of a functioning rental market in the major cities, comparisons of user costs and market rents are difficult in Sweden, and comparisons of user costs and regulated rents are severely misleading. However, market rents are available for some segments of the market, more precisely some newly produced rental housing where rent control is effectively exempted. For that market segment, Flam (2016) shows that owner-occupied housing is not overvalued—if anything, somewhat undervalued.

Regarding the risks associated with housing prices and household debt, European Commission (2018, p. 32, incl. footnote 30; italics added) further states:

> **Steadily growing household leverage** [DTI ratios] **coupled with elevated house prices makes the economy vulnerable to shocks**. If mortgage interest rates were to rise—either driven by a gradual normalisation in monetary policy or by wider risk premiums[30]—highly-indebted households may need to rapidly reduce consumption to meet rising mortgage payments. This would reduce demand and raise uncertainty, potentially weighing on growth and employment and thus further decreasing households' ability to service their mortgages. Ultimately, this could lead to a disorderly deleveraging process with a significant broader macroeconomic impact, in line with historical developments in some other countries facing a combination of high house prices and household debt ...

[30] Wider mortgage risk premiums could potentially be triggered by, for example, a house price correction, a wider economic slowdown or higher funding costs for banks as market perceptions of their riskiness worsen.

OECD (2017, p. 26) states:

> [I]mportantly, highly indebted households tend to reduce consumption disproportionately when housing prices fall, as illustrated by recent developments in Denmark and

> the Netherlands, the two OECD countries with the highest household debt-to-income ratios. The vast majority of Swedish mortgages carry a variable interest rate, which increases the vulnerability of households to interest rate increase.

Thus, both the European Commission and the OECD refer to the interest sensitivity of consumption. But they do not mention the endogeneity of interest rates—discussed in section 4.2—and the fact that, for countries like Sweden with a flexible exchange-rate regim and monetary policy following flexible inflation targeting, recessions and crises are characterized not by high but by low interest rates and, with variable mortgage rates, improved household cash flows. Furthermore, with respect to the possibility of rising mortgage risk premiums, the Euro Commission does not mention the obvious policy response in Sweden, namely—given that the problem would be a liquidity problem for banks, not a solvency problem—liquidity support and lending of last resort by the Riksbank or the NDO.

In addition, the reference to developments in Denmark and the Netherlands concerns the correlation between high household indebtedness and subsequent spending falls. But, as far as I can see, there is no discussion of causality, of what mechanism or common factor has caused the correlation, and whether or not that mechanism or common factor is present in Sweden. There is no specific discussion of whether the housing collateral channel is operating or not in Sweden. Instead, a negative causal effect of indebtedness on subsequent consumption growth is apparently taken for granted.

Generally, the housing and mortgage markets and other relevant structural characteristics vary considerably across countries. This means that results and conclusions from one country do not easily carry over to other countries and that superficial comparisons of indicators across countries become misleading. For reliable analysis and conclusions, there is no choice but to study a given country in depth, taking all the relevant local circumstances into consideration. As Muellbauer (2012, p. 97) puts it:

> For assessing whether a housing market is overheated enough to threaten financial and economic stability, policymakers should avoid relying on analysis from a 'sausage machine' approach to large multi-country datasets which skate over data quality, a proper treatment of the supply side and of credit markets, and institutional variation across countries and over time.

Finally, it is noticeable that the IMF (2017) Article IV report is less alarmist than the European Commission and the OECD. It emphasizes the structural problems in the Swedish housing market. It does not mention any specific risks from housing prices and household debt and does not provide any detailed analysis of such risks, but it nevertheless supports the second amortization requirement, with further steps, including debt-to-income limits, to be implemented "if needed." In contrast, OECD (2017) directly suggests a DTI limit as an additional policy action, but does not provide any particular analysis in favor of that measure.

### 5.1 Summary

In summary, as far as I can see, the international organizations mentioned do not seem to provide any more thorough or more sophisticated analysis of Swedish housing prices and household debt than what is already provided by the FI. Their assessments seem open to same criticism as that provided in sections 2–4 above. The organizations have not been able to show that Swedish housing prices and household debt are too high or that Swedish household indebtedness poses a macroeconomic risk.

Furthermore, Swedish authorities often refer to these international organizations as providing "independent" support of their policy and actions. My experience from a six-year term as a deputy governor and executive-board member at the Riksbank is that at least some organizations' missions to Sweden have been subject to considerable pressure and persuasion to write in the favor of an authority and support its policies. Furthermore, because national authorities have an advantage regarding information and resources, it is more demanding and risky for a mission to write a critical rather than a supportive report, especially when the different authorities agree among themselves. Thus, the incentives are to some extent in favor of supporting national authorities and this way making the support less independent. I have indeed a few times during my term seen internal celebratory emails from officials reporting that a mission after some persuasion had revised part of a report in a desired direction.

## 6 Conclusions

This paper answers three questions about current Swedish housing prices and household debt: (1) Are housing prices too high? (2) Is household debt too high? (3) Does household debt pose an "elevated macroeconomic risk"? Whereas Finansinspektionen, (FI, the Swedish FSA) has argued that the answers to these questions are all *yes* and that this justifies a substantial tightening of lending standards achieved through mandatory amortization requirements and some pressure on lenders to tighten lending standards in other ways. This paper argues that the answers to the questions instead are all *no*.

Regarding question (1)—whether Swedish housing prices are too high—during the last ten years, price-to-income (PTI) ratios have risen. This is itself not surprising, given the underlying fundamental and structural problem in the Swedish housing, namely a structural excess demand due to a growing structural demand for housing in the major cities together with structural supply restrictions. There is also a lack of a functioning rental market—due to rent control.

But, more importantly, the price-to-income ratio is not a good indicator. The interest-payments-to-income (IPTI) ratio, calculated as interest rates times housing prices divided by disposable income, is a better indicator. It can be seen as the interest payments for mortgages of a constant LTV ratio, or as a simple capital cost of housing. During the last ten years, the IPTI ratios have fallen much more than the PTI ratios have risen. For Stockholm apartments, the PTI ratio have

risen by about 13%, whereas the IPTI ratio has fallen by 30% or more. The more relevant user-cost-to-income (UCTI) ratio has fallen even further. For Stockholm apartments, the UCTI ratio has fallen by about 60%. Thus, prices have not risen so much as to keep IPTI and UCTI ratios stable.

Furthermore, these interest payments and user costs are calculated with a 10-year mortgage rate, which after the deduction of a term premium can be seen as banks' expectations of average short mortgage rates during the next 10 years. In addition, the user costs are calculated under the assumption of a zero real after-tax capital gain. That they nevertheless have fallen substantially indicates that households are not speculating in future capital gains. There is thus no evidence that current housing prices are too high relative to what is consistent with their fundamental determinants and what they were in June 2008.

However, comparing with housing prices ten years earlier is a relative valuation. One can also make a more absolute valuation. As an example, the current user cost of an average Stockholm studio is only about 16% of the median net income of 25–29-year-old individuals in Stockholm. This indicates that housing prices are not too high in an absolute sense. The user cost is actually substantially lower than the rent for rent-controlled Stockholm studios, which in turn is much below the market rent on Stockholm studios in the secondary rental market.

Finally, there is no indication that households have overoptimistic expectations of low future mortgage rates. Households' expectations of future mortgage rates are substantially higher than banks' expectations. Neither is there any indication that households have overoptimistic expectations of future housing prices.

Altogether, there is no evidence that housing is overvalued relative to levels justified by fundamental determinants.

Regarding question (2)—whether Swedish household debt is too high—there is no indication that Swedish household debt is too high, given housing prices, and the value of household assets, and the answer to question (1), that there is no evidence that housing is overvalued. The ratio of household debt to total assets (excluding collective pension claims) is stable at below 30%. The ratio of household debt to real assets (single-family houses, tenant-owned apartments, and second homes) is on a downward trend and now below 50%. The growth rate of the debt-to-income-ratio is not far from its long-run mean and has fluctuated around its long-run mean in recent years.

In particular, there is no indication of household debt posing a threat to financial stability. With an LTV limit of 85%, an average LTV ratio of 63% for new borrowers, and an average LTV of 55% for the total stock of mortgages, households have on average ample housing equity. Furthermore, the FI's stress tests in its annual mortgage market report—with individual household data—shows that borrowers have good and over time increasing debt-service capacity and, in particular, very high and increasing resilience to disturbances in the form of housing-price falls, interest-rate rises, and income losses due to unemployment. Thus, the risk of credit losses on mortgages is very small. Should they nevertheless materialize, banks have satisfactory capital buffers to absorb them.

Indeed, the FI correctly judges that "the financial-stability risks associated with household debt are relatively small."

Regarding question (3)—whether Swedish household debt poses an elevated macroeconomic risk—there is indeed evidence from Denmark, the UK, and the US of a *correlation* between households' pre-crisis indebtedness and subsequent negative consumption responses during the financial crisis 2008–2009. But there is no evidence that high household indebtedness *caused* a subsequent larger negative consumption response. The correlation is instead explained by an underlying common factor that caused both high pre-crisis indebtedness and a large negative crisis consumption response. For Denmark, the UK, and the US, the evidence is that this factor is debt-financed household overconsumption relative to income, more precisely overconsumption financed by housing equity withdrawal (HEW). Through the housing collateral channel, increasing housing prices pre-crisis allowed households to use HEW to finance such overconsumption. When the crisis came, housing prices no longer increased but fell, and lending standards were tightened. Then the HEW and the overconsumption could no longer be maintained. The overconsumption resulted in a low saving rate in Denmark, the UK, and the US before the crisis, and the saving rate rose substantially during the crisis.

Importantly, there is no evidence that the housing collateral channel is strong in Sweden and that there is any debt-financed overconsumption of a magnitude that would be of macroeconomic significance. In contrast to what was the case in Denmark, the UK, and the US before the 2008–2009 crisis—and to what was the case in Sweden before the 1990s crisis—the Swedish household saving rate is now at a historical high. Also, the consumption of durables is moderate and not excessive.

Furthermore, microdata studies of existing HEW in Sweden show that it has been used to pay off high-interest unsecured consumer loans and thus to achieve a more efficient and resilient household debt composition. It has also been used to finance startup businesses. There is also evidence that it has been used to smooth consumption in the face of income shocks during the crisis. Interestingly, the HEW seems to have been used to increase resilience and reduce the consumption response in the crisis rather than the other way.

It is true that high household debt with variable mortgage rates makes the cash-flow of indebted households more sensitive to interest-rate changes. But this creates a strong cash-flow channel for the transmission of monetary policy and makes it easier for the Riksbank to stabilize consumption by lowering the policy rate or keeping the policy-rate as low as possible in a crisis. In particular, the cash-flow channel implies that highly indebted households benefit more than less indebted households—and renters—from the low interest rates associated with recessions. Mortgages with variable interest rates this way provide some insurance against recessions and work as an automatic stabilizer.

However, one might think that, in a crisis, the Swedish banks might face some difficulties issuing mortgage-backed bonds to financing their mortgage lending and that this might increase

the spread between mortgage rates and the Riksbank policy rate. But, given the safety of Swedish mortgages and the high capitalization of the banks, this would be a clear *liquidity* problem, not a *solvency* problem. It then justifies policy action in the form liquidity support and lending of the last resort by the Swedish National Debt Office or the Riksbank, which would prevent the spread from increasing—as such policy action did during the 2008–2009 crisis.

In addition, in the severe *real-time* stress test of Swedish households that the 2008–2009 crisis provided—with falling housing prices and increasing unemployment—household consumption fell only a little, and the saving rate rose only a little. Indeed, household consumption helped stabilize the economy when export and investment collapsed. This real-time stress test does not provide any evidence for Swedish household indebtedness posing a macro economic risk.

In a paper with the in this context particularly relevant title—"When is a housing market overheated enough to threaten stability?"—Muellbauer (2012, p. 73) emphasizes that, when assessing possible housing overvaluation, it is helpful to distinguish between, on the one hand, housing overvaluation due to extrapolative expectations and "frenzy"—overoptimism and exuberance— at given fundamentals, and, on the other hand, shifts in possibly fragile fundamentals. The examination above of any overoptimism and other aspects of frenzy and of the state of fundamentals shows that there is no indication of any frenzy or any fragile fundamentals and therefore, on both accounts, no evidence of any overvaluation of Swedish housing and any associated threat to financial or macroeconomic stability.

That the answers to these questions, in particular question (3), are *no* rather than *yes* implies that the FI's rationale for its recent tightening of lending standards vanishes. The fact is that the FI's tightening of lending standards lacks scientific support.

The FI has received considerable criticism for its introduction of amortization requirements, but its macroprudential policy has also been criticized in more general terms. The Swedish National Accounting Office—an authority under the Riksdag, the Swedish parliament—has provided considerable and comprehensive criticism of Swedish macroprudential policy and the FI. It has stated among other things that both the objective of the macroprudential policy and the links between risks and actions are unclear and has proposed some recommendations for improvements (Swedish NAO, 2018).[59]

[59] The recommendations are:

- The Government should clarify the objective of FI's macroprudential remit and at the same time make it clear how FI is to rank various trade-offs.
- FI should indicate interim objectives in line with the ESRB's recommendations, or more clearly justify and describe how vulnerabilities are used as operative support for decisions on measures.
- FI should develop and implement a more detailed framework document in order to ensure the effectiveness of macroprudential supervision and make it more transparent and predictable. In that context, FI should explain more clearly than at present the pros and cons of the different instruments.
- The Government should provide reference material for its positions on macroprudential measures that require its consent, and thus supplement FI's analyses with macroeconomic and distribution policy analyses.
- The agencies who are obliged to contribute to financial stability should continue to develop cooperation on the choice of instrument, so that more types of measures are analysed and compared in order to effectively achieve financial stability.

That there is no evidence that Swedish household debt poses an elevated macroeconomic risk means that the tightening have little or no benefits in reducing any risks. But they have substantial costs, as further explained in Svensson (2019a). As we have seen in section 1.1, the tightening is substantial. According to one simple measure, the tighter lending standards of managing a 7% interest rates and amortization requirements of 3% are (for an individual with a 30% income tax rate) equivalent to a requirement that a borrower can manage an interest rate of $7 + 3/(1 - 0.3) = 11.3\%$ on an interest-only loan, which is an increase of 5.3 percentage point over a requirement before the tightening that the borrower can manage a 6% interest-rate on an interest-only loan.

As a second measure of the magnitude of the tightening of lending standards, we noted that with the tighter lending standards, only the top 20% of the income distribution of Stockholm 25–29-year-old individuals have enough income to pass the banks' affordability tests and obtain a loan of 85% of the price of an average Stockholm studio. Before the tightening, the top 50% of the income distribution had enough income. This can be seen as a credit contraction of $(50 - 20)/50 = 60\%$ for this group of individuals. And given the lack of the a functioning rental market—due to rent control—those excluded from borrowing may have to go to the secondary rental market with short-term leases and exorbitant rents. Clearly, this provides some indication of the substantial welfare costs caused.

Furthermore, a policy that excludes a substantial share of households from borrowing to buy a home (the user cost of which) they can easily afford—and leaves them exposed to the expensive and temporary housing in secondary rental market—is hardly consistent with the FI's objective to ensure that the financial system "has smoothly functioning markets that meet the needs of households and corporations for financial services, and provides comprehensive protection for consumers" (Swedish Ministry of Finance, 2017; FI, 2014).

Finally, as further examined in Svensson (2019a), mandatory amortization requirements increase the fixed monthly housing payments, make more borrowers credit- and liquidity-constrained, and force them to undertake more involuntary saving. Indebted households become less resilient to income shocks. They find it more difficult to smooth consumption when hit by income shocks, and their consumption become more sensitive to income shocks (Baker, 2018). When sufficiently constrained, they even become hand-to-mouth consumers (Campbell and Mankiw, 1989; Kaplan et al., 2014; Ampudia et al., 2018), with a marginal propensity to consume out of income approximately equal to one. Indebted households will reduce their consumption more when incomes fall, which may indeed reinforce a recession. It follows that mandatory amortization requirements may increase macroeconomic risk and are counterproductive as a measure to reduce macroeconomic risk.

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# Appendix

## A A brief history of the first amortization requirement

The story that ends with the first amortization requirement of June 2016 has some twists and turns. In November 2010, at least one bank offered mortgages up to an 85% LTV ratio without any amortization (SBAB, 2010, see footnote 8 above). In December 2010, the Swedish Bankers' Association (SBA) issued a recommendation that mortgages should be amortized down to an LTV of 75% in 10–15 years (Swedish Bankers' Association, 2010).[60] The Riksbank for several years argued rather intensely in favor of amortization requirements, for example in Sveriges Riksbank (2012), where it also reported that almost 60% of new mortgage holders did not amortize in 2011 (chart 3:7). Household indebtedness and amortization requirements were increasingly debated (about amortization requirements, for example, Svensson, 2013b).

In March 2013, the minister for financial markets, Peter Norman—perhaps to some extent in response to the Riksbank's intense arguing— announced that the Government had given Finansinspektionen (FI) an assignment to strengthen the foundation of a "healthy amortization culture" ["sund amorteringskultur"] (Norman, 2013). According to the assignment, the FI should investigate what is needed for an appropriate regulation that would require mortgage firms to suggest an individually tailored amortization plan to mortgage customers or existing customers who increase their loans.

The explicit assignment to the FI stated (Swedish Ministry of Finance, 2013, section 7; my translation):

> 7. [Finansinspektionen] shall, for the purpose of strengthening the foundation of a healthy amortization culture, investigate the conditions for appropriate regulation that would require mortgage firms to provide proposals for an individually tailored amortization plan to new mortgage customers or existing customers wishing to increase their loans.
>
> By an amortization plan is meant a written plan, which describes the time profile for amortization and extends far into the future. *In the amortization plan the mortgage firm shall justify why the plan is in the customer's long-run interest. The documentation shall also report the customer's attitude toward the plan. The measure does not intend to restrict the freedom of contract between the mortgage firm and the borrower. The amortization plan shall not include a formal requirement to amortize. ...*

That the purpose of the measure was neither to restrict the freedom of contract nor to introduce a mandatory amortization requirement but to give the customers better information was also emphasized by the minister (Norman, 2013, my translation):

> The purpose of the commission is to give households better information, not to limit the freedom of choice. *There shall not be any formal amortization requirement. Mandatory requirements of amortization risks affecting individual households' economic situation in a clearly negative way if their situation in life suddenly changes.*

In October 2013, the FI published a report proposing that the banks should offer their customers individually tailored amortization plans (FI, 2013a). The stated purpose was "to increase consumer awareness of and knowledge about the importance of amortization, and hence promote

[60] Assuming 15 years, linear amortization, and starting from the LTV limit of 85%, this means amortizing on average $(85 - 75)/15 = 0.67\%$ per year of the mortgage at origination.

sound, stable financial markets." The FI stated that it could introduce a regulation enforcing the recommendation, but that this would first require an amendment in the Consumer Protection Act. Importantly, the proposal did not include a mandatory requirement for customers to amortize their mortgages.

In response to the public discussion about amortization—and presumably in the hope of avoiding an inflexible regulation—the SBA introduced a recommendation for banks to provide individually tailored amortization plans for borrowers in March 2014, as well as tightening its amortization recommendation to include loans with an LTV of more than 70% rather than 75%. The recommendation should be applied fully from July 2014. (Swedish Bankers' Association, 2014b,c).[61]

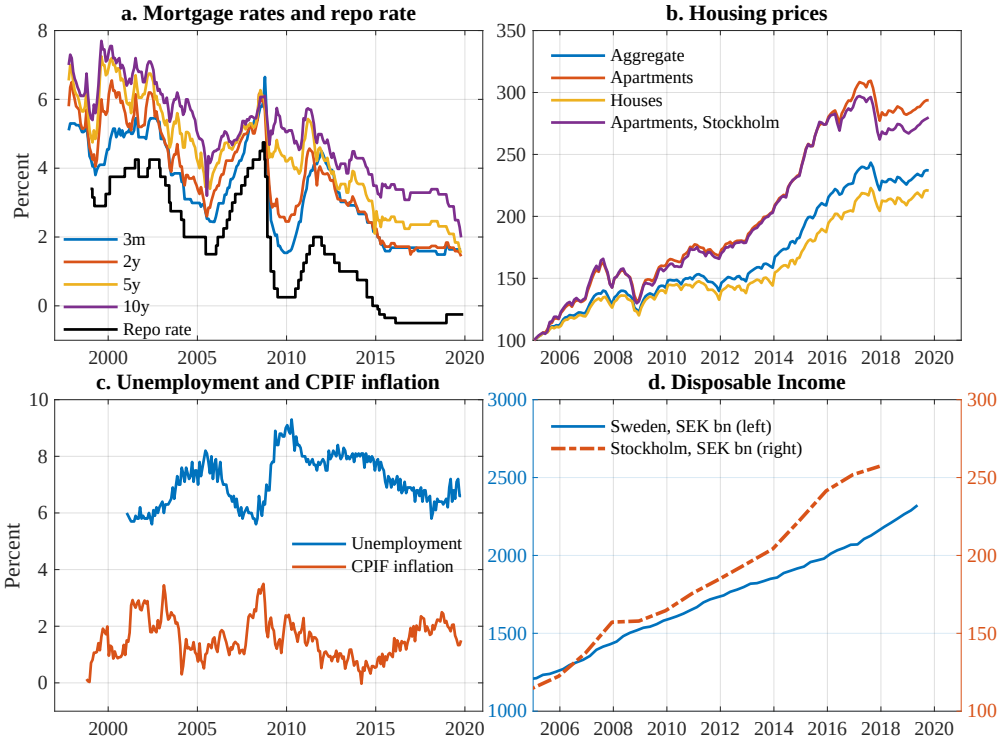
In October 2014, the SBA announced that it intended to tighten the recommendation, to involve amortization down to 50% (Swedish Bankers' Association, 2014a). However, the Swedish Competition Authority (SCA) announced in November 2014 that such a recommendation from the SBA is a tightening and would concern a larger share of the stock of mortgages than before. Given that that the SCA considered amortization conditions as one of the most important means of competition for the banks, it had made a preliminary judgment that such a recommendation by an industry association might limit competition in a way that benefits the banks affected and therefore violate the competition regulations. Therefore, any limitation of the freedom to choose amortization conditions would better be a regulation by a public authority. Given this, the SBA withdraw its 2014 recommendations (Swedish Competition Authority, 2014).

At this stage, the FI might have re-proposed its more flexible regulation about individually tailored amortizations plans without a mandatory amortization requirement. Instead, in November 2014, the FI announced that it planned to propose a regulation about mandatory amortization. The proposal was announced in March 2015. However, the Court of Appeal of the city of Jönköping noted that the FI did not have the legal authority to introduce the regulation. In September, the government proposed new legislation to give the FI the authority. The FI proposed a new regulation about amortization requirements in December 2015 (FI, 2015), which after the introduction of the new legislation and the government's consent were finally introduced in June 2016.

[61] Assuming 15 years, linear amortization, and starting from the LTV limit of 85%, this means amortizing on average $(85 - 70)/15 = 1\%$ per year of the mortgage at origination.

# B Data, assumptions, and additional figures

Figure B.1: Morgage rates, housing prices, repo rate and disposable income.



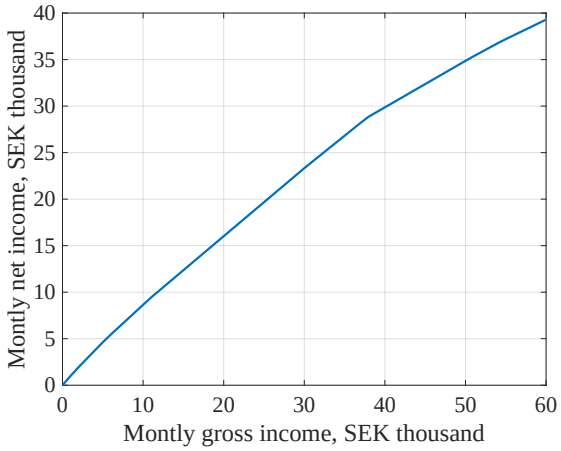

Source and note: SBAB, Statistics Sweden, Thompson Reuters Datastream, Valueguard. Stockholm refers to Stockholm Municipality. Housing prices are in current prices, indexed to 100 for January 2005. The unemployment rate is for ages 15-74 years, seasonally adjusted. Disposable income Sweden is a trailing 4-quarter moving sum of quarterly disposable income; disposable income Stockholm is annual data plotted in the middle of the 4th quarter of each year; current prices in SEK bn. SEK/EUR $\approx$ 10.

Table B.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 | SEK 2,100 |
| Monthly benchmark living costs | SEK 9,300 |
| Down payment, 15% | SEK 0.42 mn |
| Mortgage, LTV ratio 85% | SEK 2.38 mn |
| Interest rate | 3.3% |
| Capital-income tax rate | 30% |
| Capital-gain tax rate | 22% |
| Expected inflation rate | 2% |
| Real capital gain after tax | 0% |

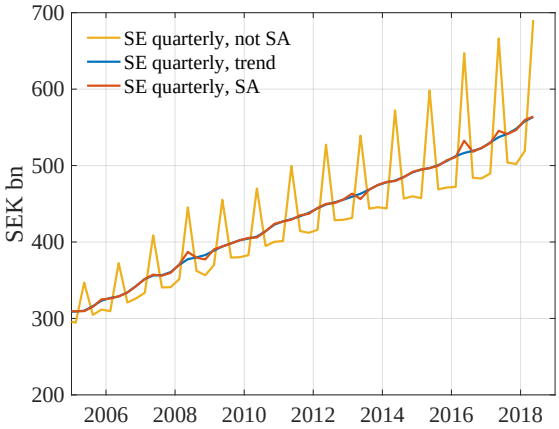
Source and note: Source for price, size, and monthly fee to the tenant-owner association is Svensk Mäklarstatistik. They refer to the mean of the studio transactions during 2017. The operating and maintenance cost is approximated by the monthly fee of SEK 1,900 plus an additional monthly operating cost of SEK 200. The benchmark living costs for single adult are from FI (2017e, appendix 1) and exceed by SEK 2,950 the estimates of the costs of a reasonable consumption standard by the Swedish Consumer agency. See Svensson (2019a) for details. SEK/EUR $\approx$ 10.

Figure B.2: Monthly gross and net income for a single adult.




Source and note: The Swedish Tax Agency's 2017 Tax Table 30, column 1. Linear interpolation with breakpoints SEK/month 0; 1,500; 5,400; 11,000; 30,200; 37,800; 50,600; 54,400; and 80,000. A previous calculation used an approximation of the tax schedule from FI (2018d, footnote 24), which exaggerated the income tax somewhat. SEK/EUR ≈ 10.

Figure B.3: Quarterly disposable income: Note seasonally adjusted, seasonally adjfand trend.




Source and note: Statistics Sweden and own calculations. Seasonal adjustment and trend calculated with EViews and X11-Auto settings. SEK/EUR ≈ 10.

Figure B.4: Monthly housing payment, user cost, and involuntary saving: Without amortization.

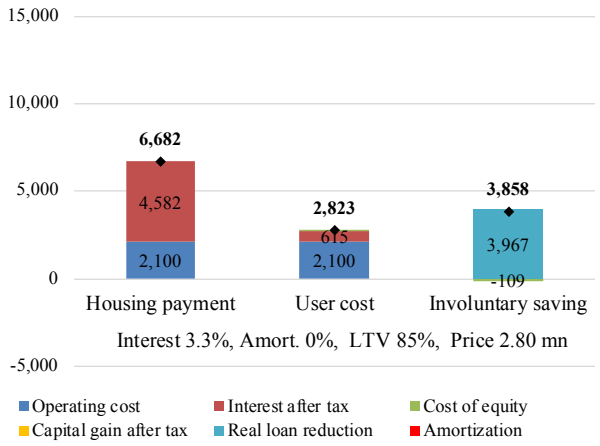
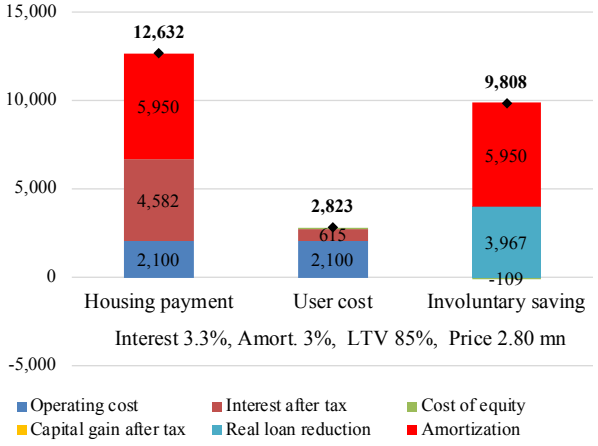



Figure B.5: Monthly housing payment, user cost, and involuntary saving: With amortization requirements.



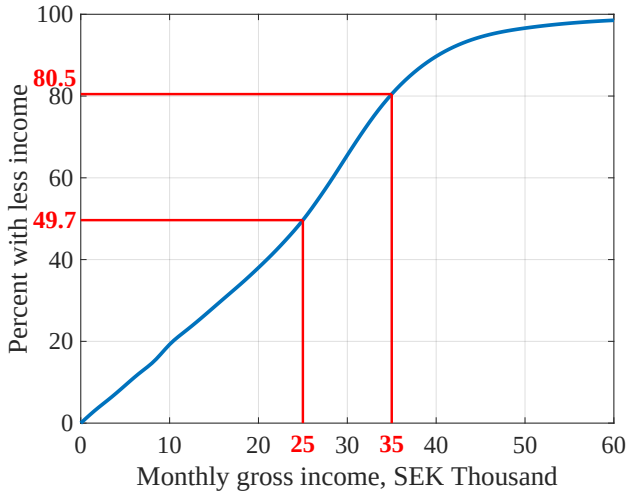

Source and note: Own calculations; see Svensson (2019a) for details. Assumptions as in table B.1. The housing payment equals the operating and maintenance cost plus the after-tax interest on the loan and the amortization. The user cost equals the operating and maintenance cost plus the real after-tax interest on the mortgage plus the real cost of equity minus the real capital gain after tax. 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 gain minus the real cost of equity. The rate of return on equity is set equal to the real after-tax interest rate. With amortization requirements, the amortization rate is 3% for an LTV ratio above 70% and an LTI ratio above 4.5. SEK/EUR ≈ 10.

Table B.2: Affordability calculations for an average Stockholm studio and a single individual, before and after the tightening of lending standards.

| | Before | After | Increase |
|---|---|---|---|
| Loan, SEK | 2,380,000 | 2,380,000 | |
| Benchmark living costs, SEK/month (1) | 9,300 | 9,300 | |
| Operating costs, SEK/month (2) | 2,100 | 2,100 | |
| Interest rate in stress test | 6% | 7% | 1 pp |
| After-tax interest in stress test, SEK/month (3) | 8,330 | 9,718 | 1,388 |
| **Required gross income increase, SEK/month** | | | **1,945** |
| Amortization rate | 0% | 3% | 3 pp |
| Amortization, SEK/month (4) | 0 | 5,950 | 5,950 |
| **Required gross income increase, SEK/month** | | | **8,336** |
| Minimum net income, SEK/month = (1+2+3+4) | 19,730 | 27,068 | 7,338 |
| **Minimum gross income, SEK/month** | **25,081** | **35,363** | **10,282** |

Source and note: Assumptions as in table B.1. "Before" is represented by an interest-rate stress tests with a 6% interest rate and no amortization. ''After" 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.2, taking into account the increase in the marginal tax rate from 27% to 30% at the breakpoint SEK 30,200. Required gross income increases are calculated with an average marginal tax rate of 28.62%. SEK/EUR ≈ 10.

Figure B.6: Cumulative income distribution 2017 for individuals of age 25–29 years in Stockholm Municipality.




Source and note: Statistics Sweden (2019d) and Svensson (2019a). The curve is a fitted 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 about SEK 25,120. SEK/EUR $\approx$ 10.