Nordic Council of Ministers

FINANCIAL REGULATION AND MACROECONOMIC STABILITY in the Nordics

Nordic Economic Policy Review 2020

FINANCIAL REGULATION AND MACROECONOMIC STABILITY
in the Nordics

Nordic Economic Policy Review 2020

FINANCIAL REGULATION AND MACROECONOMIC STABILITY in the Nordics
Nordic Economic Policy Review 2020

Nord 2020:025
ISBN 978-92-893-6565-9 (PRINT)
ISBN 978-92-893-6566-6 (PDF)
ISBN 978-92-893-6567-3 (EPUB)
ISSN 1904-4526 (PRINT)
ISSN 1904-8092 (PDF)
http://dx.doi.org/10.6027/Nord2020-025

Layout: Gitte Wejnold and Louise Jeppesen
Print: Rosendahls

Printed in Denmark

NORDIC SWAN ECOLABEL
Printed matter
5041 0457

Nordic co-operation
Nordic co-operation is one of the world's most extensive forms of regional collaboration, involving Denmark, Finland, Iceland, Norway, Sweden, the Faroe Islands, Greenland, and Åland.

Nordic co-operation has firm traditions in politics, the economy, and culture. It plays an important role in European and international collaboration, and aims at creating a strong Nordic community in a strong Europe.

Nordic co-operation seeks to safeguard Nordic and regional interests and principles in the global community. Shared Nordic values help the region solidify its position as one of the world's most innovative and competitive.

Nordic Council of Ministers
Nordens Hus
Ved Stranden 18
DK-1061 Copenhagen
www.norden.org

Read more Nordic publications: www.norden.org/publications

Contents

Financial Regulation and Macroeconomic Stability in the Nordics

Lars Calmfors[1]
Peter Englund[2]

[1] Research Institute of Industrial Economics and Institute for International Economic Studies, Stockholm University. Email: lars.calmfors@iies.su.se.
[2] Stockholm School of Economics and Uppsala University. Email: peter.englund@hhs.se.

1. Introduction

The financial system channels resources from savers to investors. It helps firms to fund new investments and households to smooth consumption over time. It allows entrepreneurs to offload risk on outside investors, and households and firms to access liquidity that helps them carry out their consumption and investment plans. A well-functioning financial system is essential to the workings of the economy. But the financial system, if left on its own, tends to be fragile. Once in a while, the system gets disturbed and a financial crisis shatters the economy. The Nordic countries all saw deep financial crises in the years around 1990 (starting already in 1988 in Norway and somewhat later in the other countries). In 2008, instabilities in the U.S. housing finance market, following a period of excessive credit expansion there but also elsewhere (for example in Denmark), spread to create a global financial crisis with serious ramifications for the Nordic countries, too.

The costs of financial crises for the real economy are usually large. Output falls, unemployment rises and stays high, and government rescue operations raise government debt. The effects tend to be long-lasting.

The insight that the financial system is fragile has since long motivated regulations of banks and other financial institutions. The global financial crisis proved that previously existing regulations were inadequate and triggered an overhaul of the regulatory framework. This is still work in progress.

Broadly speaking, risks and costs of financial crises depend on three factors: (i) the robustness of the financial sector itself; (ii) the robustness of the non-financial economy, households and firms; and (iii) the ways of resolving a crisis, should it occur. The regulatory framework that has emerged following the financial crisis addresses all three factors.

Traditionally, most regulatory effort has focused on the first of these factors: to make banks and other financial institutions safe enough. Negotiations under the auspices of the Basel committee have aimed at making banks sufficiently robust to withstand even

very large shocks to solvency and liquidity.[3] This has resulted in a detailed web of regulations regarding capital requirements to ensure that banks are solvent with a sufficient margin, and on so-called net-stable-funding ratios and liquidity-coverage ratios to guarantee continued liquidity even during periods of severe stress. The new Basel III framework, a set of regulations developed in response to the 2007–2009 global financial crisis, is currently in the process of being implemented at the national level. The details and pace of introduction vary considerably across countries, with the Nordic countries generally at the forefront.

Research has shown a close connection between financial crises and indebtedness of the private sector: a rapid increase of private-sector debt in Finland before 1991, highly-leveraged real-estate developers in Sweden in 1992, subprime borrowers and owners of mortgage-backed securities in the U.S. in 2008, and over-consuming Danish households in 2009 played major roles for subsequent crises. As a result, much attention has been given to the fragility of private-sector balance sheets. So-called macroprudential regulation has emerged as a policy field of its own with new tools under development. In practice, measures have so far primarily concerned monitoring and regulation of household debt, e.g. in the form of amortization requirements as well as loan-to-value and loan-to-income stipulations.

The third important factor is how a crisis is resolved. Historically, large sums of taxpayer money have been used to bail out bank owners, often with lasting effects on sovereign debt and sometimes to such an extent that risk premia on sovereign bonds have soared with further feedback effects on government finances, which have in turn had repercussions on banks etc. (the infamous *doom loop*). To reduce the risk of the state having to take over failed banks, bail-in of creditors has been launched as an alternative to bail-out. The idea is that by letting some debt instruments absorb losses and converting such instruments into equity, an otherwise healthy bank which suffers large temporary losses can be kept in business with-

[3] The Basel Committee on Banking Supervision, hosted by the Bank for International Settlements (BIS) in Basel, is comprised of central banks and bank supervisors from 28 jurisdictions. The committee's mandate is to strengthen the regulation, supervision and practices of banks worldwide with the objective of enhancing financial stability.

out costs to taxpayers. Bail-in is a key part of the new resolution procedure for troubled banks agreed upon in the EU.

The Nordic countries have gone further in putting the evolving regulatory framework to work than many other countries. Capital requirements are generally set higher than required by the Basel rules, supervisory authorities are actively pursuing the macroprudential agenda with restrictions on household debt, and resolution planning is well advanced.

2. The articles in the volume

This year's volume of the Nordic Economic Policy Review is devoted to the question of how well the new financial regulations are likely to work and to what extent they will contribute to macroeconomic stability. Preliminary versions of the five papers in this volume were presented and discussed at a conference in Helsinki, hosted by the Finnish Ministry of Finance, on the 12th of December, 2019. The contributions address a number of pertinent questions:

- How stable is the financial sector in the Nordic countries today?
- Should monetary policy be used to stabilize household debt?
- What are the costs and benefits of amortization requirements and other elements of macroprudential regulation related to household debt?
- What are the prospects and problems of the new European bail-in rules?
- Which are the arguments pro and against non-euro countries joining the EU banking union?

The articles were all finished before the outbreak of the corona crisis, so they do not contain any assessments of the effects this might have on the interaction between the macro economy and the financial sector.

2.1 How stable is the financial sector in the Nordic countries?

Jesper Rangvid provides an overall assessment of financial stability in the Nordics. As a historical background, he gives a short recapitulation of the crises around 1990 and in 2008, and notes sev-

eral common characteristics. Financial liberalizations helped trigger high growth in lending prior to the crises. Lending was often related to the real-estate sector. When the crises occurred, house prices dropped significantly, economic activity contracted, and unemployment rose. The paper extrapolates past growth trends to calculate losses from the crises in terms of foregone GDP. Losses accumulate to a staggering one or two years of economic output.

To analyse the current situation (before the corona crisis), Rangvid looks at a number of indicators with a potential to predict crises. Overall, the Nordic banking sectors are more robust today than before as a result of stronger regulation. Nordic banks are well capitalized compared with the period prior to the 2008 crisis and compared with banks in other European countries. Credit losses have been almost non-existent.

Lending has been growing at a steady pace but there are no signs of sudden bursts of lending, as has preceded earlier crises. In all Nordic countries, house prices and household debt levels are high by historical standards. In fact, growth in house prices and household leverage has been persistent during the last three decades (Denmark with faster growth before the global financial crisis, and a bust in house prices following it, being the only exception) and with no signs of a trend break in recent years. The overall conclusion is that traditional indicators of elevated risk of financial crises are not flashing red.

Low interest rates have contributed to raising asset prices, in particular house prices. Low interest rates make asset prices particularly sensitive to interest-rate movements. Recent asset prices reflect market expectations that interest rates will remain low for several years to come. Sudden unexpected increases in interest rates could, however, cause asset prices to fall. This would affect the wealth and solvency of households and could pose a threat to financial stability.

On the other hand, if interest rates remain negative for a long time, it could hurt bank profitability. If banks are unwilling or unable to pass on negative interest rates to depositors, bank profits will suffer.

In conclusion, Rangvid stresses that crises, almost by definition, emerge from unexpected directions, and mentions cyber risks as one such new source of a future crisis. That the next macroeconomic – and possibly financial – crisis would come from a virus was obviously not easy to predict. It was neither in Rangvid's nor in our list of potential economic shocks.

2.2 Monetary policy and household debt

Martin Gulbrandsen and *Gisle Natvik* address the interplay between household debt accumulation and monetary policy. Recent empirical evidence indicates that household borrowing may raise the risks of deep economic recessions. Hence, household debt accumulation seems a valid concern for a central bank aiming to stabilize economic activity. A common policy view is therefore that central banks should 'lean against the wind' and try to counter rises in household debt by keeping interest rates higher than what is motivated by concerns regarding only inflation and resource utilization. The authors challenge this conventional wisdom.

A growing research literature emphasizes the role of household balance sheets and cash flows in the transmission of monetary policy. An important feature of these contributions is that many households are assumed to be liquidity-constrained. Based on the logic of these models, a likely key channel through which real interest changes affect household behaviour is households' interest expenses: if a higher interest rate reduces the cash flows of indebted households, they may borrow more or repay less debt in order to smooth their consumption. In addition, interest hikes may raise the real value of household debt by pushing inflation down (the Fisher effect). The two effects both work in the direction of real-debt increases when real interest rates increase. This is in contrast to the traditional intertemporal substitution effect of interest hikes, according to which households are induced to re-allocate consumption from today to tomorrow as the relative price of future consumption falls.

One would expect high debt levels not only to pose risks to aggregate demand, but also to shape how monetary policy affects debt accumulation itself. The paper provides micro-level snapshots based on Norwegian data on how household cash flows and debt accumulation co-move with interest rates and inflation. Unlike the

naive logic of stylized models, which stress intertemporal substitution, hikes in realized real interest rates are found to be associated with *higher* growth in real household debt. This pattern is driven by a strong association between inflation and real debt growth: the growth of real debt falls when inflation goes up and increases when it goes down.

The authors show that the positive association between the real interest rate and real-debt growth is driven by 'stayers', i.e. households that do not change address (the intensive margin). This is consistent with these households following nominal amortization plans under existing mortgage agreements. In contrast, 'movers' (the extensive margin) enter into new mortgage agreements when buying a new home, which gives more scope for intertemporal substitution to play out.

This descriptive evidence illustrates why careful microeconomic studies are needed to inform discussions of how monetary policy should best respond to household debt movements. The authors caution policymakers against pursuing contractionary policies that reduce inflation in the belief that this will curb real debt. By lowering inflation, such policies might backfire by leading to higher, not lower, household real-debt burdens. Rather than to explicitly target stabilization of debt per se, it might be better if central banks simply target inflation at not too low levels, yielding stable real-debt growth as a by-product.

2.3 Macroprudential policy and household debt

In the last decade, macroprudential policy has evolved as a new policy area. Analysing the Swedish experience, *Lars E. O. Svensson* discusses if and when household debt poses a financial-stability problem that should be addressed by macroprudential measures. He argues that the measures undertaken by the Swedish Financial Supervisory Authority, *Finansinspektionen* (FI), such as amortization requirements and loan-to-value caps, have led to a substantial credit tightening with no demonstrable benefits but substantial individual and social costs.

Svensson scrutinizes the analysis behind these measures. They are largely based on the view that there is a risk that highly indebted

households may sharply reduce their consumption after a macroeconomic shock, which could deepen an economic downturn, such as happened in other countries during the 2008–2009 financial crisis. Credit tightening is supposed to reduce this risk by reducing household indebtedness.

According to existing empirical research, quoted by Svensson, the consumption fall in those other countries was not caused by indebtedness in itself but by households' having used mortgages to finance an unsustainable consumption boom before the crisis, which turned to a bust and thus contributed to the crisis. But Svensson sees no signs of such over-consumption recently in Sweden, where the saving rate, on the contrary, has risen to a historic high. Furthermore, Svensson argues that households' ability to maintain consumption when income falls does not depend on indebtedness per se but on cash-flow margins and access to liquidity. In this sense, amortization requirements are counterproductive, since they tend to reduce both cash-flow margins and access to liquidity, thereby increasing the income sensitivity of consumption and reducing macroeconomic stability.

The credit tightening also distorts household decisions by increasing housing expenditures and hampering consumption smoothing for those affected. In particular, the tightening limits the access to the housing market for young persons and other market entrants (outsiders). Overall, the macroprudential regulations that have been introduced in Sweden have a regressive profile by reducing welfare for households without sufficiently high income or wealth.

The article includes suggestions for a better-functioning mortgage market as well as proposals to reform the governance of macroprudential policy through a separate decision-making body (a Macroprudential Policy Committee) comprising both internal members from the FI and outside experts. The committee's work should according to the proposal be evaluated by a new Macroprudential Policy Council working along the lines of the fiscal councils that have been established in most EU countries, including in Sweden.

2.4 Bail-in and the new resolution framework in the EU

Esa Jokivuolle, Vesa Vihriälä, Kimmo Virolainen and Hanna Westman analyze the new bail-in rules that have been introduced in the EU as a part of the regulatory reforms after the global financial crisis. Instead of bailing out bank creditors by public authorities, creditors are now expected to share the burden of bank failures along with owners.

The European resolution framework is based on the EU Bank Recovery and Resolution Directive, which sets clear rules for the planning and execution of bank resolution, including the bail-in of creditors. The institutions for the implementation of bank resolution are largely in place. Nevertheless, not all banks in Europe have yet modified their liability structures to meet the requirements set by the authorities, nor have decisions been taken on all details of the supporting legislation. So far, there is very little evidence on how the new rules work in practice. In the Nordic countries, the only examples of bail-in come from a couple of rather small Danish banks.

The new resolution approach based on bail-in serves two related purposes. First, it is intended to reduce risk-taking incentives for banks. Second, it will limit (ideally eliminate) taxpayers' costs should a crisis occur. However, bail-in also involves risks and practical difficulties. A key challenge is to prevent contagion to other financial institutions if a major – systemically important – institution should be subject to bail-in. The risk of contagion may be particularly important in a situation of widespread economic weakness when many institutions may have to be resolved at the same time.

The systemic challenge of contagion is particularly important in the Nordic countries with a concentrated and highly interconnected banking system. Fortunately, Nordic authorities and banks are well advanced in their resolution planning. This gives some confidence that the resolution of even a large Nordic bank should be manageable without devastating financial-stability consequences, at least when the failure has idiosyncratic roots and is not part of a systemic crisis.

2.5 Pros and cons for non-eurozone countries of taking part in the banking union

The European banking union is a project aimed at unifying banking supervision and resolution across the EU. It consists today of two components: the Single Supervisory Mechanism and the Single Resolution Mechanism. A third proposed component, but one which has not yet been agreed upon, is a European Deposit Insurance Scheme.

Karolina Ekholm discusses the pros and cons of taking part in the banking union from the perspective of EU member countries remaining outside the euro area in the foreseeable future, i.e. Denmark and Sweden in particular. The starting point is the banking union as it has evolved until today, with centralized mechanisms for supervision and resolution and some risk-sharing elements in the form of a resolution fund and an agreed backstop to that fund.

Ekholm stresses that the potential benefits as well as costs are highly uncertain. Expanding the banking union is likely to lead to more efficient resolution of cross-border banks, with less ring-fencing and therefore smaller overall losses. It may also be conducive to a more efficient organisation of bank activities in Europe and thereby to a more efficient market for banking services. Part of the benefits from an additional country joining will accrue to the other countries of the union. A potential gain from joining is that the ECB, which is responsible for the supervision of systemically important banks in the banking union, might build up more expertise in carrying out this task than national supervisory authorities and be subject to smaller risks of regulatory capture. But against this, one must set the risk of a more heavy-handed and stylized approach that may fail to take specific national circumstances properly into account.

The benefits of participating seem smaller for non-euro countries than for countries in the euro area. Only the latter benefit from a weakening of the existential threat to the common currency itself.

At the same time, the potential costs of participating in the banking union seem low for non-euro countries. Unlike the euro area members, non-euro countries have the right to leave the banking union after three years or after disagreeing with a decision made

by the single supervisor. The legacy problems associated with a larger share of non-performing loans in some southern European countries could, however, imply a risk. Ultimately, the assessment of net benefits depends on the broader value put on closer cooperation with euro-area members in matters related to financial integration and financial stability.

3. Lessons learned

Many observers, including international organizations like the IMF and the EU Commission, have repeatedly focused on high and growing household debt as a major threat to macroeconomic stability in the Nordic countries. The articles in this volume offer important insights into various aspects of the relation between debt and stability. Rangvid notes the strong statistical relation between past *growth* of debt and the occurrence of financial crises, but stresses the absence of a relation between the *level* of debt and crises. The recent Nordic situation has been characterized by a high debt level, but modest debt growth. Hence, according to this reasoning, there is no prima facie cause for concern.

Two contributions look at the association between economic policy and debt. Guldbrandsen and Natvik study the ability of monetary policy to affect real debt. They take issue with the common idea that raising interest rates will lead households to save more and borrow less. The authors show that this ignores two counteracting effects. First, increasing interest payments leave less income to amortize existing loans. Second, a higher interest rate tends to lower inflation and thus to raise real debt. This suggests that the net effect of monetary policy on real debt is ambiguous and that central banks are better advised to focus solely on inflation.

If monetary policy has little effect on real debt, it is natural to turn to macroprudential policy. Before employing instruments such as amortization requirements, loan-to-value caps or loan-to-income stipulations, one should, however, as argued by Svensson, examine how debt is being used. Judging from recent experiences, high and growing debt only poses a threat to macroeconomic stability in situations when it is used to finance a consumption boom. Oth-

erwise, there are strong disadvantages of making households more credit-constrained.

Financial crises tend to become international by nature. Even if they originate nationally, they usually have large international repercussions. Systemically important banks invariably operate across national borders. This suggests the need for international co-operation in supervision and regulation. Resolution of banks with operations in many markets and funding from the world market is complex to handle for domestic authorities in purely bilateral co-operation with their counterparties in other countries. From this perspective, there are good arguments for Denmark and Sweden to join the European banking union. This would also, in principle, allow risk sharing across borders. The main counterargument is the legacy of weak banking structures in several south European member countries which implies a risk that new entrants into the banking union may have to share the burden of bank failures there. Even if the long-run objective is to join the banking union, there may thus be an option value of waiting and finding out if the legacy problems can be sorted out. The downside of such a strategy is that Denmark and Sweden will have much less impact on the banking union's continued development, not least regarding a deposit insurance system.

All papers in this volume were written before the corona outbreak. This represents a different type of shock than those that have triggered earlier financial and macroeconomic crises. It is a shock originating in the real economy that simultaneously affects supply, as people are locked out from many workplaces, and demand, as people are confined to their homes with limited possibilities of purchasing goods and consuming services. Even under the most favourable assumptions, the short-run macroeconomic effects will be huge. At the time of writing, the adverse effects are dramatic for some sectors of the economy, including restaurants, transportation and tourism, where many actors have lost almost all revenues because of the falls in demand. But also the manufacturing sector is hard hit. This reflects both broken international supply chains and reductions in demand when both consumption and investment fall worldwide.

Although the economic repercussions of the corona outbreak started in the real economy, they will likely impose enormous pressure on the financial system. At first, many firms and households will encounter liquidity problems, and later many firms will face bankruptcy. The amount of non-performing loans will rise, and lenders are bound to face large credit losses. Banks will have to identify which firms may be solvent in the long run. Problems will be aggravated by the huge uncertainty about the dynamics of the epidemic.

The banking systems in both the Nordics and elsewhere were stronger at the start of the corona crisis than they were at the outset of the global financial crisis in 2008. As the current crisis unfolds, the financial system and the new regulatory framework will be put to a much harder test than anyone could have expected. In particular, the resilience of the new bail-in rules in Europe may undergo a worse stress test than any regulator would have been able to design. It remains an open question whether government bailouts can be avoided if a systemic bank crisis follows. We suspect not. But at the time this volume is published we will know more than at the time of writing.

Crises – not least financial ones – arrive unexpectedly: if they had been widely foreseen, they would probably have been avoided. We are not aware of any pre-crisis analyses or stress tests of the financial sector's resilience that have featured a scenario – or even type of shock – such as the one now occurring. This underscores the importance of building regulation and supervision systems that are so robust that they can withstand also the unthinkable. Almost by definition, this will be impossible, but the better we succeed, the less will be the need for hasty improvisations and the smaller will be the adverse consequences.

How Stable Is the Nordic Financial Sector?[1]

Jesper Rangvid[2]

Abstract

The Nordic financial sectors were challenged during the early 1990s and in 2008. The crises were costly, with losses in terms of foregone GDP accumulating to, in some cases, two years of economic output (GDP). High credit growth and real estate booms, preceded by financial liberalizations, caused the crises. There were many similarities across the Nordics, but also some important differences. Currently, credit growth is low and banks are well capitalized. Traditional indicators of financial crises are not flashing red. On the other hand, house prices and household debt levels are elevated. Risks resulting from low interest rates are also discussed.

Keywords: Credit growth, house prices, household debt, capitalization of banks, financial regulation, low interest rates.
JEL codes: E44, E58, G21, G28.

[1] The author would like to thank Anneli Tuominen and Peter Englund who discussed the paper at the 2020 Nordic Economic Policy Review seminar 'Financial Regulation and Macroeconomic Stability', as well as Lars E. O. Svensson, Lars Calmfors (editor), and other participants at the seminar for comments and suggestions.
[2] Copenhagen Business School, the Danish Finance Institute and PeRCent. Email: jr.fi@cbs.dk.

'It's awful - Why did nobody see it coming?'
The Queen (Elizabeth II) in November 2008 on why 'nobody' predicted the financial crisis.

'Robust Financial Sector in Denmark'
First-page headline – typed in large bold letters - in the 2008 Financial Stability Report of Nationalbanken. The report, analysing the robustness of the Danish financial sector, was published in May 2008, i.e. only a few months prior to the outbreak of the worst financial crisis since the 1930s. Half of Danish banks disappeared following the financial crisis of 2008.

1. Introduction

Economists struggle to predict recessions and financial crises. An et al. (2018) conclude that forecasters 'miss the magnitude of the recession by a wide margin until the year is almost over' and that private and official public forecasters 'are equally good at missing recessions'. This paper analyses the stability of the Nordic financial sector.[3] It is a dangerous task because things that look good on the surface might be unstable underneath, as my quotation above from Nationalbanken's 2008 Financial Stability Report illustrates. In fact, few individuals and authorities foresaw the fragility of the financial sector prior to the financial crisis of 2008.[4]

These words of caution do not mean that one should not try to evaluate financial sector stability. The stability, and potential instability, of the financial sector is of first-order importance for economic activity and, hence, for economic well-being, as recent financial crises in the Nordics illustrate. The crises caused large drops in GDP and jumps in unemployment rates. In addition to the immediate effects, economic activity remained subdued many years after the crises. This paper presents simple calculations of the costs of recent financial crises in the Nordics. Costs, in terms of foregone GDP, often

[3] When referring to financial stability and financial crisis, the paper more specifically refers to the stability of and/or crisis in the banking sector. In the conclusion, the paper briefly discusses other forms of threats to financial stability.
[4] This does not mean that there were no warnings; see, e.g., Rajan (2005). Overall, however, few foresaw the timing and magnitude of the 2008 financial crisis. Rangvid et al. (2013), Chapter 7, contains a detailed discussion of how the Danish authorities missed the foretelling of the crisis. Johansson et al. (2018) describe how the Riksbank in Sweden did not foresee the financial crisis.

amount to one or two years of economic activity. As financial crises impose huge costs on societies, it is important to judge financial sector stability, keeping in mind that it is a difficult task.

The Nordics experienced financial crises in the early 1990s and 2008. In both episodes, a number of features were similar across countries. A couple of years prior to the crises, credit started expanding, often as the result of different forms of financial liberalization. Lending was usually related to developments in the housing market, and real estate prices increased. The rate of credit expansion increased even more, and real estate prices skyrocketed. At some point, the tides turned. House prices had become too elevated. External shocks also played a role, as in 2008 when the Nordics were affected by the global financial crisis and in the early 1990s when Finland was affected by the collapse of the Soviet Union, its largest trading partner, and Finland and Sweden imported high global interest rates because of their fixed exchange rates. Lending contracted and house prices fell as a result of the crises. They had severe economic consequences, as GDP contracted and unemployment increased. Losses in banks accumulated. Banks were not robust enough to cover those losses, though. In addition, during the 2008 crisis in particular, banks faced challenges rolling over their funding needs, i.e. faced liquidity squeezes. Governments intervened, by extending liquidity guarantees, injecting capital, and taking ownership of banks. The crises were severe.

In spite of overall similarities, there were also some clear differences between the Nordic countries. In the early 1990s, Denmark was less affected by the crisis – there almost was no crisis in Denmark – whereas the crises were systemic in Finland, Norway, and Sweden. The crises during the early 1990s were partly caused by financial liberalization, which fuelled credit booms, in Finland, Norway, and Sweden.[5] On the other hand, during the 2008 crisis, the situation was almost the opposite. Denmark faced a severe financial crisis, to a large extent caused by internal events, such as liberalizations on the housing market, whereas the other Nordic countries were less affected, and, if so, mainly due to external shocks, i.e. the global financial crisis in 2008. Denmark was also affected by international developments during the 2008 crisis, of course, but domes-

[5] See, for instance, Englund (1999) and Honkapohja (2014).

tic factors played a major role. The Rangvid report on the financial crisis in Denmark (Rangvid et al. 2013) decomposes the difference between actual Danish GDP growth in 2009 (–4.9%) and expected Danish GDP growth in 2009 (1%) into underlying drivers. The report concludes that around a third of the 5.9 percentage points larger-than-expected 2009 GDP drop was due to domestic factors.

Along a number of dimensions, the situation looks different today. The rate of credit growth in the Nordics is low. This is important, as the rate of credit expansion is often recognized as a predictor of financial crises, both in the Nordics, as mentioned above, but also globally (Schularick and Taylor 2012). Loan-loss provisions in Nordic banks are low, too. Banks are also considerably more robust, compared to the situation prior to the financial crisis of 2008. Capital ratios have improved, liquidity requirements have been implemented, and the same goes for restructuring and resolution regulations. In addition, large banks are routinely exposed to stress tests. Nordic banks remain well capitalized following stress tests. Finally, different kinds of macroprudential regulation have been implemented. To a large extent, several of the traditional indicators of a looming financial crisis are not flashing red in the Nordics.

This does not mean that there are no areas of concern. First, real estate prices have been increasing in the Nordics for almost three decades. Hand in hand with elevated real estate prices, household debt has been increasing. House price-to-income ratios have increased, too. House prices relative to incomes cannot continue increasing forever. Historically, however, crises tend to occur after a few years with very strong booms in house prices and household debt, like in Denmark in 2003–2006. This is not what characterises the Nordics today. When house prices, household debt levels, and house price-to-income ratios have been increasing for almost three decades, these variables have a hard time predicting turning points in the Nordics. High house prices and high levels of household debt make households vulnerable, but it is difficult to time a potential turnaround in the housing market from persistent house price movements.

A second cause for concern is low interest rates. First, low interest rates contribute to high asset prices, and thus also to high real estate prices. When Nordic house prices are elevated and house-

hold debt levels high, increasing interest rates can cause instability, in particular if interest rates rise rapidly. This concern is even more pronounced when interest rates are low, as today, because the sensitivity of asset prices to interest rate movements is larger at low levels of interest rates. Not much indicates that interest rates should start rising soon, but it is an area to monitor. Second, if interest rates stay negative, and banks are unwilling or unable to pass on negative rates to depositors, negative interest rates lower the profitability of banks. Low profitability of banks makes them less robust. Currently, investors are sceptical about the outlook for banks and doubt their profitability. Stock prices of banks are depressed. If investors are right, this is a concern for financial stability, too.

The paper proceeds as follows. The next section presents estimates of the costs of financial crises in the Nordics, focusing on the crises in the early 1990s and 2008 in Denmark, Finland, Norway, and Sweden. Section 3 evaluates what caused these crises. Section 4 investigates how stable the financial sector in the Nordics is today. Section 5 discusses consequences of low interest rates for financial stability in the Nordics. A final section concludes.

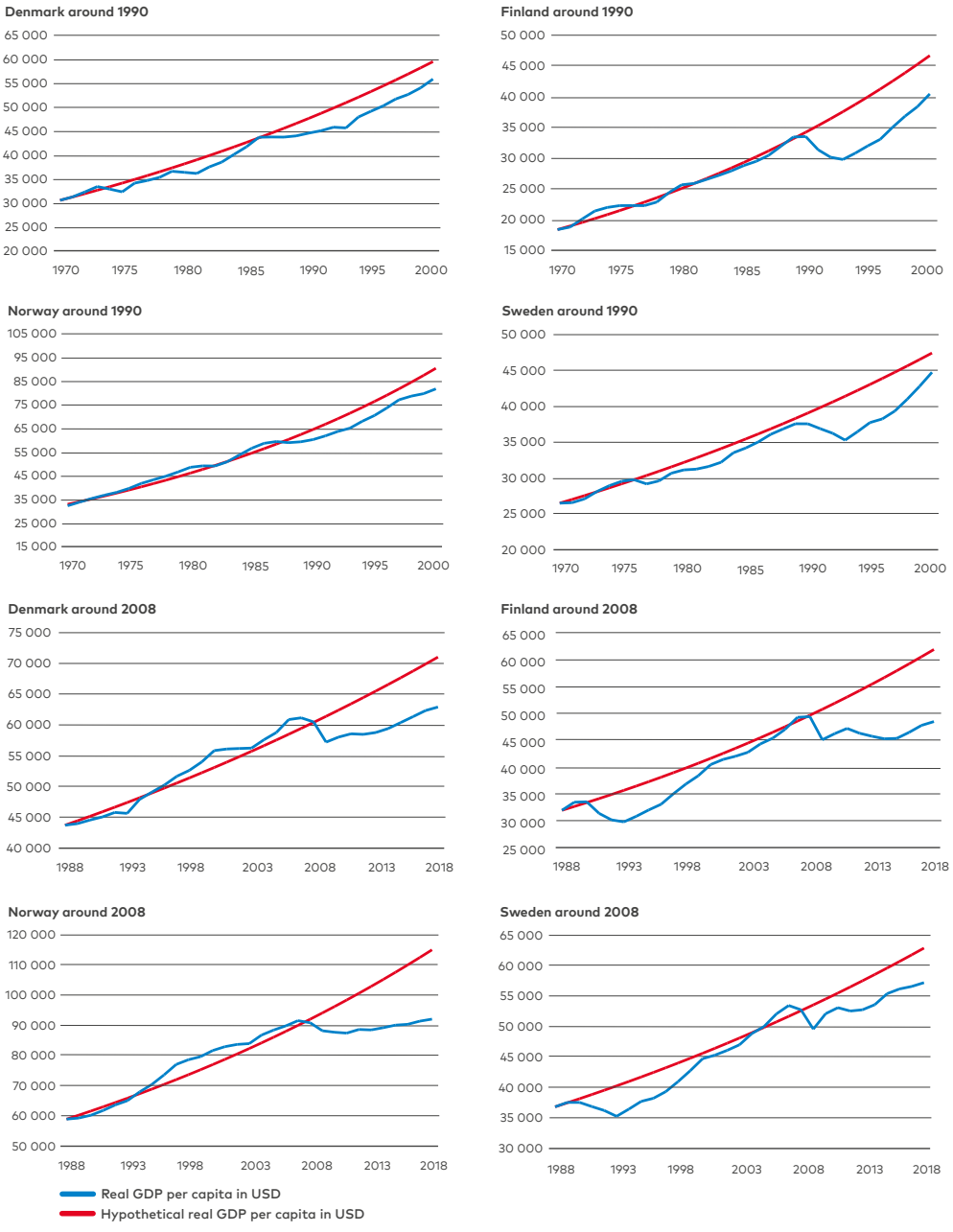
2. Costs of financial crises

Financial crises are tremendously costly. When estimating the economy-wide costs of such crises, a common procedure is to contrast GDP growth during and after a financial crisis with a hypothetical path, counterfactually assuming no financial crisis.[6] The difference between the two is the reduction in economic activity due to the crisis. If actual GDP is considerably below the hypothetical GDP that would have prevailed in the absence of the crisis, the cost of the crisis has been large.

Figure 1 presents paths of actual and hypothetical real GDP per capita in USD for Denmark, Finland, Norway, and Sweden in years surrounding the financial crisis of 1990 (the first four graphs) and for the financial crisis of 2008 (the lower four graphs). Hypothetical GDP is calculated as follows. I take a starting point twenty years before the peak of the financial crises, i.e. 1970 for the 1990 crises

[6] See Schwierz (2004) and Laeven and Valencia (2013).

Figure 1 Actual and hypothetical real GDP per capita around crisis



Note: GDP is measured in USD. Hypothetical GDP measures GDP if no crisis had occurred and GDP had continued to grow at its historical rate.
Sources: St. Louis FRED database and own calculations.

Table 1 Output losses associated with financial crisis and changes in real per capita GDP in USD, percent

	Denmark	Finland	Norway	Sweden
Change in GDP 1990–1993*	2.4	-11.1	4.9	-6.1
Accumulated loss, 1991–2000	93	210	88	124
Change in GDP 2007–2010	-5.1	-6.2	-4.2	-2.5
Accumulated loss, 2008–2018	91	172	139	68

Note: * For Norway, the 1990s crisis starts in 1988, i.e. the three-year change in output is calculated for 1988-1991.
Source: Own calculations.

and 1988 for the 2008 crisis.[7] I then calculate the average annual growth rate of real per capita GDP country-by-country for the period ranging from the starting year (1970 or 1988) until four years before the financial crisis. I stop four years before the financial crisis, as crises are typically preceded by booms. If including these pre-crisis boom years in the estimation of 'normal' GDP growth, the estimate would be biased upward. I then calculate a hypothetical path for GDP by extrapolating GDP from the starting year onwards with the average growth during non-crisis years. I do this for each country for each crisis.

Figure 1 shows that financial crises are typically associated with high losses in terms of foregone GDP. Take Finland around 1990 as an example. Real GDP per capita was developing steadily and smoothly during the period leading up to the financial crisis. The crisis changed this dramatically.[8] From 1990 to 1993, GDP dropped by 11%. In itself, this is a huge drop in GDP. On top of this, however, the recovery was

[7] For Norway, I assume that the crisis starts in 1988, similar to Schwierz (2004), i.e., for Norway, the pre-crisis period (for the 1990 crisis) is 1968–1988.
[8] As discussed below, it was not only financial-sector developments that caused GDP to drop, as Finland more or less simultaneously saw its largest trading partner, the Soviet Union, collapse, contributing to the contraction in economic activity. However, the common patterns across the financial crises in the Nordics in the early 1990s and 2008 reveal that financial crises are particularly costly.

slow. Ten years after the crisis, GDP had not recovered to the level that would have prevailed had there been no crisis. In fact, ten years after the crisis, in 2000, the accumulated difference between hypothetical no-crisis GDP and actual GDP amounts to 210% of GDP in 1990. Two years of GDP were lost due to the crisis.

Table 1 collects calculations for all Nordic countries. Typically, financial crises result in accumulated losses of aggregate output corresponding to one or two years of GDP. This holds for all countries, and for both the 1990 and the 2008 crisis. I conclude that large macroeconomic costs followed the financial crises in the Nordics.

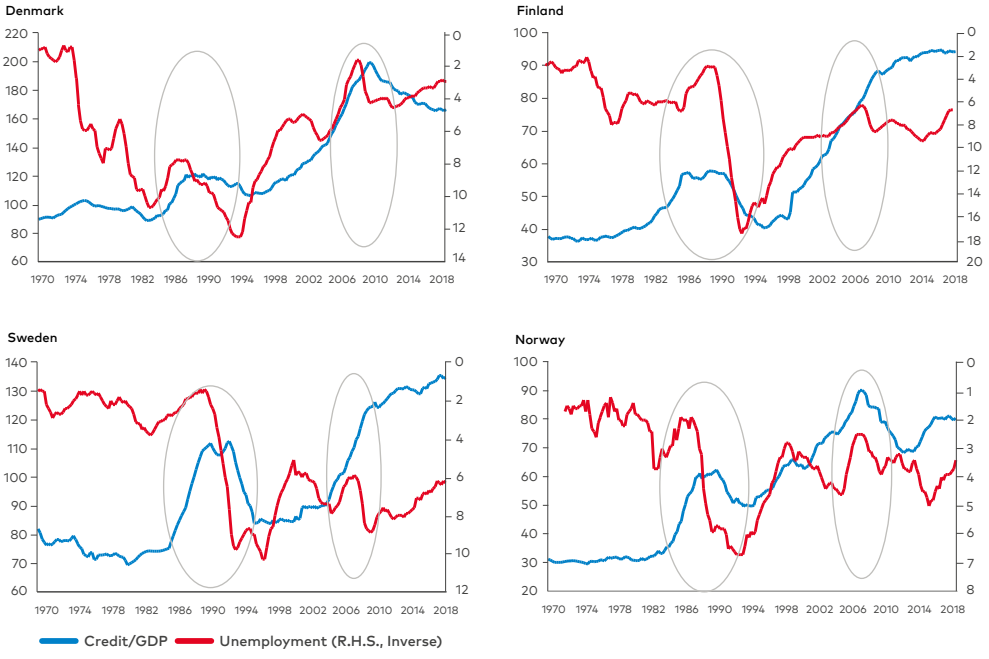
2.1 Credit contractions

The described crises were not typical recessions. They were 'financial' crises. This is illustrated in Figure 2. It shows movements in bank credit-to-GDP ratios and unemployment rates (right-hand-scale, inverted axis) for Denmark, Finland, Norway, and Sweden during the 1970-2019 period. Take the crisis in the early 1990s in Sweden as an illustration. Before the crisis, credit expanded quickly. In the early 1980s, bank credit amounted to around 75% of Swedish GDP. Over the course of five years, until 1990, bank credit-to-GDP increased to 110% of GDP, i.e. an expansion by 50%. Similar credit expansions were seen in the other countries, and this goes for years preceding the 2008 crisis, too.

When the crisis hits, banks restrict lending. Lending contracts significantly. In Sweden, for instance, credit contracted from 110% of GDP in 1993 to 85% during the course of three years, i.e. more than a 20% drop. Credit thus contracted by more than GDP during the crisis. A credit crunch was realized. When firms and households cannot borrow, unemployment increases. In Sweden, it increased from around one percent in 1991 to around ten percent three years later, i.e. a ten-fold increase. Crises are costly, both in terms of aggregate output (Figure 1), but also in terms of families facing unemployment and reduced standards of living.

Similar patterns of expanding credit and falling rates of unemployment before the crises, and credit contraction and rising unemployment as a result of the crises, are seen in the other countries, too, both in 1990 and in 2008, with some heterogeneity across them.

Figure 2 Credit to the private non-financial sector by banks, percent of GDP (left-hand scale), and unemployment rate (right-hand scale, inverted)

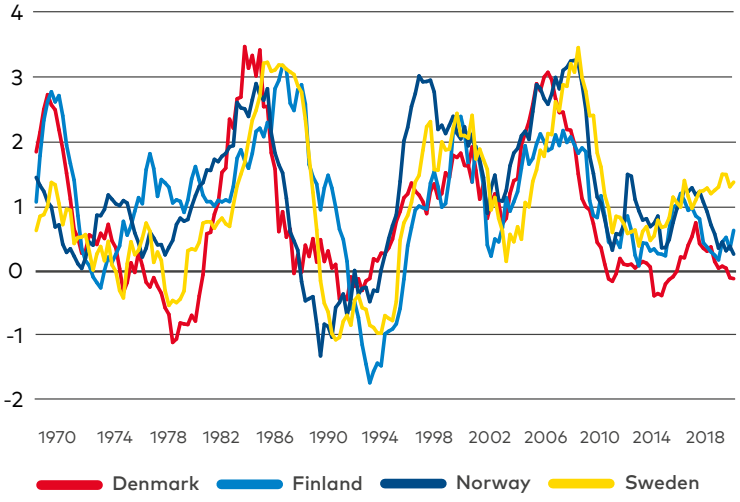


Sources: St. Louis FRED database and own calculations.

3. What caused the 1990 and 2008 financial crises in the Nordics?

Strong growth in credit and real estate prices preceded the crises in both the 1990s and 2008. In simple but illustrative terms, house prices increased, people borrowed to build and purchase houses, credit expanded, house prices increased even more, and the pre-crisis boom got rolling. At some point, house prices peaked. House prices started falling. Credit contracted, the economy contracted, and house prices fell even more. The crisis had begun.

Figure 3 Quarterly growth rates in total credit to the private non-financial sector, adjusted for inflation, percent



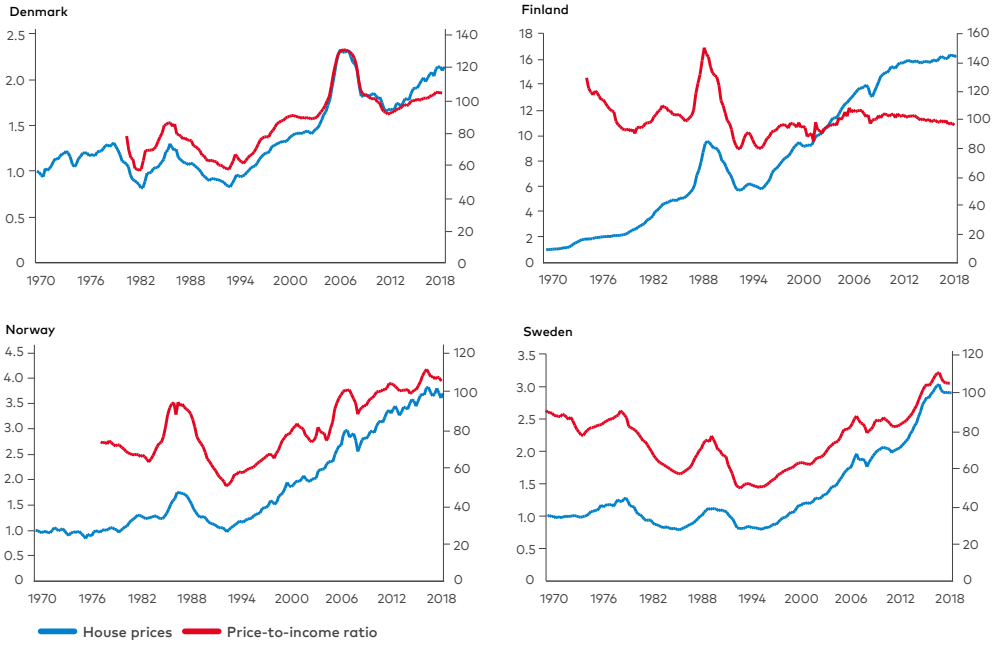
Sources: St. Louis FRED database and own calculations.

Credit growth is generally considered one of the better indicators of a looming financial crisis (see Schularick and Taylor 2012).[9] Figure 3 shows quarterly growth rates of total credit in the Nordic countries, adjusted for inflation. Credit growth rates are highly correlated across the countries and follow a clear business-cycle pattern. Growth rates in credit increased significantly prior to the 1990s and 2008 crises in all countries, only to fall markedly after the crises. In the late 1980s, credit increased by around 3% per quarter in real terms, but fell to zero, or even negative, rates of growth after the crisis. The same goes for the 2008 crisis.

Real residential prices show somewhat similar patterns, as Figure 4 reveals. House prices increased rapidly before the crisis in the early 1990s, only to fall dramatically after the crisis. The pattern is particularly dramatic in Finland. House prices increased rapidly from 1987 to 1989, and dropped from 1990 to 1993. House prices fell by 40%

[9] Rangvid and Vølund (2013) study the Danish banking crisis in 2008. They find that banks with strong lending growth prior to the crisis were more likely to fail during and after it.

Figure 4 Real residential property prices (normalized to one in 1970, left-hand-scale) and house price-to-income ratios (right-hand-scale)



Sources: St. Louis FRED database, OECD, and own calculations.

over the span of just two years. Developments were similar in Denmark surrounding the 2008 crisis. From 2004 to 2006, house prices increased in real terms by around 60%. From 2006 to 2009, house prices fell in real terms by around 20%.

For Finland, Norway, and Sweden, the situation was somewhat different in the 2008 crisis. In these countries, there was no clear burst of a house-price bubble following the crisis. To the extent that GDP suffered, it was more as a consequence of the drop in global economic activity that resulted from the global financial crisis, as this had spill-over effects on economic activity in these countries.

I conclude that lending and house price booms have preceded recent financial crises in the Nordics, though with some differences between

the countries. In the 1990s crisis, Finland, Norway, and Sweden were more subject to these factors than Denmark. In the 2008 crisis, Denmark was more subject to these factors than Finland, Norway, and Sweden.

Losses on loans to households were generally rather small, i.e. banks did not run into trouble because households defaulted. Rather, banks faced losses on their exposures to commercial real estate developers, as Rangvid et al. (2013) emphasize for the Danish 2008 crisis. The same applied to the 1990s crises in Finland and Sweden. Drops in house prices can still have macroeconomic effects, however, if households cut down consumption when they see house prices, and, hence, their housing wealth fall.

Credit, and consequently house prices, increased prior to financial crises, but what caused credit to expand in the first place? Again, there are similarities between the underlying triggers in the Nordics. For the 1990s crises, as mentioned, Finland, Norway, and Sweden, were heavier affected than Denmark. Englund (1999) describes the Swedish crisis, Honkapohja (2014) the Finnish one, and Vale (2004) the Norwegian one. All authors stress the liberalization of the financial sector prior to the crises. The liberalizations allowed banks to increase lending and set interest rates more freely.

In Denmark, prior to the 2008 crisis, financial liberalization took place in the form of the introduction of interest-rate-only loans in 2003 and a freeze of property taxes, both of which contributed to increasing demand for housing and pushed up house prices, as Rangvid et al. (2013) demonstrate. In addition, prior to the crises in the 1990s and 2008, the macroeconomic situation was stable and reasonably prosperous, feeding into an optimism on behalf of both banks, households, and governments (Rangvid et al. 2013).

The exchange rate regime also played a role. Prior to the 1990s crisis, Denmark, Finland, and Sweden had fixed exchange rates. Defending them during 1992 became costly as interest rates had to be hiked when speculative pressures mounted. Finland and Sweden were forced to abandon the fixed exchange rate in 1992, leading to large depreciations of the Swedish krona and Finish markka. During the 2008 crisis, only Denmark had a fixed exchange rate. While

most other countries could lower interest rates to support demand in the wake of the crisis, the Danish central bank had to increase interest rates in the autumn of 2008 to defend the exchange rate. A fixed exchange rate contributes to stability of the exchange rate but restricts monetary policy. During a crisis, countries with floating exchange rates, such as Norway and Sweden today, can use monetary policy to support domestic demand, whereas countries with exchange rates, such as Denmark, use monetary policy to support the exchange rate regime. And with the euro, as in Finland, there is, of course, no possibility of an own monetary policy.

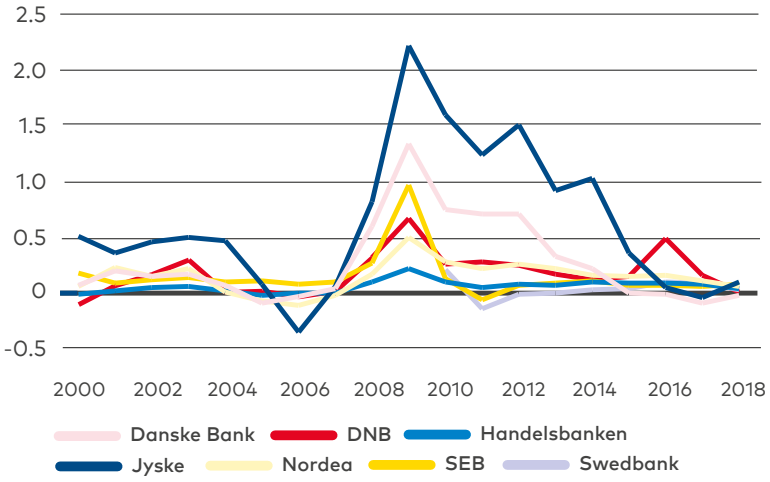
4. Where are we today in terms of risks?

Figure 3 shows that lending growth is low today, both absolutely and relative to historical levels in Denmark, Finland, and Norway. In Sweden, lending growth has been rising during recent years, but is still low in a historical comparison. The indicator traditionally indicating troubles ahead is not flashing red.

Another indicator of troubles is loan-loss provision of banks. Typically, when times are good, lending growth is high and some banks start lending to less robust projects. When the tides turn, these projects turn sour and losses start mounting. Figure 5 shows loan-loss provisions for a selected group of large Nordic banks surrounding the 2008 crisis. The figure provides two main insights. First, losses started mounting right before the crisis; from 2007 to 2008, several banks faced large jumps in loan-loss provisions. Second, loss provisions are low today.

In contrast to growth rates in credit, house prices have reached elevated levels in the Nordics. This is clear from Figure 4. In Finland, Norway, and Sweden, house prices have been increasing more or less without interruption since the crises in the early 1990s, i.e. for almost thirty years. Danish house prices have also been increasing since the early 1990s, but with an important interruption around the crisis of 2008. The diagram shows house price movements in real terms. The rises mean that house prices in the Nordics have been increasing considerably faster than other prices in the economy.

Figure 5 Loan-loss provision, percent of average loans, for selected large Nordic banks

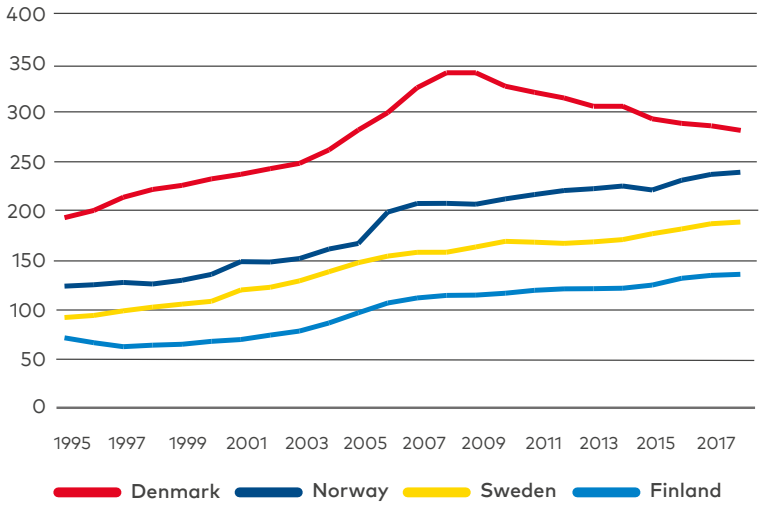


Sources: Thomson Reuters Eikon and own calculations.

If incomes of households increase at a pace similar to that of house prices, there would be less cause for concern. As is also seen in Figure 4, except for Finland, this is not the case. In Norway and Sweden, in particular, house price-to-income ratios have been constantly increasing for almost thirty years. This trend cannot continue forever. Households cannot continue using ever-larger fractions of their income to finance house purchases. The question is whether house prices at some point will flatten out or whether they will fall.

The strong and long-lasting increase in house prices has meant that households in the Nordics have become more leveraged (see Figure 6). Household debt as a percentage of disposable income has been more or less constantly increasing in Finland, Norway, and Sweden during the last two decades. In 1995, the debt-to-income ratio was 70%, 90%, and 120% in Finland, Sweden, and Norway, respectively. Today (in 2018), debt-to-income ratios stand at 135%, 190%, and 240% in the three countries, respectively. Debt (as a fraction of income) has doubled in all three countries. Denmark is an outlier, both in terms of the level of household debt and its dynamics. Household debt in Denmark has traditionally been very high, but

Figure 6 Household debt, percent of disposable income



Sources: OECD and own calculations.

spiked at more than three times disposable income in 2008. Since the financial crisis, Danish household have reduced their leverage significantly, such that the debt-to-income ratio is now not much higher in Denmark than in, e.g., Norway.

There are good reasons to monitor dynamics of household debt and house prices. In a series of papers, Mian and Sufi have highlighted the dangers arising from rapidly expanding house prices and household debt.[10] Mian and Sufi (2018) contains an overview of their findings. The finding is that short-lived rapid increases in household debt and house prices predict financial crises. The authors primarily focus on the relation between changes in debt and house prices over a three-year period and their consequences for subsequent economic activity. A recent illustrative Nordic case in point is the experience of Denmark in the mid-2000s. House prices and household debt increased dramatically in 2003–2007, as Figures 4 and 6 show, only to be followed by a severe financial crisis.

[10] See Mian and Sufi (2011, 2014), Mian et al. (2013), and Mian et al. (2017).

It is less straightforward, however, to extract implications from the Mian and Sufi studies for the examples of Norway and Sweden where household debt and house prices have been steadily rising for many years. House prices started to increase in Norway in 1993. Following the Mian and Sufi results, one would expect troubles ahead as of 1996 i.e. after three years. This is not what happened. On the contrary, house prices have kept increasing for a further 25 years. In other words, the Mian and Sufi findings describe well the Nordic crises in the early 1990s, and the Danish crisis in 2008, but the findings are not directly transferable to current situations in Finland, Norway, and Sweden. High house prices and household debt make household balance sheets vulnerable, but it is difficult to predict the timing of troubles ahead with an indicator that has been constantly increasing for 25–30 years.

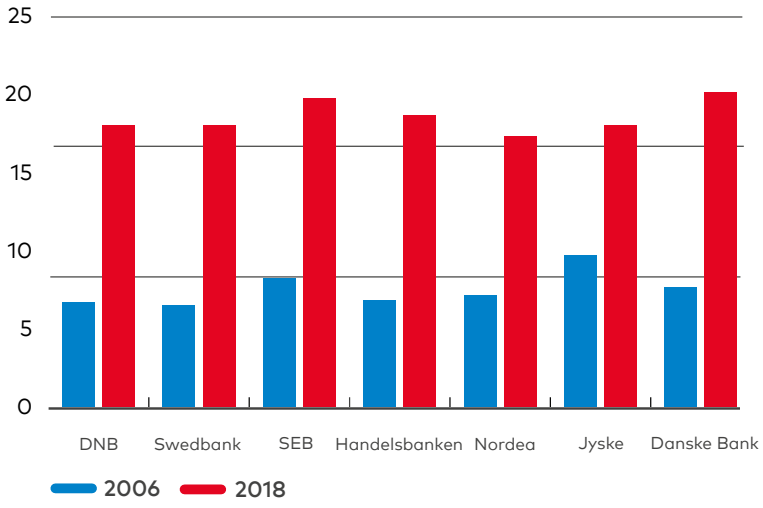
The conclusions drawn in this section – that credit growth is low, and thus less of a concern, but house prices and household debt levels high – are with some modifications also conclusions in financial stability reports from some Nordic central banks. In Sweden, Riksbanken (2019, p. 4), concludes 'High household indebtedness forms the greatest risk'. Norges Bank (2019) concludes that 'High household debt' is flashing red. In Denmark, Nationalbanken (2019a) does not make clear what it considers major risks to financial stability.

4.1 Regulation and robustness of banks

When discussing risks to financial stability, an important aspect relates to banks' capital and liquidity positions, i.e. their robustness in the event of a crisis. On this dimension, banks are in a better position today, compared to the situation preceding the financial crisis of 2008. Figure 7 shows capital ratios of selected large Nordic banks: those banks that enter the EBA stress tests.[11] The diagram makes clear that banks are considerably better capitalized today compared to the mid-2000s. Before the financial crisis of 2008, capital ratios were typically around 8%. Today, they are close to 20%. Figure 8 shows how large Nordic banks have continuously built up capital after the financial crisis. It is primarily in terms of risk-weighted assets that banks are more robust today. In relation to total assets,

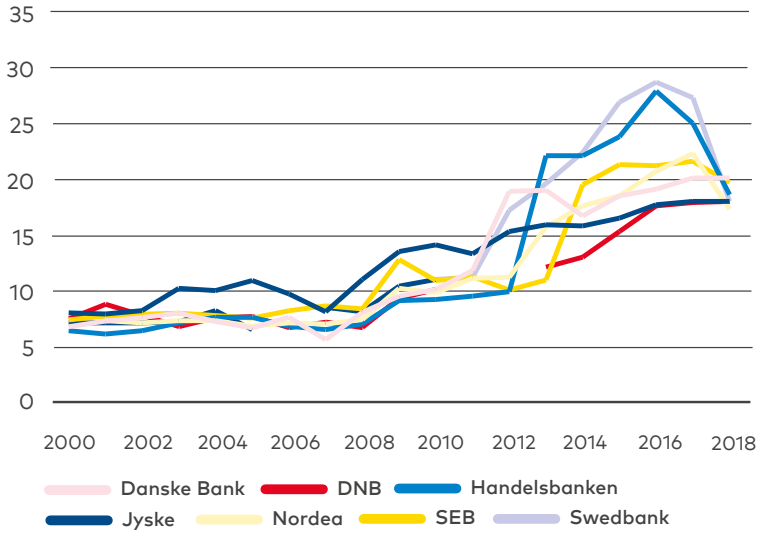
[11] Capital ratios are calculated as Tier-1 capital to risk-weighted assets. Tier-1 capital mainly consists of equity capital (Core equity Tier-1 capital) but typically includes some other types of equity-like capital (Additional Tier-1 capital) as well.

Figure 7 Capital ratios of selected large Nordic banks, before and after financial crisis, percent



Note: Capital ratio is Tier-1-capital to risk-weighted assets.
Sources: Thomson Reuters Eikon and own calculations.

Figure 8 Build-up of capital ratios for selected large Nordic banks, percent



Note: Capital ratio is Tier-1-capital to risk-weighted assets.
Sources: Thomson Reuters Eikon and own calculations.

banks are not much more capitalized than before the crisis, but total assets do not take the riskiness of banks' assets into account, i.e. the relevant measure of capitalization is capital in relation to risk-weighted assets.

The fact that banks are better capitalized today is part of a larger story. Regulation of banks has been considerably strengthened since 2008. Capital requirements have been tightened. Before the 2008 crisis, banks could fulfil capital requirements by financing only 2% of their risk-weighted assets by equity capital. Today, large systemically important banks typically have to finance at least 15% of their risk-weighted assets by equity capital. It is a sevenfold, or more, increase in capital requirements. In addition to increased requirements on capital as a fraction of risk-weighted assets, requirements on capital as a fraction of non-risk weighted assets have been introduced (restrictions on leverage ratios), alleviating concerns about the use of internal rating-based (IRB) models.[12] Furthermore, the finalization of Basel III introduces risk floors on credit exposures, further alleviating concerns about estimations of risk weights in internal models.[13] The impact of the finalization of Basel III is so large that it is typically referred to a new round of regulation, i.e. as Basel IV. As an example, the Danish authorities estimate that Basel IV will increase the required amount of capital to be held by Danish credit institutions by one third (see Erhvervsministeriet 2018), on top of already higher capital requirements imposed after the 2008 crisis. This is a large increase in capital requirements. Some academics wish for more (Admati and Hellwig 2013), but it is beyond discussion that capital requirements have increased significantly after the crisis of 2008.

Before the financial crisis, neither Basel requirements nor EU regulation stipulated minimum levels of liquidity to be held by banks. National supervisors might have imposed some liquidity requirements, but there were no international minimum standards. The

[12] In internal rating-based models, banks – subject to supervision and approval by financial regulators – estimate risk weights themselves using their own historical data. This allows for a clearer identification of risk that are specific to the individual bank. At the same time, risk weights in internal rating-based models are typically lower than in standard models. In the latter, banks do not estimate risk weights themselves but use risk-weights predefined by the financial regulator.
[13] International banking regulation is drafted by the Basel committee. The Basel committee consists of central bank governors. The committee is based in the Swiss town Basel. Banking regulation is revised from time to time. The latest major revision is Basel III. Basel III takes into account lessons from the financial crisis of 2008.

financial crisis was largely a liquidity crisis, as revealed by the drying-up of global liquidity resulting from the collapse of the investment bank Lehman Brothers in September 2008. It sent shock waves through the global financial system. Banks became worried about the robustness of other banks. Lending between banks, an important facilitator of liquidity in the financial system, came to a complete halt. Today, there are liquidity requirements in the Basel III standards and in European legislation, in the form of the Liquidity Coverage Ratio and the Net Stable Funding Ratio.[14]

In addition to stronger capital and liquidity requirements, large banks are routinely exposed to stress tests, both internally in banks themselves, but also externally from supervisors and rating agencies. Stress tests evaluate whether banks are left with sufficient capital following a period of severe stress, typically defined as a recession scenario where GDP falls, house prices decrease, unemployment increases, etc. Stress tests of Nordic banks are conducted by national and international authorities, such as EBA (European Banking authority).[15] Tests by EBA allow for a comparison across countries. The stress scenarios are considerably 'tougher' today, compared to tests before the crisis, in the sense that the assumed falls in GDP, stock prices, house prices, etc. are larger than those in tests before the financial crisis. For Sweden, as an illustration, EBA assumes that GDP falls by 15.9% in a crisis compared to what GDP would have been had there been no crisis, unemployment is expected to increase by 5.9 percentage points as a result of the crisis, and house prices to fall by 56.4%, i.e. a very severe crisis. EBA stress tests reveal that Nordic banks remain solvent, even after such crises.

On top of all this (stronger capital and liquidity requirements, and stress tests), resolution and restructuring regulations have been implemented after the financial crisis. These regulations require

[14] The liquidity coverage ratio (LCR) requires banks to hold enough liquid assets such that banks can continue operating in a liquidity-stress scenario for 30 days. The Net Stable Funding Ratio (NSFR) requires banks to have a stable funding situation in the longer run. Together, the LCR and NSFR, thus, govern banks' liquidity needs in the short and the long run.
[15] EBA is an EU institution that aims to secure a consistent implementation and conduct of banking regulation and supervision across EU member states.

banks to finance themselves with additional capital instruments that can be bailed in if a restructuring/resolution situation arises.[16]

The Nordic countries have also implemented different macroprudential regulations. These restrict lending practices, such that banks are only allowed to lend to borrowers with sufficiently high incomes and solid debt positions. The restrictions are typically defined in terms of limits at the individual-borrower level on debt-to-income ratios, stress tests on interest rate exposures of mortgage borrowers (borrowers shall be able to meet payments if interest rates rise), down-payment requirements, etc.

Words of caution

In light of the horrifying costs and experiences following the financial crisis of 2008, there are lots of good things to be said about the stronger financial regulations that have been implemented. One should bear in mind, however, that risk and returns typically go hand in hand. When building a safer banking system, which is good, something has to give. One cannot rule out that subdued growth rates in credit following the financial crisis (see Figure 3 above) may at least partly be due to increased capital requirements. For instance, Imbierowicz et al. (2018) show that increased capital requirements might reduce lending growth in the short run. The financial sector was obviously not capitalized enough before the financial crisis and growth in lending was high. Today, banks are well capitalized and the financial system safer. Growth in lending is low. It is only good that banks are safer, but one should be aware that nothing comes for free. The cost of equity capital is higher (for the bank) than the cost of other types of capital. If there are frictions in the economy, such that the Modigliani and Miller (1958) capital structure irrelevance theorem does not hold, the costs of running banks increase when they are required to finance their operations with more equity capital. If banks cover those additional costs by raising lending rates, it becomes more expensive for firms and households to borrow, potentially affecting consumption and investments negatively, which in the end could

[16] Bail-in capital instruments are debt instruments that can be converted to equity capital if the bank faces losses, such that its capital ratio falls below a certain trigger level. For a discussion of pros and cons of bail-in capital instruments, see Jokivuolle et al. (2020) in this volume.

reduce economic growth. The potential impact of Basel IV is a cause for concern in this regard (Copenhagen Economics 2019).

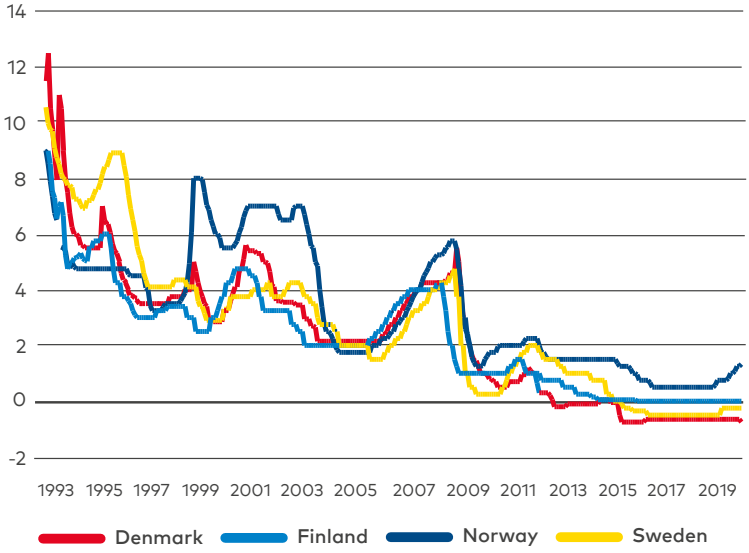
While few disagree that capitalization of banks was too low before the crisis, it is more difficult to judge whether a highly capitalized banking system will lead to a more stable financial system in the end. Admati and Hellwig (2013) and Cochrane (2014) argue for very high capitalizations of banks. Cochrane (2014) goes as far as to argue for 100% equity financing. Others fear that a too heavily capitalized banking system will lead to migration of risks from the regulated banking system to less regulated parts of the financial system (Kashyap et al. 2010) or restrict banks' ability to transform liquidity (DeAngelo and Stulz 2015). Also, the introduction of bail-in instruments has raised the risk that they in themselves create bank runs. If a creditor knows that he/she might be bailed-in, should the bank fail, the creditor will try to run away when default risk increases, increasing the challengers for the bank, as discussed by Goodhart and Avgouleas (2016). This fear is not least grounded in experiences after the bankruptcy of the investment bank Lehman Brothers in September 2008. After its fall, interbank markets freezed. This caused severe troubles for financial institutions, as they then faced difficulties covering their funding needs. A creditor who can be bailed in might be even less willing to supply loans to financial institutions in times of crisis.

5. Other causes for concern

Even if lamps are not flashing alarmingly red, there are causes for concern, and, largely, these arise from low interest rates. Figure 9 shows monetary policy rates for the Nordics over the last 25 years. Policy rates have been trending downward, with business-cycle interruptions. Today, policy rates are at very low levels in historical terms. Most recent tendencies are that rates have been slightly increasing in Norway and Sweden, but are still at very low levels.

Policy rates are low mainly because neutral interest rates are low. Jordà and Taylor (2019) show that neutral interest rates have been falling globally during recent decades. Nationalbanken (2019b) pro-

Figure 9 Monetary-policy interest rates, percent



Note: For Denmark, the monetary policy rate is the rate on certificates of deposit, for Finland the discount rate/short-term euro repo rate, for Norway the policy rate (the sight deposit rate), and for Sweden the repo rate.
Sources: Thomson Reuters Eikon and own calculations.

vides similar evidence for Denmark.[17] When neutral rates drop, monetary policy rates must follow, if monetary policy should not be contractionary.

Low policy rates, and low interest rates in general, raise a number of warnings with respect to financial stability. First, when policy rates are very low, there is less room for expansionary monetary policy. Figure 9 shows how the Nordic central banks all reduced their policy rates significantly right after the outbreak of the crisis in 2008. When entering the crisis in 2008, policy rates were typically around

[17] The 'neutral' interest rate is the interest rate that keeps economic output at its potential level. The 'neutral' interest rate cannot be observed in the market but must be estimated. In a globalized world, the 'neutral' interest rate is determined by global supply of savings and global demand for investments. It takes us too far afield discussing reasons underlying falling global neutral rates, but parts of explanations can be found in lower productivity growth rates globally, shifts in global savings rates, lack of investment opportunities, etc. As an example, if global demographics change such that global demand for savings increases, this will increase demand for assets, such as bonds, pushing up their price, and hence lowering the interest rate. In addition, monetary policy in the form of quantitative easing has contributed to low interest rates since the financial crisis. For more, see e.g. Bean et al. (2015).

four percent. Just one year later, in 2009, policy rates had been drastically reduced, in Sweden to just 0.25%, in Norway to 1.25%, and so on. An important role of monetary policy is to soften the blow from a recession and help the subsequent recovery getting under way. When interest rates are low, monetary policy cannot be used as aggressively as historically has been the case following financial crises.

The fact that monetary policy is constrained does not mean that there is no role for it at all. Central banks have been creative finding alternative ways to expand monetary policy, including quantitative easing, forward guidance, liquidity extension to the private sector, etc.[18] At the end of day, however, monetary policy is less powerful when interest rates cannot be lowered. This is also verified in research. Alternative monetary policy such as quantitative easing had some effect on economic activity when initially implemented, but later rounds have had less influence, as showed in Krishnamurthy and Vissing-Jorgensen (2013).

The second cause for concern relates to the consequences of low interest rates. Low interest rates affect asset prices and incentives to accumulate debt, and they affect bank profitability. Take asset prices first. When interest rates are low, expected returns to fixed-income investments are low. This lowers demand for fixed-income assets, and increases demand for risky assets, pushing up their prices. One such risky asset is real estate. As mentioned in Section 4, one of the salient features of Nordic macroeconomic developments during the last couple of decades, when interest rates have been falling, is increasing real estate prices. Households have become more leveraged as a result (see Figure 6 above). If those forces that have pushed down interest rates during recent decades reverse, households might face troubles servicing their debt, with negative consequences for financial stability.

[18] 'Quantitative easing' refers to the central bank buying financial assets, typically government bonds or mortgages bonds, in financial markets, in order to drive up their prices and lower longer-term interest rates. 'Forward guidance' refers to the use of communication tools by the central bank to inform markets about future movements in the monetary policy rate. If the central bank communicates to the public that it will keep short-term interest rates low for long, this will tend to decrease long-term interest rates today, helping to support economic activity.

In addition, low levels of interest rates increase asset prices, as they lower the rate used to discount future cash flows. Low interest rates also increase the sensitivity of asset prices to interest rate movements. This means that it takes a smaller increase in the interest rate to have a substantial impact on asset prices when interest rates are low, as they are today. To see this in the simplest way, consider the 'Gordon growth model' used to find the value of a stock.[19] With a constant discount rate, r, and a constant dividend growth rate, g, the price of the stock today is $P = D/(r-g)$, where D is the current level of dividends. If dividends today are 3, the discount rate 5% and dividend growth 1%, the stock price today is 3/(0.05 - 0.01) = 7.5. If interest rates fall by 1 percentage point causing, ceteris paribus, the discount rate to fall by 1 percentage point, too, the new stock price is 3/(0.04-0.01) = 10, i.e. the stock price increases by 33%. If the interest rate is instead at a low level, say 3%, the stock price changes from 15 to 30, i.e. it doubles, when the interest rate falls by 1 percentage point. At lower interest rates, asset prices are thus more sensitive to interest rate movements.

Research indicates that low interest rates are here to stay (see for instance Rachel and Smith 2017), not least due to lower rates of productivity growth going forward. However, idiosyncratic shocks could affect individual countries causing their interest rates to rise. Furthermore, some of the forces that caused interest rates to fall during recent decades (demographic developments) might shift. Barclays (2015), for instance, expect that more people will be in retirement relative to the number of people working during the next couple of decades. People in their working age save for retirement while people in retirement dissave. With relatively more people in retirement, there will be a smaller supply of savings. This should tend to increase the interest rate. In sum, even if only little indicates that interest rates are about to hike, should it happen nevertheless, this could cause troubles, as real estate prices and levels of household leverage are high in the Nordics. Increasing interest rates could lead to asset-price falls. Increasing rates could also put pressure on households with adjustable-rate mortgages who would face increased interest payments.

[19] The 'Gordon growth model' is explained in finance textbooks (see, e.g., Bodie et al. 2008).

On the other hand, should interest rates stay low, this is also cause for concern. If banks are unwilling to pass on negative deposit rates to their customers, which evidence seems to indicate, low interest rates hurt bank profitability, as low interest rates cause low interest rate margins and increase costs of holding liquidity.[20] Recent research indicates that negative interest rates, via their negative effect on bank profits, might be counterproductive.[21] If negative interest rates are here to stay, one might be concerned about bank profitability going forward.

Bank profitability has been high during recent years, in spite of low interest rates. After the crisis, from 2010-2018, average annual return on equity for selected large Swedish banks has exceeded ten percent. Several of the underlying factors contributing to a high return might be temporary, however. Financial markets have been sprinting since the end of the financial crisis of 2008, generating income in banks from trading financial assets and servicing customers dealing with financial markets. At some point, financial markets turn. Loan-loss provisions have been very low, in some cases even negative (see Figure 5 above). When economic growth drops, loan-loss provisions will rise. Such developments would add to the pressure on bank profits from low interest rates. Investors are concerned. Price-to-book ratios of banks are low, in particular for Danish banks. As examples, Danske Bank and Jyske Bank are trading at half their book value in 2020. If bank profitability is low, resilience of banks is low. Investors are skeptical about the outlook for banks. Regulators and independdent analysts might also be concerned.

6. Conclusion

This paper has discussed the stability of the Nordic financial sector. Most of the typical indicators of troubles ahead are not flashing red.

[20] Since 2012, the monetary policy rate has been negative in Denmark. It was only during 2019, i.e. after seven years with negative rates, that Danish banks started charging negative rates on households' deposits. Furthermore, negative rates typically apply to large deposits only, deposits in excess of EUR 100 000 for instance. This demonstrates that banks are reluctant to pass on negative rates to retail customers. Rates on corporations' deposits have been negative for longer in Denmark. If banks fully passed on negative rates to customers, negative rates would not necessarily hurt banks' profits. On the other hand, the monetary policy rate of Riksbanken has been negative during 2015–2019 but Swedish banks have not passed on negative rates to retail customers.
[21] See Eggertsson et al. (2019) and Heider et al. (2019).

High credit growth is one of the better predictors of financial crises. Credit growth is low in the Nordics. Loan-loss provisions are low, too. Nordic banks are also considerably better capitalized today, compared to the period before the financial crisis of 2008. Large banks are exposed to severe stress tests, and remain well capitalized after severe stresses. Many types of regulation imposed after the financial crisis have strengthened resilience of banks.

House prices in the Nordics have increased for more or less three decades, as have household debt levels. House prices are at elevated levels. This is a cause for concern. Historically, however, financial crises are preceded by short-lived rapid increases in house prices and household debt. This is not what characterizes house-price movements in the Nordics today. Rather, house prices have been smoothly and persistently increasing for long, but there is no recent extraordinary boom in house prices. At some point, house price increases relative to income will have to come to a halt, but it must not result in a crash.

Low interest rates, via their effects on house prices and bank profitability are causes for concern. The persistent reduction in interest rates during the preceding decades have contributed to the rises in house prices and household debt. If interest rates start increasing, household balance sheets might be squeezed, leading to house price falls. On the other hand, if rates stay negative for long, this hurts bank profitability and potentially threatens banks' traditional business model, when banks are unwilling to pass on negative interest rates to depositors. In conclusion, even if traditional indicators of financial crises are not flashing red, there are areas of vulnerabilities that need monitoring.

The paper focuses on the banking sector, due to its importance for economic activity and the fact that previous financial crises in the Nordics have had their root causes in the banking sector. Since the financial crisis of 2008, the financial sector has been subjected to heavy regulations. There are good reasons, but generals have a tendency to fight the last war, i.e. who knows if the next crisis arises outside the regulated banking sector. New risks might relate to credit provided by other institutions than traditional banks, for instance pension funds that start lending directly to projects but are

not subject to the same capital regulation as banks. If some types of exposures are subject to less regulation in parts of the financial system, and risks migrate to those parts of the system, overall risks in the economy have not necessarily been reduced.

Also, the financial system is becoming more and more digitalized. This makes the financial system more efficient, but, at the same time, opens the door to new types of risks, such as the risk of a serious breakdown in IT infrastructure. In general, and almost per definition, financial crises tend to arise because they are unanticipated - if they were expected, action would have been taken to prevent them. This means that we should pay attention to traditional banking activities and their risks, but we should also keep eyes wide open for new pockets of risks.

References

Admati, A. R. and Hellwig, M. (2013), *The bankers' new clothes: What's wrong with banking and what to do about it*, Princeton University Press.

An, Z., Jalles, J. T. and Loungani, P. (2018), How well do economists forecast recessions?, IMF Working Paper, WP/18/39.

Barclays (2015), Population dynamics and the (soon-to-be disappearing) global 'savings glut', Report.

Bean, C. R., Broda, C., Ito, T. and Kroszner, R. (2015), Low for long? Causes and consequences of persistently low interest rates, *Geneva Report on the World Economy* 17.

Bodie, Z., Kane, A. and Marcus, A. J. (2008), *Essentials of Investments*, Seventh Edition, McGraw-Hill International Edition.

Cochrane, J. H. (2014), Toward a run-free financial system, in Baily, M. N and Taylor, J. B. (eds.), *Across the great divide: New perspectives on the financial crisis* (197-249), Hoover Institution.

Copenhagen Economics (2019), EU implementation of the final Basel III framework. Impact on the banking market and the real economy, Report.

DeAngelo, H. and Stulz, R. M. (2015), Liquid-claim production, risk management, and bank capital structure: Why high leverage is optimal for banks, *Journal of Financial Economics*, 116(2), 219-236.

Eggertsson, G. B., Juelsrud, R. E., Summers, L. H. and Wold, E. G. (2019), Negative nominal interest rates and the bank lending channel, NBER Working Paper No. 25416.

Englund, P. (1999), The Swedish banking crisis: Roots and consequences, *Oxford Review of Economic Policy*, 15(3), 80-97.

Erhvervsministeriet (2018), Effekter af Baselkomitéens anbefalinger om kapitalkrav til kreditinstitutter, Köpenhamn.

Goodhart, C. and Avgouleas, E. (2016), A critical evaluation of bail-in as a bank recapitalization mechanism, in Evanoff, D. D., Haldane, A. G. and Kaufman, G. G. (eds.), *The new international financial system: Analyzing the cumulative impact of regulatory reform* (267-305), World Scientific Studies in International Economics Vol. 48.

Heider, F., Saidi, F. and Schepens, G. (2019), Life below zero: Bank lending under negative policy rates, *The Review of Financial Studies*, 32(10), 3728-3761.

Honkapohja, S. (2014), Financial crises: Lessons from the Nordic countries, *Journal of Financial Stability*, 13, 193-201.

Imbierowicz, B., Kragh, J. and Rangvid, J. (2018), Time-varying capital requirements and disclosure rules: Effects on capitalization and lending decisions, *Journal of Money, Credit and Banking*, 50(4), 573-602.

Johansson, M. W., Molin, J., Niemeyer, J. and Berntsson, C. N. (2018), The Riksbank's work with financial stability before, during and after the global financial crisis, *Sveriges Riksbank Economic Review*, (4), 48-68.

Jordà, O. and Taylor, A. M. (2019), Riders on the storm, Manuscript.

Kashyap, A. K., Stein, J. and Hanson, S. (2010), An analysis of the impact of "substantially heightened" capital requirements on large financial institutions, Harvard working paper.

Jokivuolle, E., Vihriälä, V., Virolainen, K., Westman, H. (2020), Bail-in: EU rules and their applicability in the Nordic context, this volume.

Krishnamurthy, A. and Vissing-Jorgensen, A. (2013), The ins and outs of large-scale asset purchases, Kansas City Federal Reserve symposium on global dimensions of unconventional monetary policy.

Laeven, L. and Valencia, F. (2013), Systemic banking crises database, *IMF Economic Review*, 61(2), 225–270.

Mian, A., Rau, K. and Sufi, A. (2013), Household balance sheets, consumption, and the economic slump, *Quarterly Journal of Economics*, 128(4), 1687-1726.

Mian, A. and Sufi, A. (2011), House prices, home equity-based borrowing, and the U.S. household leverage crisis, *American Economic Review*, 101(5), 2132-2156.

Mian, A. and Sufi, A. (2014), What explains the 2007-2009 drop in employment?, *Econometrica*, 82(6), 2197-2223.

Mian, A. and Sufi, A. (2018), Finance and business cycles: The credit-driven household demand channel, *Journal of Economic Perspectives*, 32(3), 31-58.

Mian, A., Sufi, A. and Verner, E. (2017), Household debt and business cycles worldwide, *Quarterly Journal of Economics*, 132(4), 1755–1817.

Modigliani, F. and Miller, M. M. (1958), The cost of capital, corporation finance and the theory of investment, *American Economic Review,* 48, 261–297.

Nationalbanken (2019a), Financial Stability, 1st half 2019.

Nationalbanken (2019b), The natural real interest rate in Denmark has declined, *Analysis*, (13).

Norges Bank (2019), Financial Stability Report 2019: Vulnerabilities and risks.

Rachel, L. and Smith, T. D. (2017), Are low real interest rates here to stay?, *International Journal of Central Banking*, 13(3), 1-43.

Rajan, R. G. (2005), Has financial development made the world riskier?, NBER Working Paper No. 11728.

Rangvid, J., Grosen, A., Østrup, F., Møgelvang-Hansen, P., Jensen, H. F., Thomsen, J., Schütze, P., Galbo, J., Ølgaard, C., Frederiksen, N. K. and Buchhave Poulsen, B. (2013), The financial crisis in Denmark - causes, consequences and lessons, Available from the webpage of the Danish Ministry of Industry, Business and Financial Affairs.

Rangvid, J. and Vølund, B. B. (2013), Leading indicators of distress in Danish banks in the period 2008-12, *Danish Economic Journal*, 151, 176-206.

Riksbanken (2019), Financial Stability Report 2019:1.

Schularick, M. and Taylor, A. M. (2012), Credit booms gone bust: monetary policy, leverage cycles, and financial crises, 1870–2008, *American Economic Review*, 102(2), 1029–1061.

Schwierz, C. (2004), Economic costs associated with the Nordic banking crisis, in Moe, T. G., Solheim, J. A. and Vale, B. (eds.), The Norwegian banking crisis (117-144), Norges Bank's Occasional Papers, No. 33.

Vale, B. (2004), The Norwegian banking crisis, in Moe, T. G., Solheim, J. A. and Vale, B. (eds.), The Norwegian banking crisis (1-21), Norges Bank's Occasional Papers, No. 33.

Comment on J. Rangvid: How Stable Is the Nordic Financial Sector?

Anneli Tuominen[1]

Jesper Rangvid has written a paper on the recent history of the Nordic financial crises and what we can learn from them. The paper has a clear focus on crises and gives a good overview on what we have lived through and what has changed since the early 1990s and 2008.

Historically, some indicators have predicted or at least preceded financial crisis. Rapid credit growth is one of the better predictors, and strong growth in real estate prices is another. As Rangvid writes, the classical boom-bust cycle often starts when house prices increase. People start to borrow to build and purchase houses, credit expands, house prices increase further, and the boom gets rolling. At some point, house prices peak. When they start to fall, credit contracts, the economy contracts, and house prices fall even more. And the downturn turns into a financial crisis.

Rangvid goes through those 'better indicators' and concludes that based on them the current situation in the Nordic countries does not look alarming. I fully agree with his analysis on the past, and broadly with regard to the present. As assessed in the paper, household debt and house prices have not risen particularly rapidly during recent years. But they have been rising for a long time, and the current situation makes me more worried than Rangvid.

Furthermore, past performance is not necessary indicative of the future. As stated in the paper, interest rates are historically low, and this can cause new types of problems: low rates can either give high asset prices and/or harm bank profitability. Should the rates increase rapidly, it would be detrimental to highly indebted households. And should the rates stay low, this would squeeze the profits of the banks, other things being equal, of course. I also agree with these risks. At the same time, however, I would like to emphasize the importance of other, non-traditional risks to the sector.

[1] FIN-FSA (Finland's Financial Supervisory Authority).
Email: Anneli.Tuominen@finanssivalvonta.fi.

Below, I first go through the main lessons of the 2008 crisis as drawn by Ben Bernanke, the chair of the Federal Reserve at the time of the crisis, and compare these with Rangvid's analysis. Then I assess the Nordic economies. How have they changed since the crises of the 1990s and 2008, and how has regulation and supervision coped with those changes? Finally, I conclude by assessing what kind of new risks we should be aware of to be better prepared against crises in the future.

1. Lesson from the 2008 crisis

Rangvid's paper focuses on the Nordic financial crises of the early 1990s and 2008. How does the Nordic picture fit with the global picture? Bernanke published in autumn 2018 his conclusion of the Great Recession and its ingredients (Bernanke 2018). He discusses two complementary narratives on the propagation mechanisms of a financial crisis. Was the 2008 crisis so deep because of the fragilities in the financial system, or because of the high level of household leverage?

According to the financial fragility narrative, mortgage-related losses triggered a large-scale panic which as a result seized the markets. Thus, at the core of the crisis was a supply-side problem, and the optimal policy response would have been to stabilize the financial system.

According to the household leverage narrative, after a large increase in leverage, a drop in house prices put many households into financial distress. As a result, at the core of the crisis was a demand-side problem, and the optimal policy response would have been to focus on that. Of course, as Bernanke states, the two narratives are complementary, not mutually exclusive.

The main tools against unknown risks are the buffers: the capital and liquidity buffers of financial institutions, non-financial institutions and households. Based on Bernanke's earlier work on the external finance premium, asymmetric information in the borrower-lender relationship implies additional costs (Bernanke et al. 1998). The size of that premium depends on the financial health of (potential) borrowers and financial intermediaries.

How can one measure the financial health of a borrower? Measurable metrics include, for example, net worth, collateral and leverage. The higher the net worth, the larger the overcollateralization and the lower the leverage ratio, the better the measurable financial health of a borrower is, and the smaller should be the external finance premium.

What about the other side, the lender, the banks? After all, they are also borrowers. The more buffers they have against unexpected risks, the more likely they are to receive finance also during bad times.

Thus, what the regulators and supervisors have done since the 2008 financial crisis with the improved micro- and new macroprudential tools – additional capital and liquidity requirements for the banks and lower leverage ratios for households – is to improve the financial health of our lenders and borrowers. We are trying to reduce the external finance premium and thus make our financial system and the whole economy more stable in bad times – and also in good times.

My interpretation is that there are no major differences between the analyses by Bernanke and Rangvid. Legislators and supervisors have demanded higher capital and liquidity buffers from the banks than before, and this has been a good thing. But raising capital requirements does come with a cost. At some point, at least in theory, the potential costs exceed the potential benefits. Looking forward, Rangvid sees the potential impact of the finalization of Basel III as a cause for concern. To some extent I share his view. But at the same time, I would like to see more quantitative impact analysis of the change: how large and long-lasting a shock is the increase in capital requirements expected to have on our economies?

2. What has changed in the Nordic economies? What has not?

Rangvid goes through the changes in banking sector regulation and supervision and in credit and house price developments that have occurred. What other issues should we analyze?

One is how the Nordic economies have changed more broadly. What has not changed is that the Nordics are still open economies, which means that they are sensitive to shocks in the global economy. And, if possible, Nordic economies are now even more closely interlinked than before. Earlier it was mainly through the real economies and especially trade. Nowadays financial integration is much deeper than it was 30 years ago.

As a result, the same pan-Nordic banks are present in all the Nordic countries. In addition, the way these pan-Nordic institutions are operating has changed. Most of them operate today with a branch structure. Branchification means that those institutions are led and supervised in a more centralized way than before. Thus, the economic and financial risks in the Nordics are today more concentrated than 30 years ago.

Markets seem to have a correct interpretation of this interconnectedness. When one major player gets a hit, all other players will also be affected. As regards the traditional risks (credit and liquidity), supervisors have sharpened their policies. Due to the changes in the Basel regulation (from Basel II to Basel III), banks now have more quality capital than before. In addition, they have new liquidity requirements in place. The liquidity coverage ratio requires banks to hold highly liquid assets to ensure their short-term obligations in a stressed situation. The net stable funding ratio is designed to reduce the longer-term funding risk of a bank.

In addition, all competent Nordic authorities have imposed macroprudential requirements on banks and households. As regards the former, systemically important institutions have to have additional capital buffers, known as O-SII buffers. In addition, there are systemic risk buffer requirements, which require either all or just significant institutions to have additional capital buffers. For example, in Finland the setting of the systemic risk buffer takes into account risk concentrations, mutual interconnectedness and interconnectedness to foreign banking and financial systems, among other things. All in all, in a European comparison, Nordic banks face higher capital requirements than is the case in an average EU country.

3. Conclusion and possible triggers of a future financial crisis

We are aware of the traditional risks, like house prices, mortgages, and – as a somewhat newer phenomenon – the increased importance of market-based funding through covered bond issuance. But there are also non-traditional risks, 'unknown unknowns', that have surprised the banks and – I must say – also the authorities. It seems sometimes that regulators and supervisors focus on solving the problems of the past rather than focusing on the challenges of the future.

Low interest rates are one example of those previously unknown risks, as described in the paper. From the point of view of macroeconomics, a low yield curve and even negative rates have been the best available way to support the real economy since the crisis. I agree with Rangvid that they are not without side effects. How long the current extremely low rates will stay with us is an open question. But I do believe that they are not the new normal, the new steady state. I expect that when the economy has recovered and become more robust, we will see positive (low risk) interest rates again. But as the new equilibrium rate is likely to be lower than before the crisis due to the weak demographics and low productivity growth, in a crisis – maybe even in a normal downturn – the likelihood for negative rates will be higher than in the past.

Money laundering is another example of a new type of risk. It is also an area where we have seen contagion between Nordic banks, at least when looking at it from the outside. Nordic banks have been heavily criticized for shortages in their anti-money-laundering capabilities. And supervisors have also been criticized and have consequently taken corrective actions. All Nordic supervisors have strengthened their anti-money-laundering capabilities, measured both by headcount and by supervision intensity.

Thirdly, the increased use of technology changes the structure of the financial system. Financial services are shifting more and more online and to mobile devices. Customers are demanding developed cutting-edge digital services, which puts pressure on the banks. The financial industry is already characterized by large IT investments,

and the need for this will not vanish in the future. It seems that banks want to launch products and services as fast as possible. However, this cannot be done at the cost of security. Cybersecurity can only be as strong as its weakest link. Both banks and supervisors should allocate more resources to combat operational and cyber risks. An interconnected and digitalized world is as strong as its weakest link (ESRB 2020).

Fourthly, there is climate change. This will change the environment for financial service providers and supervisors. And the change is likely to be faster than we thought not such a long time ago. As regards banks and insurance companies, there are physical risks, transition risks and liability risks. Especially in the short and medium term, we should pay much more attention to transition risks, as they are likely to cause large changes in credit risk and asset values, especially in CO^2-intensive sectors (ESRB 2016).

A dramatic change

The world has changed dramatically since I wrote the previous part of my comment. We have encountered an unprecedented global crisis. The corona crisis has caused a collapse of production and world trade. Unlike the 2008 crisis, its roots are deep in the real economy and therefore policy measures focusing only on the financial sector are not enough. To put it shortly, the coronavirus pandemic is a true 'unknown unknown'.

The initial policy reaction has been impressive. Central banks have reacted quickly and are doing their 'whatever it takes' to supply liquidity to the financial markets. The supervisors and regulators have released macro buffers set during the good times and declared that they endeavour to use the flexibility built in the regulation as well as asked banks to refrain from dividend payments. All these supervisory measures are set to boost banks' capacity to absorb losses and support lending to the economy. And last but not least, the governments have tailored impressive packages to support both the liquidity and solvency of firms and households.

The question arises whether the Nordic financial sector is stable enough to withstand the consequences of the corona crisis. I do not want to speculate but it should be emphasized that the Nordic

financial sector faces the crisis from a much stronger footing than either in the 1990s or 2008, thanks at least partly to tougher regulatory requirements and more intrusive supervision.

References

Bernanke, B. S. (2018), The real effects of disrupted credit: Evidence from the global financial crisis, BPEA conference draft.

Bernanke, B. S., Gertler, M. and Gilchrist, S. (1998), The financial accelerator in a quantitative business cycle framework, NBER Working Papers No. 6455.

ESRB (2016), Too late, too sudden: Transition to a low-carbon economy and systemic risk, ESRB ASC Report No. 6.

ESRB (2020), Systemic cyber risk, ESRB Report.

Comment on J. Rangvid: How Stable Is the Nordic Financial Sector?

Peter Englund[1]

Jesper Rangvid paints a well-balanced and convincing picture of the stability of the Nordic financial sector. Banks are profitable and well capitalized. Provisions for loan losses are essentially zero. Indicators, like debt growth, that have been shown to have statistical power to predict crises in the past do not flash red today.

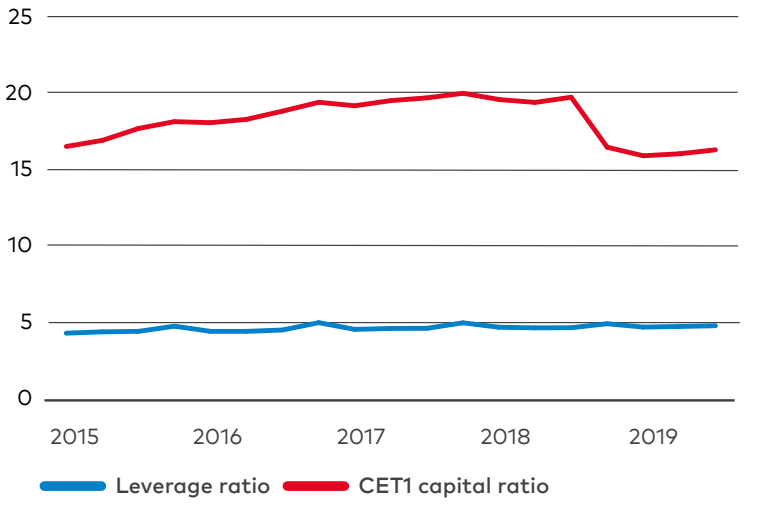
It is difficult to quarrel with this positive picture, but there is reason for humility. As quoted in the paper, queen Elisabeth famously queried why (almost) nobody saw the previous crisis coming, so how can we make statements about the likelihood of a future crisis with any confidence? A partial answer to the latter question can point to two developments after the crisis. First, bank regulation has undergone revolutionary changes based on a combination of new and old instruments: capital ratios, liquidity requirements, a new resolution framework etc. As a result, banks, and the financial sector more broadly, should now be better equipped to withstand disturbances from whatever source. Second, there has been an enormous amount of new research on the topic of financial stability. We (think we) have a better theoretical understanding of the mechanisms leading to a crisis, and there now is much more solid empirical research that helps to identify indicators with some ability to predict crises.

1. Are banks well capitalized?

As a result of the new battery of regulations, banks are better capitalized today than before. As shown in the paper, capital ratios of major Nordic banks have trebled, from 5-7 percent before the crisis to 15-20 percent today. These ratios are also higher than those of banks in most other countries. But it is important to keep in mind that we are looking at *risk-weighted* ratios, and the increase does not necessarily mean that banks have three times as much capital as a cushion against future losses. In fact, the capital buffers have hardly increased at all since before the crisis. For the major Swed-

[1] Stockholm School of Economics and Uppsala University. Email: peter.englund@hhs.se.

Figure 1 CET1 capital ratio and leverage ratio for the major banks in Sweden

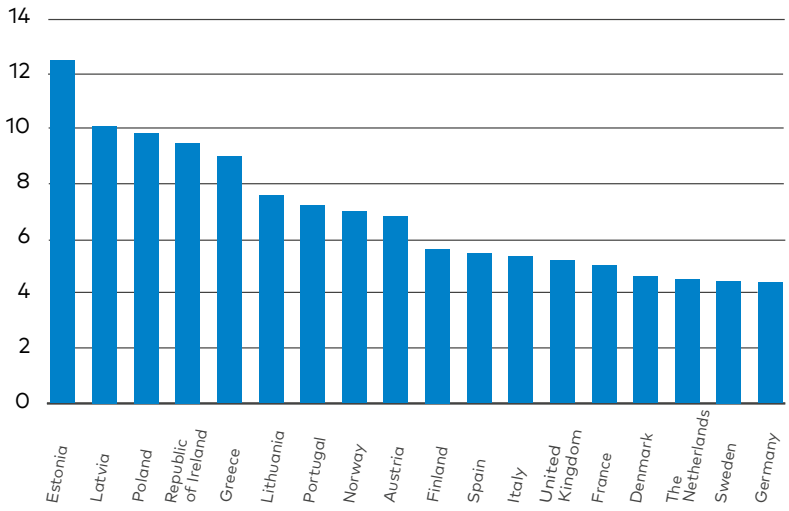


Note: The decrease in the Common Equity Tier 1 (CET1) capital ratio from the fourth quarter of 2018 is due to the risk-weight floor for mortgages being moved from Pillar 2 to Pillar 1.
Source: Sveriges Riksbank, Financial Stability Report 2019:2, chart 22.

ish banks, leverage ratios (relating capital to the *unweighted* sum of assets) still stand at slightly below five percent; see Figure 1. In fact, Nordic banks rank towards the bottom among EU countries in terms of leverage, as can be seen in Figure 2.

What has happened is that the average risk weight on the asset portfolios of Nordic banks has come down over time. Nordic banks in general have lower average risk weights than banks from other countries. A main explanatory factor is the large and increasing fraction of low-risk lending to the household sector, in particular mortgages. Currently, loans to households, including housing coop associations, make up more than half of all lending from Swedish banks (63 percent in the second quarter of 2019 according to Finansinspektionen 2019). The low risk weight on mortgages and other household loans reflects the fact that losses on household lending in Sweden have historically been minuscule, even during the crisis in the early 1990s. In contrast to the U.S., loans in most European countries

Figure 2 Leverage ratio, European countries, June 2019



Source: Sveriges Riksbank, Financial Stability Report 2019:2, chart 23.

are full recourse and give banks the right to repossess other assets beyond the collateral.

Looking at the experience of other countries (Ireland, Spain) during the worldwide financial crisis makes it clear, however, that mortgages are not universally risk-free even if they are full recourse. Apparently, there are exceptional situations where the crisis is so deep that the legal right to repossess assets is of little value. Consequently, bank internal models based on historical default rates may indicate too low risk weights on household loans. [2] Against this background, regulators in many countries overrule internal models and impose higher minimum risk weights on mortgages. In Sweden, the minimum is now set at 25 percent, at least twice as high as the weight generated by internal models based on historical losses. Whether this catches the riskiness of mortgages looking ahead depends on how likely we deem an Irish situation in the future.

[2] There is large international variation in risk weights, even on the same type of loans; see e.g. Turk-Ariss (2017). This has led to a broader discussion of the relevance of risk weights derived from internal bank models.

2. How risky is household debt?

Even if the probability of credit losses on loans to households is small, household debt may still be associated with stability risks. There are two sets of evidence on this. First, Jordà et al. (2013) and others have shown that growth of credit to the private sector is about the only factor with an ability to predict financial crises. Second, research summarized by Mian and Sufi (2018) indicates that a large increase in household debt is a good predictor of recessions. Typically, such debt increases result from shocks to the supply of credit, often due to changed regulations or financial innovations that are amplified by feedback loops from the real estate market. Examples of supply shocks that have triggered crises in the past include the dismantling of lending restrictions in the Nordic countries in the 1980s, which was followed by increased competition among banks and other financial institutions; the development of the market for mortgage-backed securities and the emergence of new lenders offering subprime loans in the United States in the 2000s; and the introduction of amortization-free loans in Denmark in 2003 which allowed homeowners to fund excessive consumption.

Rangvid, correctly in my view, points out that there is little sign today of such supply-driven credit expansion. Household debt has been increasing steadily for a long time, but with no acceleration in recent years. Neither are there any signs of a debt-driven consumption boom at this point of time; see Svensson (2020) for a discussion of the current Swedish situation including a comparison with the Danish experience a decade ago. Hence, referring back to the risk weights on mortgages, it is hard to claim that these should currently be too low. Nordic banks do appear to be well capitalized relative to the risks in their loan portfolios. But their capital buffers against *unexpected* shocks, not reflected in the risk weights, are no larger today than they were a decade or two ago.

The magnitude of loan-loss provisions is another possible indicator of riskiness. As discussed by Rangvid, loan losses have been negligible in the last few years. It is not clear, however, that this is such a useful indicator. In fact, Figure 5 in the paper shows that loss provisions were essentially zero, even negative in some cases, in 2006 and 2007 immediately before the crisis started and losses exploded in 2008 and 2009. A similar pattern held for Sweden in the early 1990s. This

illustrates that crises, almost by definition, are difficult to predict with sufficient accuracy to affect loss provisions beforehand. If anybody would see a crisis coming, measures would already have been taken to prevent it.

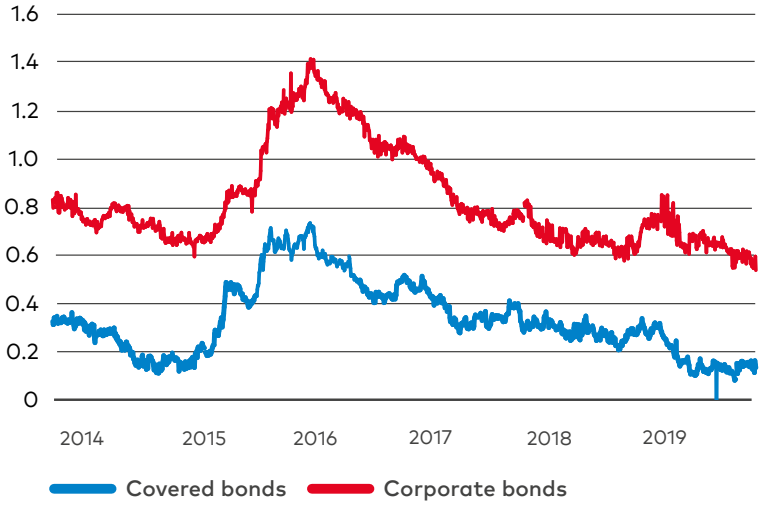
3. Today's low-interest environment

While the direct indicators of bank health signal little risk, the macroeconomic environment may be more of a concern. Since a number of years, interest rates are low or even negative, due to a combination of low neutral rates (i.e. interest rates consistent with constant inflation) and an expansionary monetary policy. Furthermore, risk premia have come down as illustrated in Figure 3. As a result, expected asset returns are at historically low levels. This obviously puts pressure on pension funds and other investors and seems to have led to a 'search for yield', where investors move towards riskier assets such as low-grade bonds, private equity, real estate, infrastructure and other alternative investments. This has increased asset values across the board, when future cash flows are now discounted at lower discount rates.

As discussed briefly in Rangvid's paper, asset values are particularly sensitive to future changes in interest rates when current rates are low. A one percentage point interest rate change has a proportionately larger price effect, the lower the interest rate. Changes in the macroeconomic environment which affect the savings-investment balance or increase risks, may therefore have dramatic consequences on asset prices and indirectly on financial stability. This concern is particularly relevant as the corona crisis hits the world, with extremely uncertain long-term impact.

In my comments at the Helsinki conference in December 2019, I tried to come up with examples of possible sources of such threats to financial instability. These included changes in the competitive landscape that may pose a threat to bank profitability. In all the Nordic countries, the banking market is an oligopoly dominated by a handful of actors. Interest margins on mortgages have remained high, but recently new actors with new business model have entered. One such model, so far best developed in the Netherlands but spreading in Sweden, builds on a transparent securitization where mortgages

Figure 3 Five-year risk premia on covered bonds and corporate bonds, percentage points



Source: Sveriges Riksbank, Financial Stability Report 2019:2, Appendix, Figure A6.

are put into funds that are sold directly to pension funds and other investors.

Another stability threat comes from cost developments in banking. With the use of cash dwindling, cyber risks become more prominent, and banks have to invest heavily to make their systems safe. Another cost driver is the control of money laundering activities, where failures like in Danske Bank and Swedbank have proven very costly in terms of fines and above all reputation.

But threats to bank profits may also come from the real economy outside the financial sector. One example is the increase in protectionism and the risk of a future trade war. At the time of writing this comment, the obvious real risk is the corona outbreak. That this happens at a time of low interest rates and low risk premia, poses an extra risk to the macro economy and the financial system beyond the enormous real risk to human life caused by the virus.

References

Finansinspektionen (2019), Stability in the Financial System, 2019:2.

Jordà, O., Schularick, M. and Taylor, A. (2013), When credit bites back, *Journal of Money, Credit, and Banking*, 45(2), 3-28.

Mian, A. and Sufi, A. (2018), Finance and business cycles: The credit driven household demand channel, *Journal of Economic Perspectives*, 32(3), 31-58.

Svensson, L. E. O. (2020), Macroprudential policy and household debt: What is wrong with Swedish macroprudential policy?, *Nordic Economic Policy Review,* this volume.

Turk-Ariss, R. (2017), Heterogeneity of bank risk weights in the EU: Evidence by asset class and country of counterparty exposure, WP/17/37, International Monetary Fund.

Monetary Policy and Household Debt[1]

Magnus A. H. Gulbrandsen[2]
Gisle J. Natvik[3]

Abstract

We address the interplay between household debt accumulation and monetary policy. Monetary policy likely affects household debt-to-income ratios via disposable income and inflation, not just by changing the financial incentive to save. We provide micro-level snapshots from Norway on how households' income flows and debt accumulation co-move with interest rates and inflation. Real interest rate hikes are associated with *increased* real debt due to strong negative association between inflation and real debt. We therefore caution against pursuing contractionary policies to curb household debt. By lowering inflation, such policies might backfire and increase household debt burdens.

Keywords: Monetary policy, household debt, debt deflation.
JEL codes: D14, E21, E52.

[1] We thank Lars Calmfors, Andreas Fagereng, Karsten Gerdrup, Martin B. Holm, Lars E. O. Svensson, David Vestin, two anonymous referees, and seminar participants at the Nordic Economic Policy Review seminar on 'Financial regulation and macroeconomic stability' in Helsinki 12 December, 2019, for helpful discussions and suggestions. This article is part of a research project at Statistics Norway, supported by the Research Council of Norway (project #287720).
[2] BI Norwegian Business School. Email: magnus.a.gulbrandsen@bi.no.
[3] BI Norwegian Business School. Email: gisle.j.natvik@bi.no.

1. Introduction

The financial crisis of 2007 and the Great Recession that followed triggered a lively international debate on how monetary policy should treat housing booms and rapid debt accumulation among households. The backdrop was a steep increase of house prices and household debt in the build-up to the crash. At the time, it was widely believed that this pattern was not a mere correlation. Rapidly growing house prices and associated borrowing were considered as main culprits behind the turmoil that followed. An immediate question then became: Could and should monetary policy have prevented the crash by more actively leaning against the run-up in house prices and households' debt burdens?

Questions of this nature have featured prominently in Nordic policy debates over the past decade. According to Figure 1a, household debt has increased steadily relative to disposable income since the mid-1990s. An exception is Denmark, where debt has fallen relative to income after house prices dropped following the 2007 crash. Unsurprisingly, these trends in household debt have largely coincided with trends in house prices, displayed in Figure 1b. Hence, greater debt has not implied that households have become poorer. Rather, household balance sheets have grown. Lately, Nordic discussions of monetary policy have largely circled around the issue of how the central banks should respond to these expanding balance sheets.

This paper will not provide an answer to the normative question of how monetary policy should respond to debt movements. Instead, we will take one step back and use Norwegian micro data to shed some light on how monetary policy directly affects household cash flows in terms of interest income and interest expenditure, and how interest rates and inflation are associated with swings in household debt.[4]

[4] We somewhat loosely use the term cash flows in describing those components of current household income that are directly affected by interest rates: interest income and interest expenditure. We do not aim to precisely distinguish how monetary policy affects these cash flows from how it affects life-time incomes.

Figure 1a Debt relative to income

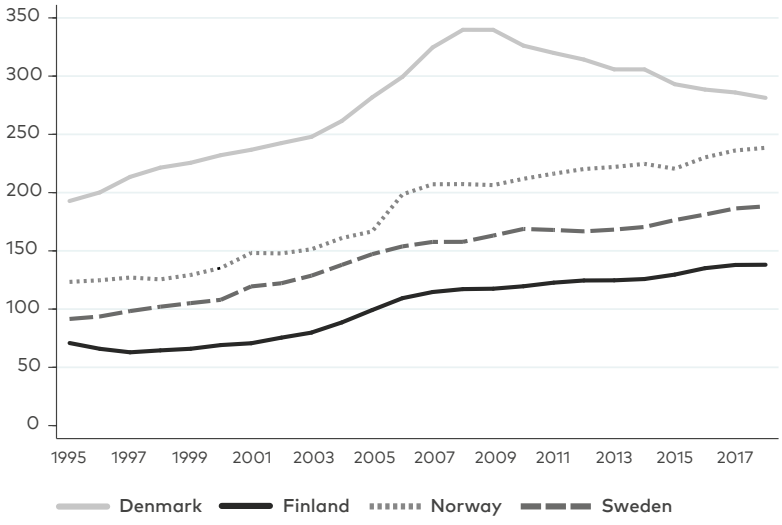
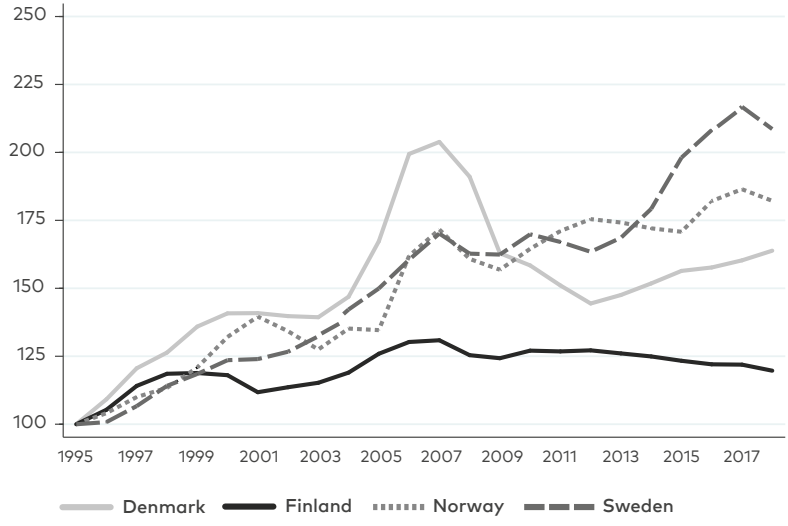


Figure 1b House prices relative to income



Note: Debt relative to income is the sum of household loans (primarily mortgage loans and consumer credit) and other accounts payable as percentage of net household disposable income. House prices relative to income is the nominal house price divided by the nominal disposable income per household head (index with 1995 = 100).
Source: OECD.

Our step back reflects where the current research frontier lies. As we will argue, a convincing case can be made that debt matters for macroeconomic fluctuations and risks of financial crises. However, this need not imply that monetary policy should aim to stabilize household debt. To conclude on that matter requires solid evidence on how monetary policy affects debt and structural economic models that are consistent with such evidence and explain household balance sheets satisfactorily. Both are in short supply at present. Still, recent heterogeneous agent models offer promise for addressing these types of questions in the future. To do so, precise microeconomic evidence on the link between household debt and monetary policy will be needed.

One conclusion we will draw from the current literature is that movements in households' disposable income are key ingredients in the transmission of monetary policy. This might sound rather trivial, but it has been largely overlooked in debates on monetary policy and household debt. The precise link to these debates is as follows: if the interest households pay on their debt is (partly) determined by the policy rate, then households' interest expenses are directly influenced by monetary policy. In the Nordic countries, it is likely that this 'cash flow' channel of monetary policy transmission is active, as adjustable rate mortgages (ARMs) are widespread.[5] Moreover, because household debt has increased as sharply as we saw in Figure 1, it is plausible that the cash flow channel of monetary policy has become more important over the past 25 years in the Nordic countries.[6]

Another take-away from the existing literature, is that inflation might play a key role in the transmission from monetary policy to real credit growth. If debt contracts are nominal, inflation can serve to reduce the real value of debt over time. This channel is sometimes referred to as the 'Fisher effect'. Historical evidence indicates that it indeed has played a stong role at the macro level. More theoretically oriented studies have argued that it might lead to a positive

[5] We are unaware of any unified source of the exact ARM prevalence in the Nordic countries. ARMs are the least common in Denmark. There, the ARM market share was approximately 20% in 2016 (Bouyon 2017). In Sweden, the ARM market share was close to 80% in 2016 according to the same source. In Finland, more than 90% of mortgage loans were based on variable rates in 2013 (Marrez and Pontuch 2013). In Norway, more than 90% of new mortgage loans are ARMs according to Olsen (2019).
[6] This would of course not be the case if deposits have increased by the same amount as debt and indebted households respond as strongly to cash flows as households with deposits.

causal effect of nominal interest rate hikes on real household debt because inflation is lowered.

Household-level data allow us to zoom in on exactly these cash flow and Fisherian debt deflation effects, and we provide some examples with registry data from Norway. First, we document how Norwegian households' interest incomes and expenses systematically co-vary with the policy rate set by Norges Bank. Both when we look at the total population and when we compare high-debt to low-debt households, this pattern is stark. In specific episodes, but far from always, the cash flow effects from interest rate changes are so strong that they also become visible in total household income. These episodes are observed toward the end of our sample period, suggesting that the cash flow effects have become stronger as household debt levels have increased.

Second, we focus attention on growth of real household debt. Here we see clear signs of Fisher effects: Growth of real debt falls when inflation goes up, and increases when inflation goes down. The tendency is particularly stark toward the end of our sample period. For nominal interest rates, there is no such pattern. Hence, the distinct *negative* association between real debt and inflation results in a *positive* association between real debt and realized real interest rates (current nominal interest rate minus current inflation). Comparing households with high and low debt levels reinforces these findings. Moreover, these patterns are particularly striking when we limit attention to households who do not relocate, while the patterns are approximately absent for households who change residence. This indicates that it is important to distinguish between the intensive and the extensive margin of debt accumulation when discussing how monetary policy affects debt and how monetary policy should be designed. At the intensive margin, inflation seems to be key.

The remainder of this paper is organized as follows. Section 2 provides a selective literature review about how debt shapes economic outcomes and how monetary policy affects debt. Section 3 gives a brief summary of our Norwegian data and some descriptive statistics on our main variables: debt and interest expenses. Section 4 presents results on the link between the monetary policy rate and household cash flows. Section 5 looks into household debt accumulation. Section 6 concludes.

2. A selective literature review

This section provides a selective review of the literature. We aim to convey how current research (i) points toward a possibly important role for debt in shaping aggregate outcomes including monetary policy transmission, and (ii) points toward multiple different and possibly opposing channels through which monetary policy affects household debt accumulation. Following the focus of existing papers, we divide this review into four sections. However, this distinction is perhaps somewhat artificial as the contents of all sections are closely connected.

2.1 Household debt and macroeconomic stability

Today, there exists a large body of studies documenting the association between household debt accumulation and macroeconomic stability. A widespread conclusion is that high levels of debt are associated with greater downturns in economic activity, such as the Great Recession. This evidence comes in several forms. At the highest level of aggregation, the evidence from Òscar Jordà, Moritz Schularick, and Alan Taylor is prominent. In a string of papers, they consider historical data going back to the nineteenth century from a multitude of countries. A main conclusion is that rapid increases in household debt go hand-in-hand with both increased risk of financial crises, and greater intensity of recessions once they occur (Jordà et al. 2013). Moreover, asset price bubbles are found to be more costly when they come with stronger escalation of household debt (Jordà et al. 2015a). And importantly, growth in the mortgage component of credit seems to be the main culprit (Jordà et al. 2016). Notably, Mian et al. (2017) reach a similar conclusion. They study the relationship between household debt and business cycles worldwide, and find that the negative correlation between changes in private debt and future output growth is driven by household debt, not by firm debt.

At an intermediate level of aggregation, the importance of household debt seems to be confirmed. A leading example here is Mian et al. (2013), who compare consumption responses in different ZIP code areas in the United States following the 2006–2009 housing collapse. The authors find that, in areas where households were more leveraged before house prices collapsed, consumption fell more strongly in response to the house-price-induced wealth decline. The

estimated effects are strong. Per dollar lost in housing wealth, consumption fell three times more in highly leveraged regions (loan-to-value ratio of more than 90%) than in low-leveraged regions (loan-to-value ratio of less than 30%).

Finally, a growing number of studies scrutinize the link between households' indebtedness and their responses to income shocks at the micro level. An early example is Dynan (2012), who used survey data (the US Panel Study of Income Dynamics) and found that households with more debt tend to respond more strongly to income changes. Baker (2018) uses linked consumer financial accounts from the United States, containing transaction and balance sheet data for several million individuals, and finds a similar pattern. However, when exploring this link further, he finds that the correlation is largely driven by liquidity constraints. Household debt does thus not seem to drive consumption behaviour in and of itself, but households who are highly leveraged also tend to be constrained in terms of their liquid assets and access to credit. Fagereng et al. (2019), who study lottery winners in Norway, echo this conclusion. They find that the expenditure response to winning varies with liquid asset holdings, but not with debt, once both are controlled for.

2.2 Interest hikes might increase or reduce household debt

Hence, there now exists macroeconomic evidence to support the view that debt propagates economic fluctuations, although the exact causal mechanism is questioned by recent micro-level studies. For a central bank aiming to stabilize economic activity, it follows that household debt is a variable to monitor. However, it remains unclear *how* monetary policy should best take debt into account. For instance, a naive conclusion might be that rising household debt should be met by tighter monetary policy, to dis-incentivize households from further borrowing. But that stance takes for granted that a higher interest rate will indeed serve to reduce household debt burdens. Whether this is actually the case, is far from obvious.

Again, we can lean on recent evidence at various levels of aggregation. At the macro level, Bauer and Granziera (2017) estimate the response of private sector debt relative to GDP after monetary policy shocks in eighteen advanced countries. The evidence suggests that after an interest rate hike, the debt-to-GDP ratio rises in the short run but falls in the longer run. Robstad (2018) finds a similar,

moderate, short-run rise in debt-to-GDP using aggregate data from Norway. In contrast, Jordà et al. (2015b) estimate that interest rate cuts are followed by increases in mortgage loans relative to GDP.[7]

At the micro level, the main evidence stems from Di Maggio et al. (2017). They study resets in the interest rates of adjustable rate mortgages (ARMs) in the United States. One finding is that when indebted households' mortgage rates fall, they use part of the increased cash flow to repay outstanding debt. Moreover, households with low housing wealth and low income use less of the additional cash flow to repay debt.

The quantitative impact of interest rates on debt has been shown to matter for monetary policy. Svensson (2017a, 2017b) presents cost-benefit analyses of monetary policies that attempt to lean against the wind by increasing interest rates to reduce household debt and the risk of financial crisis. A sharp conclusion is that, because interest rate hikes are blunt in dampening debt growth, they are likely to cost more in terms of reducing aggregate demand than they benefit society in terms of lower risks of financial crises.

Gelain et al. (2018) study the impact of monetary policies that aim to stabilize debt movements within the confines of a New Keynesian Model. A key finding is that when debt accumulation is modelled realistically, any policy of systematically raising interest rates when households' debt burdens increase, is detrimental. Instead, optimal targeting of the debt-to-income ratio (or just real debt) tends to imply that interest rates should be lowered when debt is high and increased when debt is low. This conclusion can be understood by distinguishing between new borrowing and repayment of existing loans. If this distinction is ignored, and all households are assumed to always be on the extensive margin where they refinance their mortgages, interest rate hikes are associated with immediate drops in debt burdens. The reason is that higher interest rates motivate higher saving. In contrast, once the distinction between new borrowing and existing loans is made, interest rate changes largely affect households' debt burdens indirectly via inflation and house-

[7] Their results follow from studying countries with exchange rate pegs and using international interest rate changes to instrument domestic interest rate changes.

hold income. Few households are at the extensive margin, households at the intensive margin tend to follow nominal plans for debt repayment, and interest rate hikes contract economic activity and thereby household income. Debt-to-income ratios therefore increase in response to a surprise increase in the monetary policy rate.

The emphasis on inflation as a determinant of growth in real household debt has empirical support. Mason and Jayadev (2014) study the evolution of US household debt-to-income ratios from 1929 to 2011. Their central conclusion is that historically, movements in aggregate debt-to-income ratios have primarily been driven by 'Fisher dynamics'. The latter refers to changes in inflation, income and interest expenditure, instead of changes in household borrowing. For instance, the growth of the US household debt-to-income ratio in the early 1980s is found to primarily reflect disinflation and high nominal interest rates on existing debt.

2.3 The importance of household balance sheets and disposable income

An upshot of the policy analyses reviewed above is that to address the interplay between monetary policy and debt, one must distinguish between the intensive and the extensive margin of debt accumulation. More generally, households' balance sheet decisions should be considered with care in this context. A growing strand of the macroeconomic literature offers promise at exactly this point. By incorporating household heterogeneity in terms of income and asset holdings into equilibrium models where monetary policy matters due to nominal frictions, heterogeneous agent new Keynesian (HANK) models have recently scrutinized conventional views on how monetary policy transmits through the economy. At present, leading examples are the studies by Kaplan et al. (2018), Auclert (2019), and Luetticke (2019). An overview of the research agenda is provided by Kaplan and Violante (2018).[8]

A central point in heterogeneous agent models is that movements in disposable income potentially play a far more important role in

[8] This literature is currently booming with a multitude of new papers in the making. The points extracted here are selected and stylized to focus on implications for questions on debt and monetary policy, and deliberately ignores many of the nuanced insights from this literature.

environments where agents are imperfectly insured and face borrowing constraints. This insight is not unique to the recent HANK literature. The novelty of these newer frameworks is that assets are distinguished by their liquidity. The rationale is, even if a household is wealthy, it might still be liquidity constrained if all of its wealth is stored in an illiquid asset like housing. Hence, a substantial share of the population, not only the poor, might be highly sensitive to swings in their current disposable income. If we focus on monetary policy, it follows that the influence of interest rate changes on household current disposable income might be an important channel in the monetary policy transmission mechanism. More precisely: If those households whose disposable incomes are most directly affected by an interest rate change also happen to have high marginal propensities to consume out of income, then monetary policy will be more powerful in the aggregate. Indeed, Kaplan et al. (2018) conclude that within their HANK model calibrated to the U.S. economy, the main way in which monetary policy affects households' demand is via their current disposable income. This channel is coined 'indirect', as interest rate changes in this model work not via interest expenditure and interest income, but via their influence on household earnings and fiscal transfers. The result contrasts sharply with the conventional New Keynesian logic that monetary policy affects households' demand by changing their incentives to save (intertemporal substitution).[9] Note that these effects via disposable income dominate monetary policy transmission even though the direct cash flow effects via interest expenditure are not modelled in detail. When the next generation of HANK models take these direct cash flows explicitly into account, the effects of disposable income in monetary policy transmission are likely to be even stronger.

The importance of current disposable income for household consumption that typify HANK models is not taken out of thin air. Instead, a vast empirical literature documents that households respond far stronger to transitory income shocks than what the stylized permanent income hypothesis predicts. For instance,

[9] Intertemporal substitution is unimportant for households who are borrowing constrained. A small increase in the interest rate raises the incentive to save, but constrained households are typically not willing to save in the first place, so they will not reduce their consumption to intertemporally substitute.

Jappelli and Pistaferri (2014) summarize much of the existing evidence, Parker et al. (2013) summarize the studies of episodes where U.S. households have been refunded tax payments, and Fagereng et al. (2019) present evidence from lottery wins. This literature finds not only that consumption responses are large, but also that they are systematically larger among households with smaller holdings of liquid assets. The latter finding fits well with HANK models.

2.4 Cash flow effects of monetary policy

In sum, we have that (i) models with realistic heterogeneity imply that disposable income responses are important for monetary policy transmission, and (ii) microeconomic evidence supports that fluctuations in disposable income indeed do influence consumption. These insights are likely important for discussions of the interplay between monetary policy and debt. In particular, household debt will typically affect the extent to which a central bank's interest rate changes feed into movements in household cash flows. This happens whenever the interest rate that households obtain on their savings or pay on their debt is tied to the policy rate. Moreover, these effects on household cash flows will be stronger, the more indebted households are.

The main cause of a direct link from policy rates to household cash flows is adjustable rate mortgages (ARMs). A small number of studies look into this channel empirically, coining it the cash flow channel of monetary policy. Flodén et al. (2018) use micro data from Sweden with the aim to estimate how policy rate changes affect household-level consumption through interest expenditure. Identification is obtained by comparing households with high and households with low initial debt relative to income. The researchers find significant and sizeable effects. Among households with ARMs and high debt-to-income ratios, the average response implies a marginal propensity to consume out of interest expenses of around one half. Notably, these effects vary considerably with household liquidity and loan-to-value ratios. The consumption response to interest expenses is greatest for households with high debt-to-income ratios, high debt relative to the value of their houses, and low holdings of liquid assets.

La Cava et al. (2016) find similar results with Australian data. The authors compare households with ARMs to households with fixed rate mortgages, and observe that consumption drops more with interest rate increases among the holders of ARMs. In addition, it is

found that the spending by holders of bank deposits increases when interest rates go up, as should be the case if the cash flow channel is the most important one.

A third main empirical study in this vein of research is that of Di Maggio et al. (2017). Their findings are consistent with the two studies mentioned above. Identification is achieved by studying households who experienced an abrupt reduction of interest expenses because their mortgage rates incidentally were reset in a period with low market rates. Borrowers responded to reduced interest expenditure partly by consuming and partly by repaying their debt more quickly. Again, the composition of household balance sheets was related to these responses, as households with lower incomes and higher housing wealth were found to spend more of their increased cash flow on consumption.

2.5 Implications for the interplay between debt and monetary policy

Taking the four strands of the literature discussed above together brings us to the following point. A relatively strong case can be made that household debt accumulation matters for macroeconomic fluctuations and risks of financial crises. Modern macroeconomic models and an array of recent empirical evidence indicate that the response of households' disposable income is a likely key channel in the transmission of monetary policy to the economy, and household debt is in turn a likely central ingredient here. The reason is that debt determines the extent to which interest rate changes impact the interest expenditure component of household cash flows. Yet, it is not obvious how monetary policy should deal with household debt, as even the sign of debt's response to interest rate changes is debatable. To answer normative questions of how central banks should deal with household debt in general, and if they should emphasize debt more relative to the conventional target variable of inflation in particular, we need better evidence on exactly how changes in the monetary policy rate and inflation feed into households' debt accumulation.

The remainder of this paper is therefore dedicated to illuminate the relationship between interest and inflation rate changes on the one hand, and households' cash flows and debt accumulation on the other.

3. Norwegian micro data

We use Norwegian administrative data, primarily the register of tax returns from the Norwegian tax administration. These data are third-party reported. Because Norway imposes wealth and income taxes, the tax registry data provide an account of yearly income and end-of-year balance sheets over time, covering all Norwegian taxpayers every year. The sample period is 1993–2015.[10]

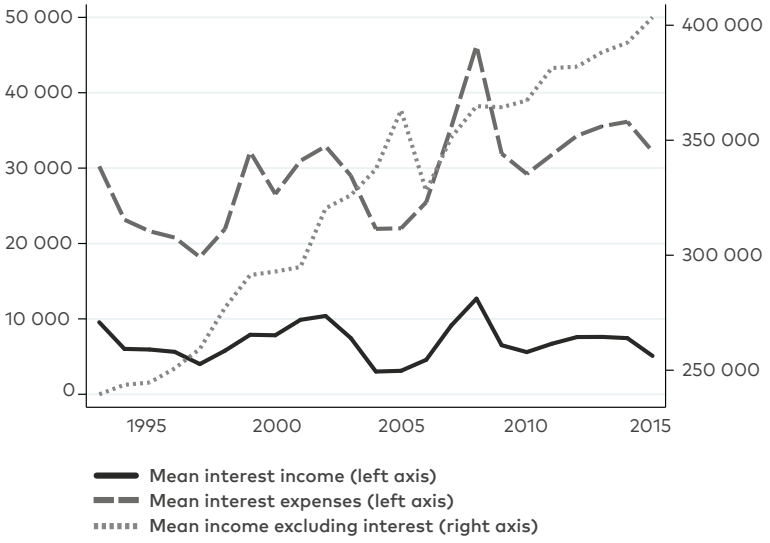
In what follows we will focus on households' debt and various components of their disposable income. The former includes all forms of debt, but is for most households dominated by mortgages. The typical mortgage contract in Norway has a repayment period of around 25 years (range between 20 and 30 years) and a floating interest rate, meaning that the rate is fixed for less than 3 months. When the bank decides to change the interest rate to its customer's disfavor, the bank is legally obliged to give a minimum of six weeks' notice.[11] In 2004–2018, the average share of adjustable rate mortgages was 91%. Around 8% of all mortgage contracts had a fixed rate for one to five years, and 1% had a fixed rate for more than five years.[12]

Total disposable income is the sum of earned income (salary plus business income), transfers and net capital income, minus all taxes paid during the year. Within total disposable income we are particularly interested in two subcomponents of net capital income: interest income and interest expenses. The former is the sum of pre-tax interest income received on all interest-bearing assets during the year. Interest expenses are the sum of all pre-tax interest expenditure paid during the year. Interest payments are tax deductible in Norway, and the expenditure measure we directly observe here is gross.

Figure 2 displays how the different income components of our choice have evolved over our sample period. All values displayed are real, deflated by the consumer price index of each respective year with

[10] For further details on the data, see Fagereng et al. (2019).
[11] Our source here is «Lov om finansavtaler og finansoppdrag» found at https://lovdata.no/dokument/NL/lov/1999-06-25-46/KAPITTEL_3. When banks reduce their deposit rate, they must notify depositors at least two months in advance.
[12] These are the official statistics provided by Statistics Norway since 2004, available at https://www.ssb.no/en/statbank/table/10648.

Figure 2 Income components over time, 1993–2015

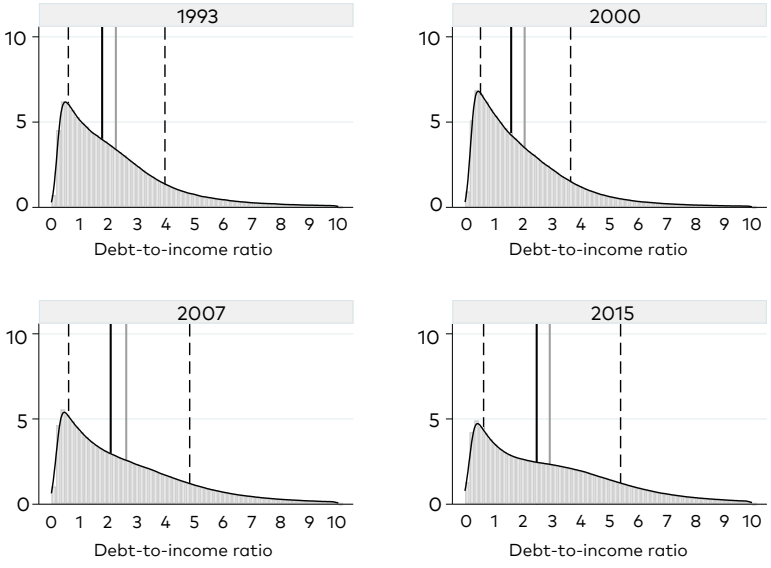


Note: Each line reports real values using 2011 as base year for consumer price inflation adjustment. The values reported are means across all households each year. Interest expenses is the sum of all interest expenditure paid during the year. Interest income is the sum of interest income received on all interest-bearing assets during the year. Income excluding interest is defined as the remainder of households' total after-tax income, after excluding interest income and interest expenses. The exact definition is: earned income (salary plus business income) plus transfers minus taxes plus net capital income minus interest income plus interest expenses.
Source: Own calculations.

2011 as base year. The graphs plot the cross-sectional mean for each year. The left vertical axis measures the real value of gross interest income and expenses. The right vertical axis measures the real value of total net income excluding interest income and expenses.

Interest income is low relative to the other components and has declined somewhat over time. Interest expenses are approximately three times larger than interest income at the beginning of the sample, and four times larger at the end. Unsurprisingly, the sum of other income components (income excluding interest in the figure) are considerably larger than both interest income and interest expenditure throughout the sample period. Most strikingly, the other income sources have increased more than interest expenditure and interest

Figure 3 The distribution of debt-to-income ratios over time in Norway, 1993–2015, percent



Note: The vertical axis measures the percentage of households with different debt-to-income ratios. Total income is defined as earned income (salary plus business income) plus transfers plus net capital income minus taxes. Each year the sample is restricted to households with real debt above NOK 50 000 and below NOK 5 000 000, and a debt-to-income ratio below 10, using 2011 as base year for inflation adjustment. The black and grey vertical lines are the median and mean, respectively. The dashed lines are the 15th and 85th percentiles of the distribution.
Source: Own calculations.

income. This might come as a surprise given the fact that the debt-to-income ratio has increased. The explanation is that interest rates have fallen at the same time.

Figure 3 displays the distribution of debt-to-income ratios across Norwegian households in four different years, from the beginning to the end of our sample period. Each year, the sample is restricted to households with a CPI-adjusted debt level between NOK 50 000 and NOK 5 million (using 2011 as base year) and with a debt-to-income ratio below 10. We later refer to this as the 'DTI sample'. On average over our 1993–2015 period, the DTI sample consist of 64% of all households. This share has increased over time, from 57% in 1993 to 62% in 2000, 66% in 2007, and 68% in 2015.

Figure 3 shows that the overall increase in indebtedness that we saw in Figure 1 is spread out across the debt distribution, but somewhat more intensively at the higher end of the distribution. The share of highly indebted households has increased over time, in particular after year 2000.

Below we will compare yearly changes in different income components and debt growth among households around the 85th percentile of the DTI distribution to the same changes among households around the 15th percentile within the DTI sample. We will study average changes among all households between the 14th and 16th DTI percentile, and average changes among all households between the 84th and 86th DTI percentile. Our results are not sensitive to exactly how we define the low and high DTI groups, but households in the tail ends, with extremely low or extremely high debt relative to income, can disproportionately influence results and should therefore be considered in isolation.

In Figure 3, vertical dashed lines display the location of these percentiles. The distance in debt-to-income ratio between these two groups has increased somewhat, just as we would expect given the DTI increase overall. The DTI ratio at the 85th percentile increased from just below 4 in 1993 to 5.4 in 2015. At the 15th percentile, the increase was from 0.6 in 1993 to 0.65 in 2015.

We will also compare debt growth among households who move (change address from one year to the next) to households who do not move. We refer to the former group as 'movers' and the latter group as 'stayers'. Over the period we observe, the share of stayers in the DTI sample has been stable around 86%. Naturally, all the four subsamples we consider (high and low DTI, stayers and movers) differ in several dimensions other than the DTI ratio and whether or not they move. We therefore display summary statistics for each of the subsamples in Table 1. One striking feature is again how much lower interest income is than interest expenses. We note that banks fund mortgages primarily through bonds in addition to deposits, and that interest income from bonds may be hidden in pension systems and mutual funds. Hence, the interest income we directly observe is likely to be measured on the low side by excluding these indirect interest incomes of households.

Table 1 Summary statistics of key variables, movers and stayers, high and low DTI

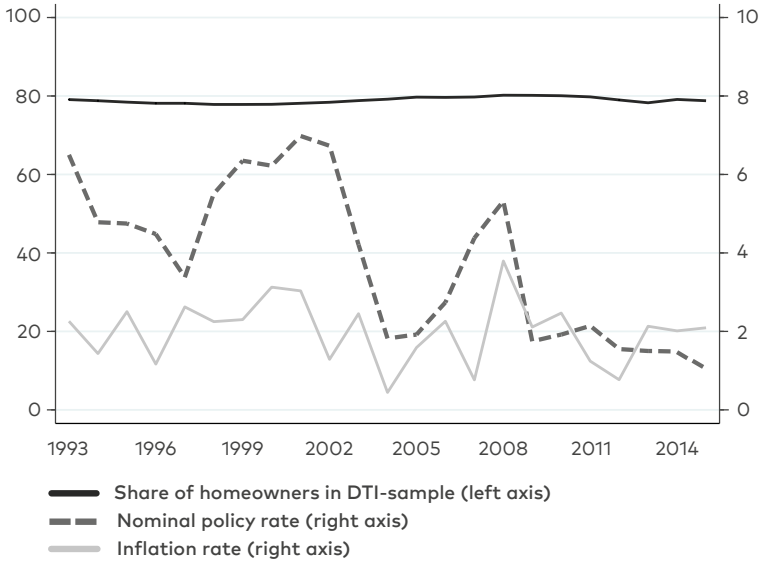
	Stayers	Movers	High DTI	Low DTI
Age	48	36	41	48
Debt NOK	613 150	621 443	1 440 133	256 449
Income NOK	315 047	239 751	349 640	337 969
Interest income NOK	7 454	3 553	3 071	6 502
Interest expenses NOK	29 683	27 287	70 731	11 585
Number of observations	52 296 846	7 927 718	685 392	685 392

Note: Mean by group across years (1993–2015). High and Low Debt-to-Income (DTI) refer to the mean among households in the 84–86 and 14–16 percentiles of the DTI sample described in the main text (NOK 50 000 < real debt < NOK 5 000 000, DTI < 10). Movers are households who change address, stayers are households with unchanged address within the year. Age refers to the oldest person in the household. Total income is salary plus business income plus transfers plus net capital income minus taxes. All NOK values are consumer price adjusted, using 2011 as base year.
Source: Own calculations.

Finally, we plot three key aggregate statistics over time in Figure 4. These are inflation and the monetary policy interest rate, which we will repeatedly return to below, as well as the home ownership rate in the DTI sample of households. We see that while the inflation and policy rates have varied notably over our sample period, the home ownership rate has been fairly stable around 80%.

There have been some relevant institutional changes in Norway over the last part of our sample period. In 2010 the Norwegian Financial Supervisory Authority (FSA) established guidelines for sound mortgage lending practices. The most important guideline was that loan-to-value (LTV) ratios should be below 90%. In 2011 the LTV guideline was tightened further to 85%. In 2015, the Ministry of Finance adopted this guideline as a regulatory requirement for residential mortgage loans. Another relevant Norwegian institutional detail is tax deductibility of interest payments. The deduction is based on the general income tax rate. Hence, when tax rates change, the value of

Figure 4 Share of homeowners in DTI sample, inflation rate and nominal policy rate, percent



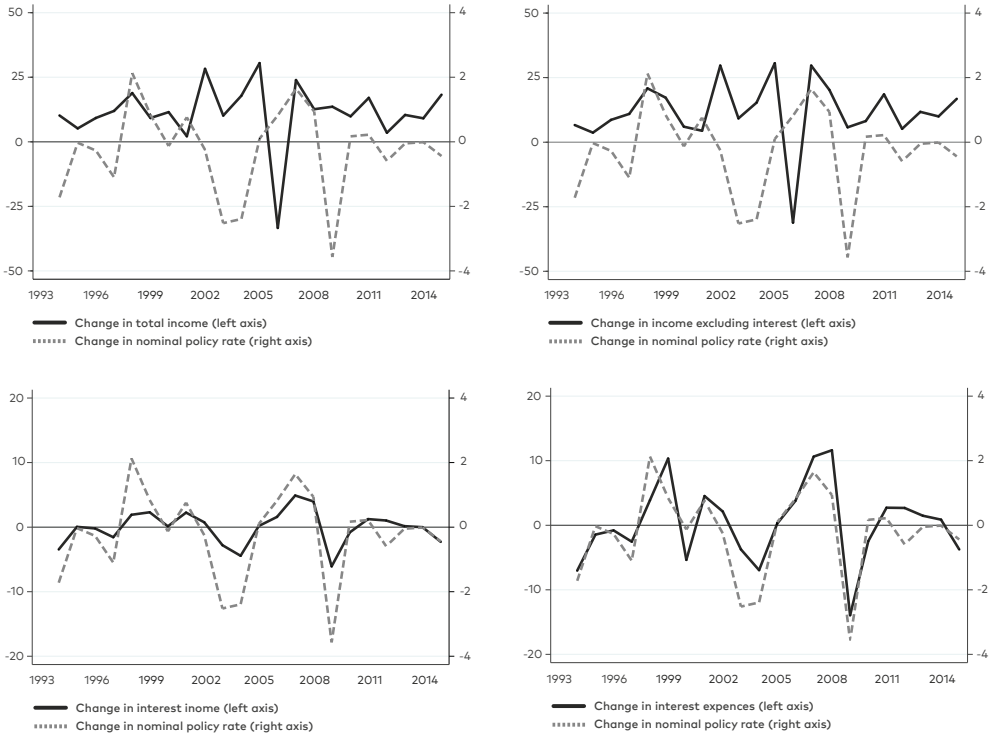
Note: Homeowners are defined as households with total housing wealth larger than zero. The solid black line is the share of homeowners in the DTI sample. The DTI sample consists of households with real debt above NOK 50 000 and below NOK 5 000 000 (using 2011 as base year), and a debt-to-income ratio below 10. DTI is calculated at start of year (i.e.values from 31 December in year *t-1*).
Sources: Own calculations and Statistics Norway.

the interest deduction changes too. In our sample period the tax rate on general income was reduced once, from 28% to 27% in 2014.

4. Interest rate changes and cash flows in Norway

Figure 5 displays the yearly cross-sectional mean changes in CPI-adjusted income components (in NOK 1000s) and yearly changes in nominal interest rates (in percentage points) during our sample period. The top panels plot total disposable income (left) and disposable income excluding interest expenses and income (right), the bottom panels income (left) and interest expenditure (right).

Figure 5 Changes in income components and in the nominal interest rate



Note: Real values in NOK 1000s using 2011 as base year for consumer price adjustment. Changes in interest rates are measured in percentage points on the right-hand-side vertical axes. All variables except the change in the policy rate are averages across all households per year. Total income is defined as earned income (salary plus business income) plus transfers plus net capital income minus taxes. Interest expenses is the sum of all interest expenditure paid during the year. Interest income is the sum of interest income received on all interest-bearing assets during the year. Income excluding interest is defined as earned income (salary plus business income) plus transfers minus taxes plus net capital income minus interest income plus interest expenses. The full sample is used.
Source: Own calculations.

Changes in interest expenditure and income closely track changes in the policy rate, just as we would expect the cash flow channel of monetary policy to operate. The tight link between interest rates and mean interest expenditure arises because nearly all Norwegian mortgage contracts have an adjustable interest rate. Hence, when the central bank increases its policy rate, indebted households experience lower cash flows, all else equal.

However, in the top left panel we observe that the interest expenditure movements are too weak to dominate the changes in total disposable income. One reason is that the swings in interest income cancel out (as seen in the lower left panel). Another explanation is simply that the two interest components are too small relative to the remaining income sources to drive total income on average. The main notable exception is 2009, where interest expenses fell so much that total disposable income increased even though non-interest income fell.

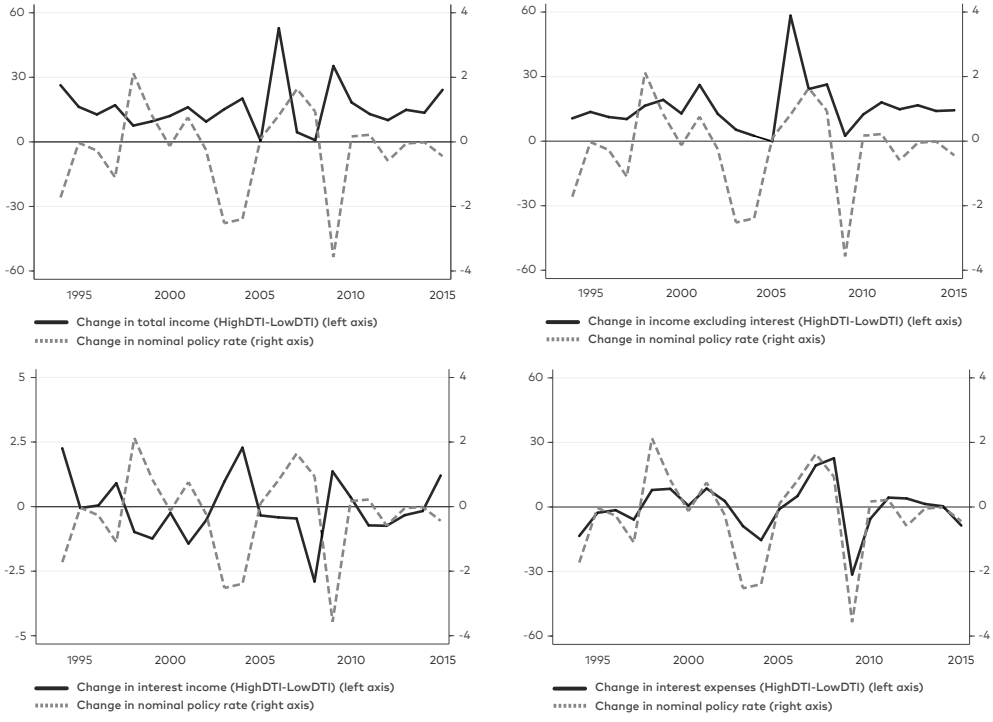
Variations in both interest rates and income components are of course endogenous and likely to depend on a host of factors. Hence, it is possible that the interest rate movements and the interest expense and interest income changes are driven by omitted variables affecting them all at the same time. A simplistic way to gauge this possibility is to use a difference-in-differences approach where we compare households whose cash flows we a priori expect to be more affected by interest rate changes to households we expect to be less affected. The most natural such stratification is according to the debt-to-income ratio. The higher is this ratio, the more strongly we expect interest rate changes to affect cash flows. By comparing households with high and households with low debt, we filter out all factors that affect both groups to the same extent. Still, our claim is of course not that these two groups are identical in all other dimensions than their debt-to-income ratio. There might therefore exist time-varying factors that affect the two groups differently, and one should carry this in mind when interpreting the patterns we uncover with our difference-in-differences approach.

Figure 6 displays the outcome of this difference-in-differences approach. We compare households between the 84th and 86th debt-to-income ratio percentile to households between the 14th and 16th debt-to-income ratio percentile of the DTI sample.[13] The left vertical axes report the difference in differences in NOK 1000s.

According to the top left panel, the difference between the total income change of high-DTI households and the corresponding change of low-DTI households has been positive throughout our

[13] Note that our comparison of the 85th to the 15th percentile of the DTI sample is almost equivalent to comparing the 90th percentile to the median of the full sample.

Figure 6 Changes in income components and in the nominal interest rate, difference in differences between households with high and households with low debt-to-income (DTI) ratios



Note: Real values in NOK 1000s using 2011 as base year for consumer price adjustment. Changes in interest rates are measured in percentage points on the right-hand-side vertical axes. Each panel plots the change in one income component among households between the 84th to 86th debt-to-income ratio percentile, minus the change in the same component among households between the 14th and 16th debt-to-income ratio percentile of the DTI sample. The DTI sample consists of households with real debt above NOK 50 000 and below NOK 5 000 000 (using 2011 as base year), and a debt-to-income ratio below 10. The debt-to-income ratio is calculated at start of year (i.e. values in year *t* apply to 31 December in year *t-1*).
Source: Own calculations.

sample period. This simply reflects that highly indebted households tend to have higher income growth in the future. We see this pattern also in the upper right panel where differences in the growth of non-interest income are displayed. Probably it was exactly the expectations of high income growth that motivated households to leverage up in the first place.

The bottom-right panel of Figure 6 shows that, when the interest rate goes up, the highly indebted households' interest expenses increase substantially more than the low debt-to-income households' interest expenses. Symmetrically, when the interest rate falls, the high-DTI households experience visibly greater interest expense reductions. This pattern is exactly what we would expect, given that households in both groups tend to have floating-rate mortgages and that the high-DTI households have about three times more debt than the low-DTI households do, as previously seen in Table 1.

For the difference in differences of interest income, we see the opposite pattern. The bottom left panel of Figure 6 shows that when the interest rate goes up, interest income tends to increase less for the high-DTI households than for the low-DTI ones. This pattern relates to a fact revealed in Table 1: on average over our sample period, the high-DTI households received half the interest income of the low-DTI households. This in turn reflects that households with high debt tend to hold fewer interest-bearing assets, in particular deposits, than households with low debt.

In the top panels of Figure 6 we see several episodes where the flows of interest expenses and incomes taken together are big enough to dominate the difference in total income change between the two groups. The most visible episodes are 2003, 2004, and 2009, when the policy rate dropped significantly. These drops stimulated the cash flows a lot more for the high-DTI households than for the low-DTI ones. This occurred by both reducing the interest expenditure by *more* and by reducing the interest income by *less* for high-DTI than for low-DTI households.

The direct cash flow effects in the bottom panels drive movements in total income only when we compare high-DTI to low-DTI groups as in Figure 6, whereas this was not the case when we looked at mean income flows in Figure 5. The reason is that when we look at mean income changes across all households, the two cash flow effects via interest expenditure and interest income go in opposite directions and, to a considerable extent, cancel each other out. In contrast, if we compare high-DTI to low-DTI households, the two cash flow effects pull in the same direction.

We conclude that the raw patterns in the data imply: (i) a tight link between policy rate changes on the one hand and household interest expenses and incomes on the other; (ii) that these direct cash flow effects do not drive movements in mean total disposable income, partly because interest expense and interest income changes cancel each other out; (iii) the direct cash flow effects have distributional consequences for total disposable income that become visible in those years where the policy rate changed markedly.

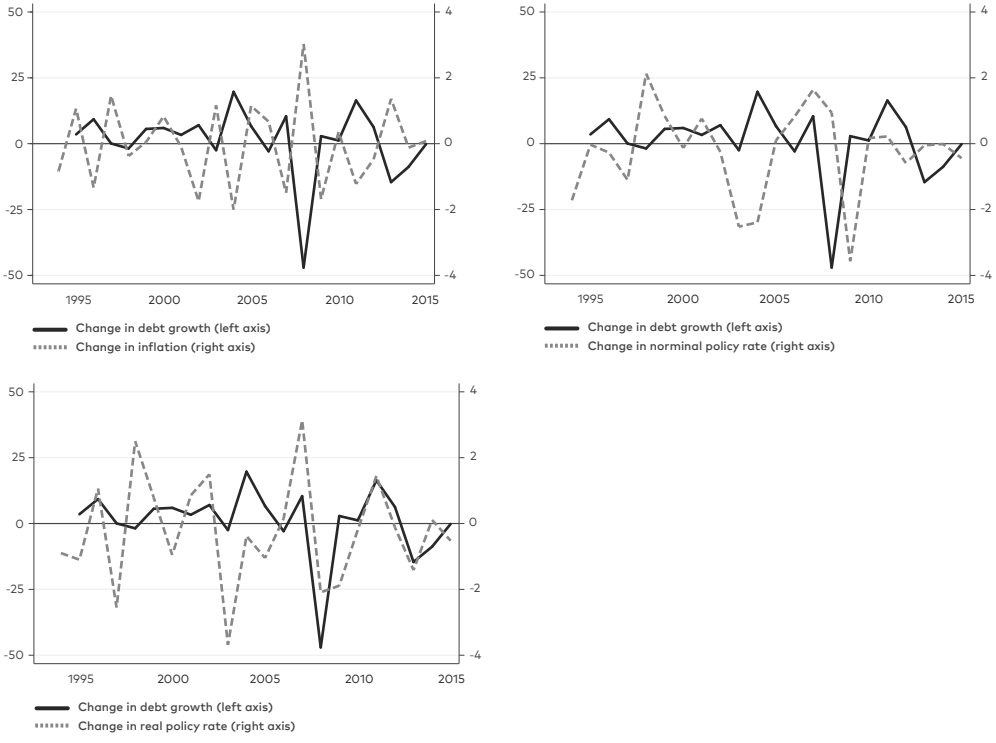
5. Interest rates, inflation and debt growth in Norway

As explained repeatedly above, even the qualitative influence of interest rate changes on debt is unsettled. We can distinguish between three opposing effects. On the one hand, higher interest rates induce a substitution effect on saving: When the real interest rate goes up, households are rewarded more for saving rather than consuming (the substitution channel). Hence, interest rate hikes should reduce debt growth. On the other hand, there are the effects of interest rate changes on income, in particular the cash flows of interest expenses and interest income, and on inflation. If interest rate hikes reduce the cash flows of indebted households, they might choose to borrow more or repay less debt in order to smooth their consumption. This cash flow channel leads to a positive effect of interest hikes on debt growth. Third, we have the 'Fisher channel', i.e. that interest hikes might raise the *real* value of household debt by pushing inflation down.[14]

We provide some suggestive evidence on the importance of these channels. Figure 7 plots changes in the cross-sectional mean of real household debt growth against changes in inflation (top left), in the nominal monetary policy interest rate (top right), and in the real interest rate (bottom). We observe strong negative co-movement between changes in inflation and changes in real debt growth. When inflation goes up, real debt growth falls, consistent with an operative Fisher channel. This correlation carries over to the panel for real

[14] Strictly speaking, there is also an income effect. This mechanism differs from the cash flow effect if interest rates change persistently. A lower (higher) interest rate today increases (reduces) the net present value of future income streams. We do not emphasize this effect here, and hence our cash-flow effect is not identified separately from income effects.

Figure 7 Changes in debt growth, in inflation, in the nominal interest rate and in the real interest rate



Note: Real values in NOK 1000s using 2011 as base year for consumer price adjustment. Changes in inflation and interest rates are measured in percentage points on the right-hand-side vertical axes. For each variable, the panels plot the first difference from one year to the next (31 December in year *t* minus 31 December in year *t-1*). The full sample is used.
Source: Own calculations.

interest rates: real debt growth tends to decrease when real interest rates fall, and vice versa. In principle, this latter pattern could have been driven by a strong cash flow channel from nominal interest rates changes, but the top right panel does not indicate so: there is no clear co-movement between changes in nominal interest rates and real debt growth.

As argued in Section 2, the Fisher effect of inflation on real debt is likely to be most important for households who are at the 'intensive

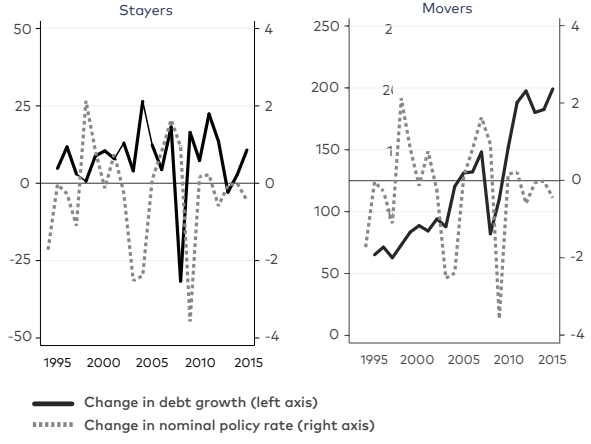
margin' of debt adjustment. That is, if households follow nominal plans for repaying outstanding debt, but enter new loan agreements in certain infrequently occurring events, we should see strong Fisher effects of inflation in those years where these infrequent events do not occur. The clearest example of such an event is a home purchase. Unfortunately, we cannot observe exactly when home purchases are made in our sample. However, we can observe when households move, which is an outcome that most likely is highly correlated with home purchases. For this reason, we separately consider debt growth among households who move and households who do not move in Figure 8.[15]

First, before turning to the substantive message from Figure 8, it might be clarifying to note why there is an upward trend in the change in debt growth for movers. The reason is a combination of two facts. First, house prices have increased dramatically over this period. Second, movers tend to climb the housing ladder and buy more expensive homes than their previous ones. The latter necessarily holds for first-time homebuyers, but is also true for broader segments of the population. Combined, these two facts have caused the debt growth among homebuyers to increase over time. Moreover, the upper left panel in Figure 8 shows that the change in real debt growth among stayers has been positive in nearly all years in this period. This means that households who do not move have tended to repay a smaller and smaller amount of their debt over time, reflecting that not all of the total Norwegian debt growth in Figure 1 is driven by home purchases.

The main take-away from Figure 8 is that changes in inflation and changes in real debt growth are negatively associated among stayers, but not among movers. This is consistent with the hypothesis that households tend to follow nominal plans for servicing outstanding debt. Again, we see no clear association between the nominal policy rate and real debt growth. Hence, the co-movement between realized real interest rate changes and real debt growth is driven by the Fisher effect and is negative, as seen in the bottom panel of the diagram.

[15] Recall that descriptive statistics on the two groups were provided in Table 1.

Figure 8 Changes in real debt growth, in inflation, in nominal interest rate and in real interest rate, movers versus stayers



Note: Real values in NOK 1000s using 2011 as base year for consumer price adjustment. Changes in inflation and interest rates are measured in percentage points on the right-hand-side vertical axes. For each variable, the panels plot the first difference from one year to the next (31 December in year *t* minus 31 December in year *t -1*). Movers are defined as household-year observations where the address changed. Stayers are household-year observations where the address did not change. The full sample is used.
Source: Own calculations.

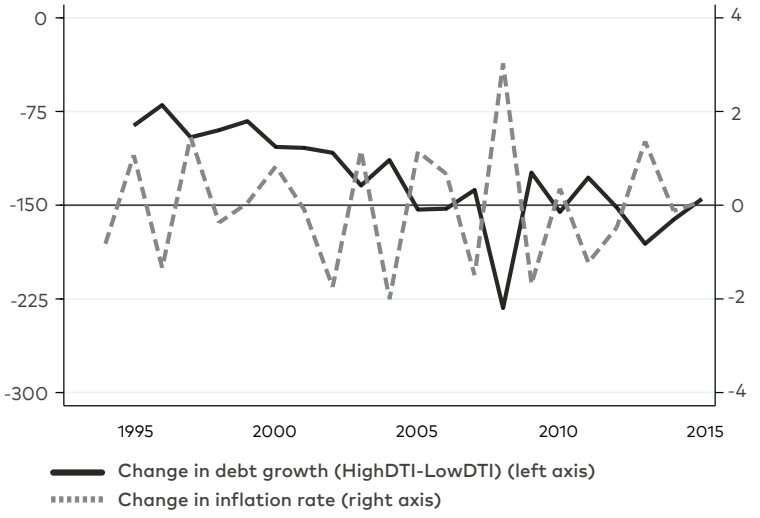
Just as for cash flows, these results are only suggestive. Inflation and real debt growth might be driven by common omitted factors, inducing a spurious correlation between the two. We therefore use the same difference-in-differences approach as before to scrutinize the correlations in Figures 7 and 8. The rationale is that highly indebted households should experience the Fisher effect more strongly than less indebted households. As for cash flows, this approach serves to filter out factors that affect the two groups to an equal extent, but it does not filter out factors that affect the two groups differentially. Therefore, these results should also be interpreted as indicative and not as firmly establishing a causal relationship.

Admittedly, comparing the difference in differences of real debt growth between two groups can be confusing. In Figure 9 we see that the difference between how much high-DTI households increased their debt growth (i.e. reduced their debt repayment) relative to low-DTI households has been negative throughout. This means that low-DTI households have curbed their yearly debt repayment more than high-DTI households. Put differently, the observation from Figure 8 that stayers on average have reduced their real debt repayment over time is primarily driven by the households with relatively low debt.

Still, while the exact interpretation of these differenced data might be subtle and challenging, for our purposes of illuminating the potential role of inflation in driving real debt dynamics, the main message from Figure 9 is clear. In those years when inflation went up, the real debt growth of highly indebted households (84–86th percentile of the DTI sample) fell more relative to the real debt growth of low-indebted households (14–16th percentile). This pattern is highly consistent with Fisher effects of inflation.

An additional feature of Figures 7–9, is that the negative association between changes in inflation and in real debt growth has become stronger over time. A likely reason is that household debt has gone up: when households hold more debt, the impact of Fisherian debt deflation increases. Hence, it makes sense that relative to other factors influencing households' saving choice,

Figure 9 Change in real debt growth and change in inflation, difference in differences between high (85th percentile) and low (15th percentile) debt-to-income households, stayers



Note: Real values in NOK 1000s using 2011 as base year for consumer price adjustment. Changes in inflation are measured in percentage points on the right-hand-side vertical axis. The black line plots the change in debt growth among households between the 84th to 86th debt-to-income ratio percentile, minus the change in debt growth among households between the 14th and 16th debt-to-income ratio percentile of the DTI sample. The DTI sample consists of households with real debt above NOK 50 000 and below NOK 5 000 000 (using 2011 as base year), and a debt-to-income ratio below 10. DTI is calculated at start of year (i.e. values from 31 December in year *t-1*).

the Fisher effects have become more important toward the end of our sample.[16]

Before turning to our conclusion, we stress that none of our approaches distinguish exogenous from endogenous interest rate changes, or expected from unexpected inflation changes. These two distinctions are important to carry in mind when interpreting our results. With respect to endogenous interest rate swings, one possibility is that the real interest rate primarily reflects the state of the business cycle, in which case changing real rates will reflect chang-

[16] To be perfectly clear: It does not follow from these empirical patterns that double-digit inflation necessarily will reduce household debt. Most likely, the prevalence of nominal (non-indexed) debt contracts would fall if inflation were to increase substantially. The Lucas critique applies to any systematic use of inflation as a policy tool to reduce real household debt.

ing economic conditions. For instance, a demand-driven expansion will cause interest rates to rise and possibly real debt growth too, as households become more optimistic about the future. In contrast, a supply-driven boom would reduce the real interest rate while stimulating debt growth. In short, one certainly cannot interpret the correlation we uncover between real interest rates and real debt as causal. To establish a firm answer here, one would need to identify the source of interest rate movements and preferably isolate the response to exogenous interest rate shocks.

With respect to inflation, all our results concern realized inflation. In standard models in contrast, it is unexpected inflation that matters because borrowers and lenders adjust their nominal balance sheets to the anticipated component of inflation However, here it is plausible that expected inflation matters more in practice than conventional models suggest, simply because nominal contracts are prevalent. Further research is needed to answer if the distinction between expected and unexpected inflation is as empirically relevant as standard theory suggests.

6. Conclusion

A growing body of empirical research suggests that higher growth in household debt is associated with greater risks of deep recessions. It might therefore be tempting to conclude that monetary policy should shift emphasis from the conventional target variables of inflation and economic activity, to instead targeting household debt. However, before jumping to that conclusion, thorough analysis of the trade-offs involved is needed. And, to undertake such analyses, precise evidence on how monetary policy affects household debt must be established.

We have argued that even the *qualitative* impact of interest rates on household debt burdens is questionable. Discussions often take the direction of the effect for granted, implicitly or explicitly assuming that a rise in real interest rates will motivate households to save more and borrow less, known as the intertemporal substitution channel. However, this presumption is unfortunate. It ignores two effects that go in the opposite direction, namely cash flow and Fisher effects. By cash flow effects, we mean in particular that when inter-

est rates increase, indebted households will spend a larger share of their disposable income on interest expenditure and thus have less income to use for debt repayment. Naturally, this effect is stronger if floating rate mortgages are the norm, as is the case in the Nordics except in Denmark. With Fisherian effects of inflation we mean that if debt contracts specify nominal repayment plans, a higher rate of inflation will reduce the real value of household debt.

When we take a cursory look at Norwegian data, we find little support for the intertemporal substitution effect on debt accumulation. There is no evidence to say that nominal interest hikes are accompanied by debt reduction. Of course, this does not suffice to conclude that intertemporal substitution is irrelevant. For instance, we do not attempt to identify exogenous interest hikes and the debt response to these. A possible explanation that we do not look into is that expected income growth might in principle fuel both interest hikes and household borrowing. Future research to sharply identify the causal effect of interest hikes on micro level debt accumulation is needed.

Regarding cash flows, we find that households' interest income and expenditure move in distinct tandem with the nominal policy interest rate. However, these cash flows together are not large enough to drive total household income across all households. Hence, they are not likely to be quantitatively important for aggregate debt accumulation either. A contributing factor to why the visible cash flow effects do not transmit to total income and debt accumulation is that the interest income and expenditure move in opposite directions and cancel each other out. Hence, the cash flow effects are still likely to matter for distributions, which we in fact observe when comparing high-debt to low-debt households.

In contrast to the suggestive patterns for interest rates, our descriptive plots are highly consistent with Fisher effects of inflation. Years with higher inflation coincide with lower growth in real household debt. Years with lower inflation coincide with higher growth in real household debt. Moreover, an interesting pattern emerges when we distinguish households that move from households that stay at the same address as in the previous year. The co-movement is stark for stayers but not for movers. This is exactly what one would expect

if households follow nominal debt repayment plans under their existing mortgage agreements, but then deviate from these plans when they buy a new home.

Our evidence is only descriptive and falls short of establishing causal effects of interest rate or inflation changes. Further research is required to quantify how interest rates and inflation causally influence micro level debt accumulation, and to understand developments of both aggregate debt and of the distribution of debt. Still, we do believe it is interesting to contrast the distinct patterns for how inflation co-moves with real debt to the vague, or non-existent, patterns for how nominal interest rates co-move with real debt. In particular, this contrast raises an issue of potentially great importance for the discussions of how monetary policy should handle household debt: policies that prevent large drops in inflation might very well temper growth in real debt as a byproduct. Hence, inflation targeting could indirectly serve to stabilize growth in real debt too.

Based on the current state of knowledge in this field and our own descriptive analysis on 23 years of Norwegian micro data, we call for caution against a monetary policy that systematically raises nominal interest rates whenever there is a concern that household debt burdens grow too fast. In particular, we caution against contractionary policies that reduce inflation in the belief that they will curb real debt. Such policies might simply backfire, as it is entirely plausible that such interest hikes lead to higher, not lower, debt burdens.

This need not imply that household debt is an irrelevant concern for a central bank. However, even for central banks worried about household debt, our message is that they need to keep an eye on inflation. Indeed, rather than to explicitly target debt stability per se, it might be better if central banks simply target inflation at appropriately high rates. As well as providing clarity about monetary policy priorities, this would prevent low inflation from aggravating household debt burdens.

References

Auclert, A. (2019), Monetary policy and the redistribution channel, *American Economic Review*, 109(6), 2333-2367.

Baker, S. R. (2018), Debt and the response to household income shocks: Validation and application of linked financial account data, *Journal of Political Economy*, 126(4), 1504-1557.

Bauer, G. H. and Granziera, E. (2017), Monetary policy, private debt, and financial stability risks, *International Journal of Central Banking*, 13(3), 337-373.

Bouyon, S. (2017), Recent trends and developments in European mortgage markets, European credit research institute commentary No. 21.

Di Maggio, M., Kermani, A., Keys, B. J., Piskorski, T., Ramcharan, R., Seru, A. and Yao, V. (2017), Interest rate pass-through: Mortgage rates, household consumption, and voluntary deleveraging, *American Economic Review*, 107(11), 3550-3588.

Dynan, K. (2012), Is a household debt overhang holding back consumption, *Brookings Papers on Economic Activity*, 43(1), 299-362.

Fagereng, A., Holm, M. B. and Natvik, G. J. (2019), MPC heterogeneity and household balance sheets, CESifo Working Papers No. 7134.

Flodén, M., Kilström, M., Sigurdsson, J. and Vestman, R. (2018), Household debt and monetary policy: Revealing the cash-flow channel, Working Paper.

Gelain, P., Lansing, K. J. and Natvik, G. J. (2018), Leaning against the credit cycle, *Journal of the European Economic Association*, 16(5), 1350-1393.

Jappelli, T. and Pistaferri, L. (2014), Fiscal policy and MPC heterogeneity, *American Economic Journal: Macroeconomics*, 6(4), 107-136.

Jordà, O., Schularick, M. and Taylor, A. M. (2013), When credit bites back, *Journal of Money, Credit and Banking*, 45(s2), 3-28.

Jordà, O., Schularick, M. and Taylor, A. M. (2015a), Leveraged bubbles, *Journal of Monetary Economics*, 76(s), 1-20, November 7-8, 2014 Research Conference on Asset Price Fluctuations and Economic Policy.

Jordà, O., Schularick, M. and Taylor, A. M. (2015b), Betting the house, *Journal of International Economics*, 96(s1), 2-18, 37th Annual NBER International Seminar on Macroeconomics.

Jordà, O., Schularick, M. and Taylor, A. M. (2016), The great mortgaging: Housing finance, crises and business cycles, *Economic Policy*, 31(85), 107-152.

Kaplan, G., Moll, B. and Violante, G. L. (2018), Monetary policy according to HANK, *American Economic Review*, 108(3), 697-743.

Kaplan, G. and Violante, G. L. (2018), Microeconomic heterogeneity and macroeconomic shocks, *Journal of Economic Perspectives*, 32(3), 167-194.

La Cava, G., Hughson, H. and Kaplan, G. (2016), The household cash flow channel of monetary policy, Working Paper.

Luetticke, R. (2019), Transmission of monetary policy with heterogeneity in household portfolios, Working Paper.

Marrez, H. and Pontuch, P. (2013), Finland's high house prices and household debt: A source of concern?, Ecfin country focus, 10(6), European Commission.

Mason, J. W. and Jayadev, A. (2014), "Fisher dynamics" in US household debt, 1929-2011, *American Economic Journal: Macroeconomics*, 6(3), 214-234.

Mian, A., Rao, K. and Sufi, A. (2013), Household balance sheets, consumption, and the economic slump, *Quarterly Journal of Economics*, 128(4), 1687-1726.

Mian, A., Sufi, A. and Verner, E. (2017), Household debt and business cycles worldwide, *Quarterly Journal of Economics*, 132(4), 1755-1817.

Olsen, O. (2019), Pengepolitikkens Verktøykasse, Speech at BI Norwegian Business Schoolm, https://www.norges-bank.no/aktuelt/nyheter-og-hendelser/Foredrag-og-taler/2019/2019-10-08-cme/.

Parker, J. A., Souleles, N. S., Johnson, D. S. and McClelland, R. (2013), Consumer spending and the economic stimulus payments of 2008, *American Economic Review*, 103(6), 2530-2553.

Robstad, O. (2018), House prices, credit and the effect of monetary policy in Norway: Evidence from structural VAR models, *Empirical Economics*, 54(2), 461-483.

Svensson, L. E. O. (2017a), Commentary: Leaning against the wind: Costs and benefits, effects on debt, leaning in DSGE models, and a framework for comparison of results, *International Journal of Central Banking*, 13(3), 385-408.

Svensson, L. E. O. (2017b), Cost-benefit analysis of leaning against the wind, *Journal of Monetary Economics*, 90, 193-213.

Comment on M. A. H. Gulbrandsen and G. J. Natvik: Monetary Policy and Household Debt

David Vestin[1]

Gulbrandsen and Natvik discuss two separate issues. The first deals with how changes in (ex-post) real interest rates co-move with changes in real debt at the household level. The main result is that a Fisher-type channel seems to be present in the data. This introduces a positive correlation between real interest rate changes and real debt growth. The authors then discuss the implication of this correlation for using monetary policy to 'lean against the wind', and express skepticism towards the idea as higher interest rates, if anything, tend to *increase* real debt.

The second issue is that changes in interest rates generate cash-flow effects, which redistribute income between borrowers and lenders, since Norwegian household debt is dominated by mortgage debt at variable interest. The authors document that households with higher debt-to-income ratios suffer more from interest rate increases, due to the higher level of debt that they carry. This opens the door for the type of monetary policy transmission channel present in so-called HANK models (Heterogenous Agent New Keynesian models): according to them, constrained households react to changes in their cash flows, as in Kaplan and Violante (2018).

1. The interaction of monetary policy and real debt growth

Studies of financial crises have established a tendency for real debt to grow above trend in the years preceding a crisis. Most of those studies are using aggregate data, and are therefore not able to distinguish among possible explanations for *why* high real debt growth is problematic and hence what the right remedy should be. To name a few possibilities, higher average leverage in the economy can imply stronger sensitivity to shocks. But a given average credit growth may also be distributed unevenly which may further increase the risk

[1] Sveriges Riksbank. Email: david.vestin@riksbank.se.

that some borrowers run into trouble. Finally, it is also likely that, when credit is growing fast, a larger share than usual of that credit goes to borrowers with low creditworthiness.

The promise of the type of microdata that the authors are working with is that they allow us to go from mere guessing to a first evaluation of the causes of real debt growth. Then, we can think about policy design to avoid the worst pitfalls of excessive debt. In principle, we could combine firm-level data with household data from many countries and study the episodes when credit was growing fast and try to establish the source of the problem. But this is of course a daunting task and the authors are limited to the Norwegian household data they do have with a sample covering around 25 years.

When analyzing these data, a main finding of the authors is that households that do not sell their property and move seem to follow a nominal amortization plan, which gives rise to a 'Fisher channel'. For this group, high ex-post inflation is associated with a higher-than-expected decline in real debt. The authors find that changes in the ex-post real interest rate tends to be *positively* correlated with real debt growth. A lower than anticipated inflation shows up as a higher real interest rate which tends to raise the real value of existing debt. The authors do not attempt to structurally identify the source of movements in real interest rates but discuss monetary policy implications based on the correlation: they argue that a monetary policy tightening that raises the real interest will tend to increase real debt because of the Fisher channel. One possible explanation for the co-movement of the real interest rate and real debt growth could be independent of monetary policy: real economic shocks might also induce a positive correlation between real interest rates and real debt growth (for example, if the economy is doing well, demand for loans is likely to increase despite a contractionary monetary policy).

However, papers like Svensson (2017) find similar patterns also for identified monetary policy shocks, supporting the interpretation of the Fisher effect. If monetary policy unexpectedly raises interest rates, inflation tends to decline more than nominal debt increases, leading to an *increase* (relative to the case of no monetary policy intervention) in the real value of debt for those who do not adjust their mortgages (with an even stronger impact on the ratio of nomi-

nal debt to GDP since the latter also declines when interest rates are unexpectedly hiked).

However, as discussed above, an open question is still which kind of real debt growth that is problematic. The studies linking real debt growth to the likelihood of financial crisis do not identify the source of debt growth. Perhaps the Fisher effect that tends to raise real credit growth when inflation is low is unproblematic as it raises the real debt of *all* households with a small amount, whereas an increase in real interest rates *might* lead to a restraining effect on new – and possibly more problematic – debt. Or perhaps not. The point is that the kind of data that the authors are working with holds the promise of answers to these questions and it is certainly worth exploring these issues further. It would be interesting to see if there is a way to use, for example, quantile regressions to try to disaggregate the results in Svensson (2017).

2. The cash-flow effect

If the authors have comprehensive information about both debts and assets at the household level, it might perhaps be possible to identify the extent to which households are constrained in their response to shocks. In a HANK model, effects of monetary policy can be amplified if many households are constrained, since for example a decline in interest rates will lead to a positive cash-flow effect for borrowers that may use this to increase consumption. If lenders are unconstrained, their declining interest income will not lead to fully offsetting effects and hence aggregate consumption may rise due to the redistribution of disposable income among consumers. Relatively poor or impatient households can be credit constrained because of collateral requirement or debt-to-income rules. But also households which are not at such boundaries can be impeded from smoothing consumption because of costs of adjusting their portfolios. Those households may hold both debts and assets, but since their assets are costly to liquidate, monetary policy shocks may give rise to a cash-flow channel also for them.

Given the microdata on both assets and loans, one could try to shed light on how important these channels are in the data. From Table 1 in the paper, the households with a high debt-to-income ratio appear

to have quite modest liquid assets, at least judging from their interest income. This suggests that they may be close to being credit constrained and have little buffers to deal with interest rate increases. If the data allow dividing households into groups based on the debt-to-income ratio, liquid assets and illiquid assets, it may be possible to shed light on how important these transmission channels of monetary policy are. For example, if one could establish that the high-debt households with low liquid assets tend neither to change debt amortization nor to change the amount of assets in the face of identified negative monetary policy chocks, this would provide indirect evidence that their marginal propensity to consume is close to one. This could then be contrasted with low debt-to-income ratio households, or households with large amounts of illiquid assets.

To conclude, the authors work with very interesting microdata that have great potential to give us a better understanding of both the transmission of monetary policy and what drives the accumulation of debt. It will be interesting to follow this research agenda as it develops.

References

Kaplan, G. and Violante, G. L. (2018), Microeconomic heterogeneity and macroeconomic shocks, *Journal of Economic Perspectives*, 32(3), 167-194.

Svensson, L. E. O. (2017), Cost-benefit analysis of leaning against the wind, *Journal of Monetary Economics*, 90, 193-213.

Comment on M. A. H. Gulbrandsen and G. J. Natvik: Monetary Policy and Household Debt[1]

Karsten Gerdrup[2]

Gulbrandsen and Natvik (G&N) discuss qualitative effects of monetary policy on real household debt growth using Norwegian micro data. They find that there is a positive correlation between real household debt and realized real interest rates. By taking a step back and analyzing the association between real interest rates and real debt growth, G&N bring forth highly policy-relevant questions. According to convincing empirical evidence, both the probability and severity of financial crises increase in tandem with high real debt growth. In the following, I will quickly summarize the authors' main findings and give two suggestions for further analyses.

First, the article studies whether interest rate changes are transmitted to changes in current-period disposable income. The authors identify cash-flow effects by dividing the population into high-debt and low-debt households, and find that high-debt households experience a weaker growth in disposable income than low-debt households in years when interest rates increase. Hence, a higher interest rate can, through the cash-flow channel, lead to *more* borrowing as indebted households prefer to smooth consumption, instead of *less* borrowing, as predicted by the intertemporal substitution channel. It is, however, found that the effect of interest rate changes on disposable income for the population as a whole is muted.

Second, it is suggested that monetary policy may affect real household debt through inflation (Fisher's debt-deflation channel; see Fisher 1933), and that this channel is probably more important than the cash-flow channel. One piece of evidence to support this is that the positive correlation between real debt and realized real interest rates is particularly striking for households that stay in their house, which may reflect the fact that many households largely follow a pre-specified amortization plan. It also appears that the negative correlation between inflation and real debt growth has become

[1] I would like to thank SeHyoun Ahn, Mathis Mæhlum and Kjersti Torstensen for helpful comments.
[2] Norges Bank. Email: karsten.gerdrup@norges-bank.no.

stronger over time as more households hold more debt. Furthermore, the authors find no clear co-movement between changes in nominal interest rates and real debt growth.

The authors' evidence is suggestive and partial. Their empirical approach does not allow them to draw conclusions on causality. However, other partial evidence suggest that other important channels may be at work as well. Future work should therefore broaden the scope of the analysis. I have two suggestions:

1. Analyze the Fisher channel further

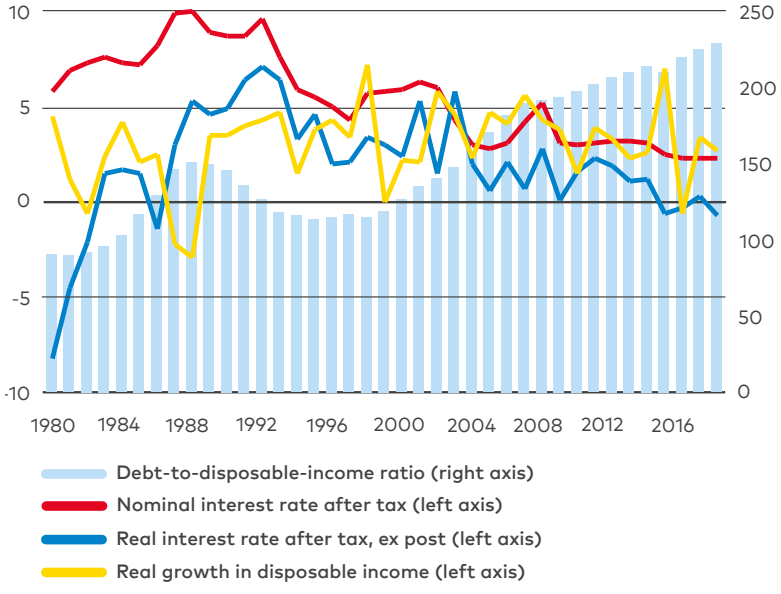
G&N could strengthen the analysis of Fisher's debt-deflation channel by applying the accounting scheme of Mason and Jayadev (2014) to Norwegian data. The accounting scheme sheds light on the interaction of changes in income, interest rates, and the price level with existing stocks of debt.

In the following, I will show some results based on aggregate data for Norwegian households. I will simplify the exposition by only including real interest rates and real income growth in the analysis, and will refer to these variables as 'Fisher variables'. Without any borrowing or amortization of existing debt, the Fisher variables determine the path of the debt-to-disposable-income ratio of households. The law of motion for the debt ratio can be written:

Change in debt-to-disposable-income ratio = Net borrowing as a share of disposable income + (Real interest rate – Real income growth) × Initial debt ratio

The relationship states that the debt ratio increases when the real interest rate is higher than real income growth and when households borrow more than they pay down on existing debt. In my accounting scheme, net borrowing is the residual after calculating the actual change in the debt ratio and subtracting the effect of the Fisher variables (real interest rate and real income growth). The real interest rate is the average nominal lending rate to households (volume-weighted) after subtracting the rise in the consumer price index (CPI).

Figure 1 Development in Fisher-variables and household debt-to-disposable-income ratio, four-quarter growth, percent

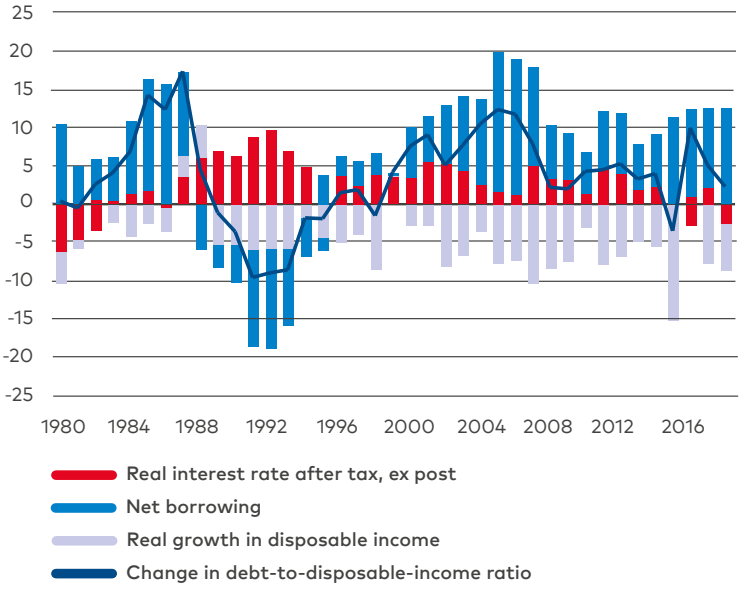


Sources: Norges Bank and Statistics Norway.

What can this simple relationship tell us about Fisher effects? Figure 1 shows growth in real disposable income and the real interest rate, together with the household debt-to-disposable-income ratio. For convenience, the chart also shows nominal interest rates. Household indebtedness has more than doubled since the early 1980s. It increased rapidly before the banking crisis in Norway erupted around 1988, and again for a long period before the global financial crisis. Real interest rates after tax have been lower than, or in line with real income growth, for most of the period, apart from around the Norwegian banking crisis years (1988–1993).

Figure 2 shows the contribution from the Fisher variables and net borrowing to the annual change in household debt-to-disposable-income ratio based on the equation above. There have been large swings in net borrowing. Growth was high in the mid-1980s but dropped markedly during the banking crisis. The contribution from

Figure 2 Contribution from Fisher variables and net borrowing to annual change in household debt-to-disposable-income ratio



Note: Real interest rate and real growth in disposable income are given in percent. Net borrowing is measured in percent of the preceding year's debt-to-disposable-income ratio. Change in debt-to-disposable-income ratio is in percentage points.
Sources: Norges Bank, Statistics Norway and own calculations.

net borrowing picked up from the early 1990s, and reached high levels prior to the financial crisis. Net borrowing was relatively low after the financial crisis but increased again in the last couple of years of the sample.

The contribution from the real interest rate to household indebtedness increased during the 1980s and peaked at the height of the banking crisis in the early 1990s. Growth in disposable income contributed to a lower debt ratio in the early 1990s, hence muting the overall Fisher effects. Since the mid-1990s, growth in disposable income has been higher than real interest rates in most of the years, and the Fisher-variables have contributed to a lower debt ratio. This analysis indicates that the large rise in the household indebtedness since the mid-1990s is mainly due to net borrowing, not Fisher effects.

G&N could do a more thorough analysis than I have done here by using micro data to identify developments for different groups of households and to improve the measurement of net borrowing. As part of this analysis, they should take account of the fact that floating-rate amortizing loans are the most common ones among Norwegian households. A feature of these loans is that an increase in nominal interest rates leads to an automatic reduction in amortization for households that stay on a specific schedule. This means that debt growth increases automatically for stayers when the nominal interest rate increases.

At this stage, the authors should not rule out the importance of channels other than the Fisher channel (such as intertemporal substitution and the cash-flow channel) for understanding the development in net borrowing. Evidence provided in Section 2 below suggest that income growth and house price growth should be included in the analysis.

If the goal of G&N is to investigate the link between ex-ante real interest rates and real debt growth, it would better to use *expected* inflation in the formula to calculate real interest rates. Using realized inflation when calculating both real interest rates and real debt growth creates a positive correlation between the two variables, which may lead to an incorrect inference.

2. Bring income growth and house price growth into the analysis

Using micro data for Norwegian households in the period 1993–2015, Torstensen (2020) finds that debt growth for house buyers (extensive margin) has followed house price movements, whereas debt growth for stayers (intensive margin) has been more in line with income growth. Furthermore, when measuring the net contribution to aggregate debt growth from buyers/sellers and stayers, she finds that debt growth is mainly driven by younger households that buy/sell houses.

These findings provide a more nuanced view on causes of debt growth. They also suggest that we need to understand the channels

from monetary policy to house prices and wage growth to complete the story.

References

Fisher, I. (1933), The debt-deflation theory of great depressions, *Econometrica*, 1(4), 337–57.

Mason, J. W. and Jayadev, A. (2014), "Fisher dynamics" in US household debt, 1929-2011, *American Economic Journal: Macroeconomics*, 6(3), 214-234.

Torstensen, K. N. (2020), Hvem har tatt opp all gjelden?, Bankplassen blogg, February 2020, https://bankplassen.norges-bank.no/2020/02/20/hvem-har-tatt-opp-all-gjelden/.

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

Lars E. O. Svensson[2]

Abstract

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

Keywords: Macroprudential policy, housing, mortgages, household debt, macroeconomic risk.
JEL codes: E211, G01, G21, G23, G28, R21.

[1] I am grateful to Bryndís Ásbjarnardóttir (discussant), Robert Boije, Robert Emanuelsson, Harry Flam, Martin Flodén, Sten Hansen, Jesper Hansson, John Hassler, Lars Hörngren, Goran Katinic, Niels Lynggård Hansen (discussant), John Muellbauer, Stefan Palmqvist, Tuomas Peltonen, Alessandro Turrini, Karl Wallentin, Xin Zhang, and the editors for comments or discussions. Special thanks to the referees, Claes Bäckström and Roine Vestman. Views expressed and any errors are my own.
[2] Stockholm School of Economics, CEPR, and NBER. Email: Leosven@gmail.com.

1. Introduction

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

The FI's mandate is:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

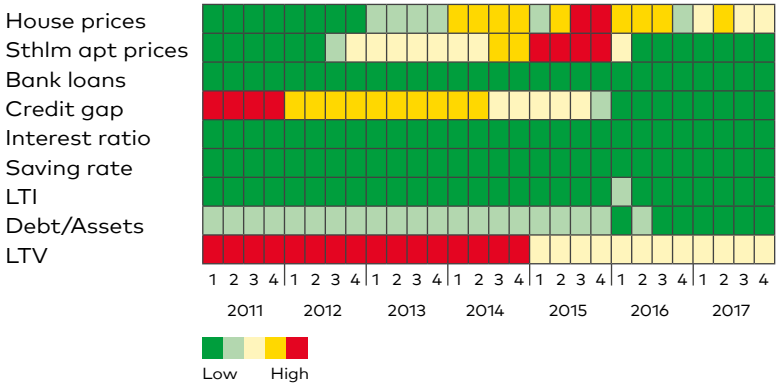
2. Several things are right with Swedish macroprudential policy

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

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

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

Figure 1 Vulnerability indicators for the household sector



Source: FI (2018a, diagram 3).

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

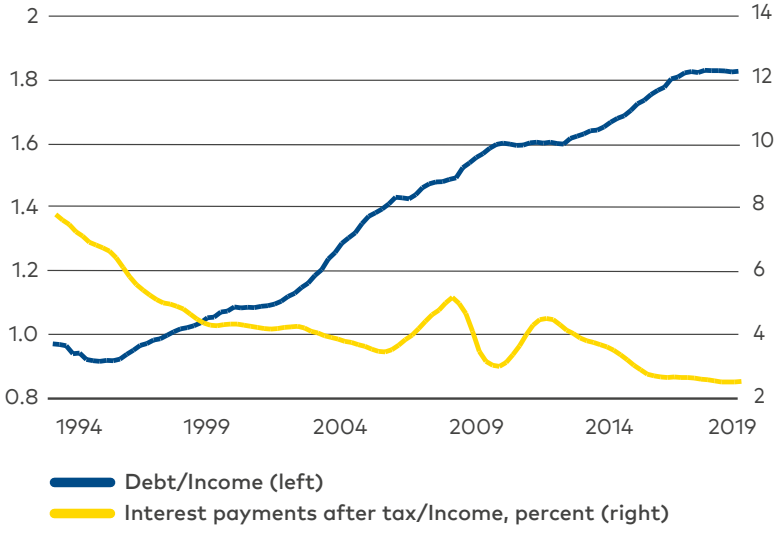
1. The consumption of highly indebted Swedish households – households with high LTV or LTI ratios – is more sensitive to housing price falls, interest-rate rises, and income falls than consumption by less-indebted households.
2. This means that highly indebted households may reduce their consumption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

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

3.2 The interest-rate sensitivity of consumption: The cash-flow channel

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

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

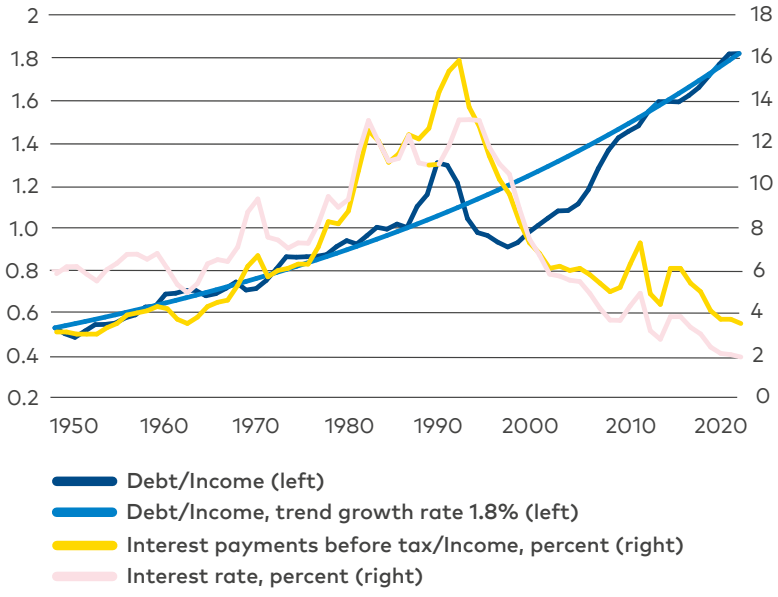


Source: Statistics Sweden.

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

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

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



Note: The interest rate has been calculated by dividing the before-tax-interest-to-income ratio with the debt-to-income ratio.
Sources: Statistics Sweden and own calculations.

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

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

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

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

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

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

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

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

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

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

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

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

[10] For details, see the discussion in Svensson (2019c, 2020b) of Bunn and Rostom (2015), Andersen et al. (2016) and Price et al. (2019).
[11] They call this phenomenon 'spending normalization'.
[12] I thank Benjamin Beckers for providing code and advice.

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

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

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

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

[13] Berger et al. (2018) provide a detailed theoretical model of housing-price effects on consumption that includes the housing-collateral effect.
[14] As noted by Guren et al. (2019, p. 1): 'In the mid-2000s boom and subsequent bust, housing wealth extraction through the mortgage market boosted consumption in the boom and reduced consumption in the bust (e.g., Mian and Sufi 2011, Mian et al. 2013).'

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

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

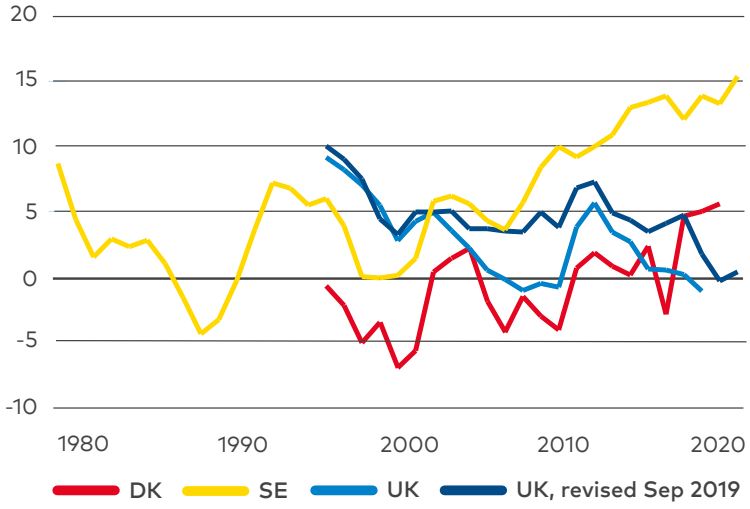
No evidence of mortgage-financed overconsumption in Sweden

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

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

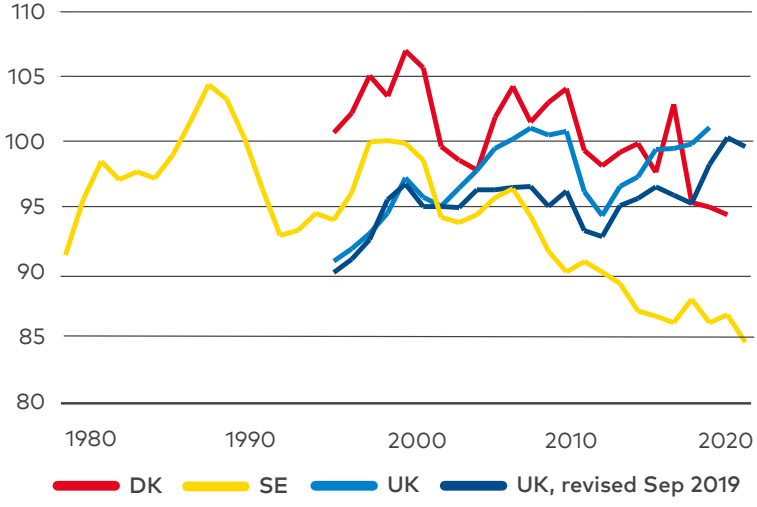
[15] See Svensson (2019c, Section 4.5) on the real-time stress test of the Swedish 2008–2009 crisis, when the cash-flow channel of monetary policy and stable household consumption helped stabilize GDP when investment and export collapsed.
[16] Mian and Sufi (2018) call it the 'credit-driven household-demand channel' and emphasize the role of a credit-supply shock initiating the U.S. boom before the Great Recession. Kaplan et al. (2019) argue that one also needs an upward shift in housing-price expectations to quantitatively reproduce the boom and bust.
[17] A new regression run by me with the Mian et al. (2017) online Replication Kit shows that the housing-collateral channel is weaker for countries with flexible exchange rates.

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



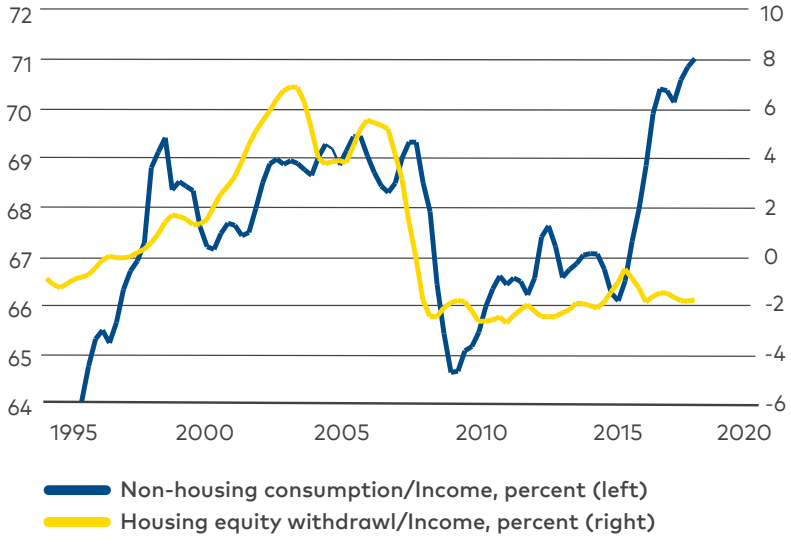
Source: OECD and Statistics Sweden.

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



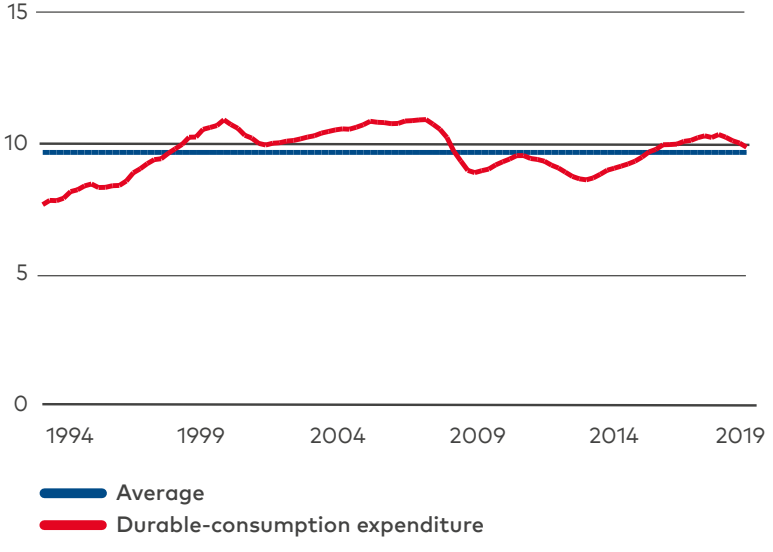
Source: OECD and Statistics Sweden.

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



Source: Bank of England, Office of National Statistics.

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



Source: Statistics Sweden.

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

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

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

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

[18] See FI (2017b, Figure 34).

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

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

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

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

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

3.4 The income sensitivity of consumption: credit and liquidity constraints

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

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

3.5 Is the above evidence enough?

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

[19] See Section 7.

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

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

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

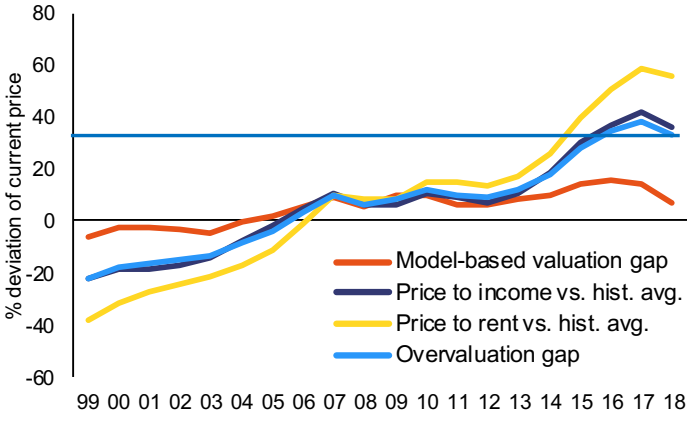
4. International organizations on Swedish housing prices and household debt

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

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

[20] The mortgage firms are not allowed to re-evaluate the collateral more often than every five years, except if the value changes for reasons other than the general development on the residential property market (FI 2016).
[21] The mortgage firms may revise the LTI ratio any time, with the gross income defined as the most recently assessed earnings income according to the Income Tax Act and other income that is assured and permanent (FI 2017d).

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



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

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

4.1 Evidence of overvaluation?

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

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

[22] Svensson (2020a) provides a detailed scrutiny of the Commission's assessment of the risks to Swedish financial and macroprudential stability from housing prices and household debt (see also Svensson 2019c, Section 5). Boije (2019) has previously criticized the Commission's analysis and recommendations for Sweden.
[23] With reference to the PTI gap and an econometric model, ESRB (2019, p. 124) concludes that Swedish housing is overvalued, 'with various estimates ranging from 20% to 60%.'

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

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

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

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

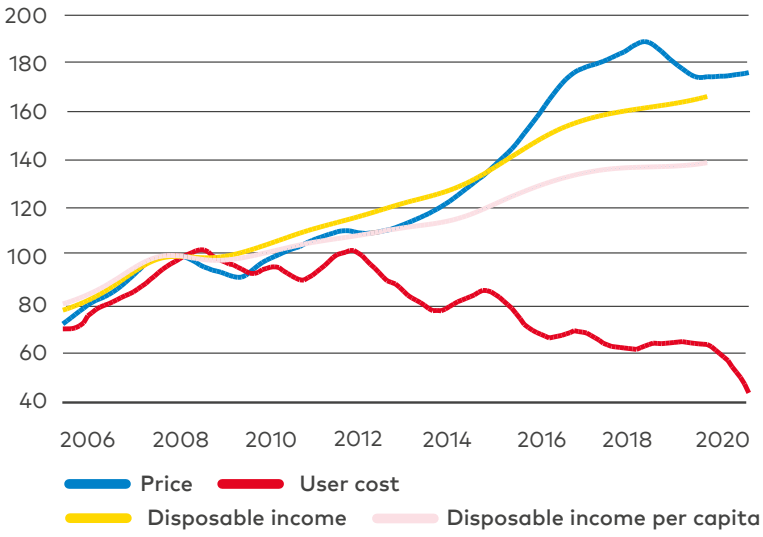
Stockholm has the highest housing prices in Sweden. It is therefore instructive to assess whether housing prices are overvalued there. As in Svensson (2019b, 2019c), the average Stockholm tenant-owned studio (one-room apartment) in 2017 can be used as an example, with assumptions and data as in Table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

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

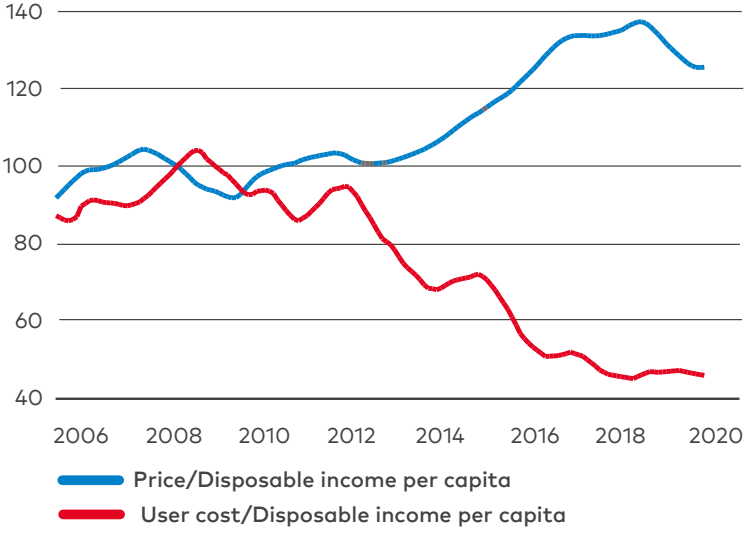
[24] The housing payment is the sum of the operating and maintenance cost (OMC) and the mortgage debt service (interest and amortization payments). The user cost – the imputed rent – is the sum of the OMC, the real after-tax mortgage interest, and the real cost of housing equity, less the (expected)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

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

a) Levels (index)

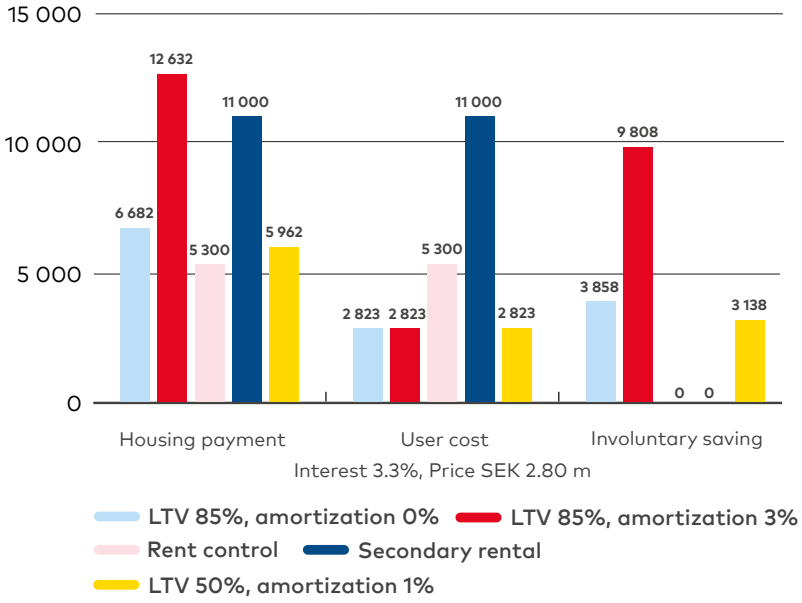


b) Ratio of price and user cost to disposable income per capita (index)



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

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



Note: The average Stockholm studio 2017.
Sources: Table A.1, Stockholm Housing Agency 2018, and own calculations.

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

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

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

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

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

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

Overvaluation, fundamentals, and expectations

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

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

[26] Other aspects of Figure 10 are discussed in Section 6 and in online appendix B.2.
[27] Flam (2016) compares owner-occupied user costs to 'presumption rents' in newly constructed rentals in Stockholm's inner city, the hottest housing market in Sweden. He finds that presumption rents exceed the user cost and thus do not indicate overvaluation even in this hot market.

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

4.2 Risks from household debt?

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

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

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

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

5. Sweden is not Denmark

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

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

[28] The ESRB (for example, ESRB 2019) draws similar conclusions about the risks from Swedish housing prices and household debt as the Commission, and its analysis suffers from the same weaknesses.
[29] See, for example, the discussion in (Svensson 2019c, Section 1) of the director general's speech in the Riksdag's Finance Committee (Thedéen 2016). The FI has repeatedly referred to the Danish experience, as has the OECD (2017, p. 26).
[30] See OECD (2008), Dam et al. (2011), European Commission (2012), Rangvid (2013, 2020), and Bäckman and Khorunzhina (2019).

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

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

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

6. The consequences and costs of the credit tightening

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

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

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

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

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

[31] A more extensive examination is available in online appendix B and Svensson (2019b).
[32] See online appendix B.1 for evidence and details.
[33] See footnote 7 for a reminder about the nature of the affordability tests. See also online appendix B.1 for evidence and a detailed argumentation.
[34] With a capital income tax rate of 30%, 3% amortization is equivalent to an interest rate increase of 3/(1–0.3) = 4.3 percentage points.

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

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

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

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

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

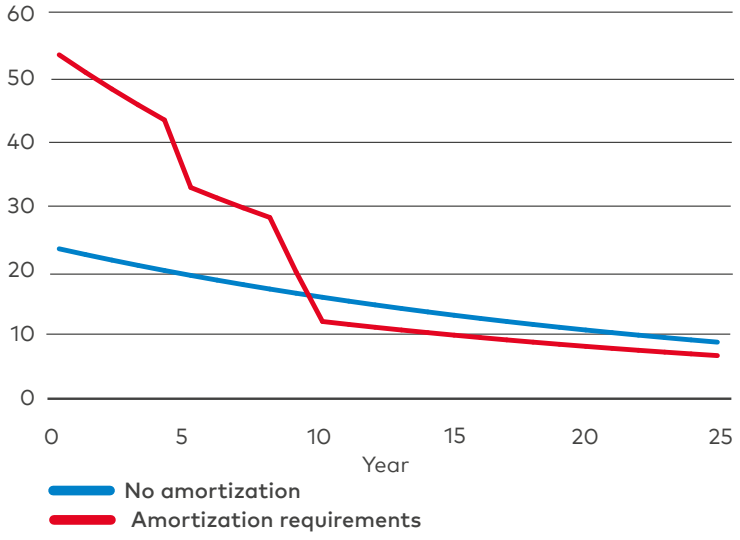
[35] See online appendix B.3, Table B.1, and Figure B.7.
[36] Online appendix Figure B.6.
[37] Several of them are listed in online appendix Table B.3.

In a new report and op-ed (Olsén Ingefeldt and Thell 2019, Thedéen 2019), the FI maintains that the amortization requirements do not exclude the young from owner-occupied housing. The argument is that, of the young who bought housing in 2012, 85% would be able to buy the same housing in 2018 if they had been young in 2018. For Stockholm, however, the fraction is only 67%. But the effect of the compulsory amortization requirements are measured in a misleading way, resulting from the difference between the actual amortization rates of, on average, 2.2% in 2018 and the actual amortization rates of, on average, 1.8% in 2012. But the high actual amortization rates in 2012 were to a large extent the result of the mortgage firms' considerable tightening of lending standards since 2010–2011 – presumably in the vain hope of avoiding a regulation of compulsory amortization – and should be seen as part of the general credit tightening induced by the FI. Some of the amortization in 2012 was probably voluntary. With higher housing prices and larger loans in 2018, many young persons may have preferred to amortize less in 2018 than in 2012.[38]

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

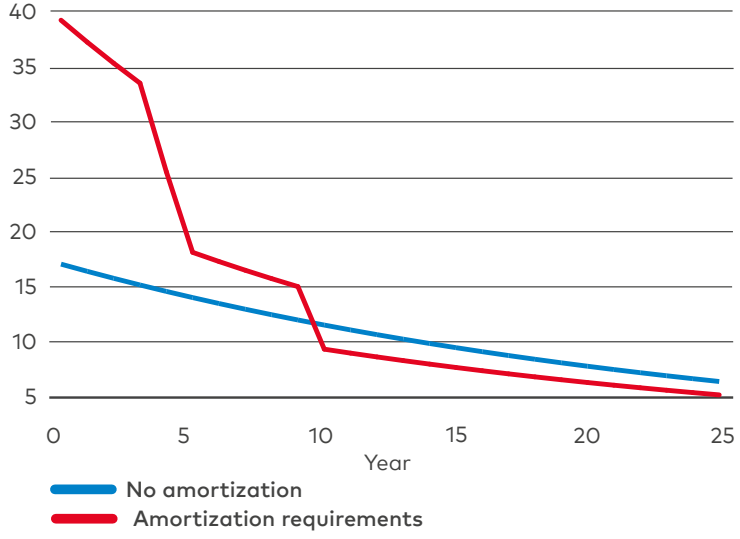
[38] An arguably more relevant comparison of the situation for the young with and without the credit tightening – taking into account the total credit tightening achieved by the FI since 2010–2011 – is provided in Svensson (2019b, Section 5.2).

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



Note: SEK/EUR ≈10.
Sources: Tables 2 and B.2 (in online appendix), and own calculations.

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



Note: SEK/EUR ≈10.
Sources: Tables 2 and B.2 (in online appendix), and own calculations.

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

6.1 Reduced resilience

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

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

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

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

[39] An underlying assumption is that incomes and housing prices grow by 4% (2% real growth and 2% inflation) (online appendix B.6).
[40] There is no reason to believe that a faster amortization rate would be better. Actually, as far as I know, there is no support for compulsory amortization at all in the research literature on optimal mortgage contracts (Section 7).

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

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

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

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

6.2 Many distortions

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

[44] They are called 'seniorlån' and 'kapitalfrigöringskrediter' in Swedish.
[45] The Swedish market for RMLs does not seem to work well presently, but a well-functioning market would have substantial benefits (Lindenius and Ferm 2017).

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

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

The 85% level was chosen in a rather arbitrary way when the mortgage cap was introduced in 2010.[47] Several countries have higher mortgage caps (Evidens 2018). The share of young individuals among new mortgagors fell sharply when the cap was introduced, from 13% in 2009 to 5% in 2010 (FI 2018b, p. 10). The LTV ratio falls over time also with an interest-only loan, if nominal housing prices increase. In growing big cities with limited land, housing prices may be expected to rise at least at the same rate as income. A temporary period with an LTV ratio of over 100% due to an unexpected fall in prices is problematic only if the home has to be sold due to a move or other reason.

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

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

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

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

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

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

8. Conclusions

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

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

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

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

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

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

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

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

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

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

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

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

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

8.1 Need for governance reforms

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

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

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

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

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

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

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

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

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

References

Ampudia, M., Georgarakos, D., Slacelek, J., Tristani, O., Vermeulen, P. and Violante, G. L. (2018), Monetary policy and household inequality, Discussion Paper No. 2170/July 2018, European Central Bank.

Andersen, A. L., Duus, C. and Jensen, T. L. (2016), Household debt and spending during the financial crisis: Evidence from Danish micro data, *European Economic Review*, 89, 96–115.

Andersson, M. K. and Aranki, T. (2019), Fewer vulnerable households after stricter amortization requirement, FI Analysis No. 17, Finansinspektionen.

[49] More specific secondary objectives may be included in the bracket, such as 'growth and employment' for Bank of England's Financial Policy Committee (Sunak 2020).
[50] I have previously recommended that the mandate and resources of the Fiscal Policy Council are extended to include monetary policy and that the name is changed to the Fiscal and Monetary Policy Council (Svensson 2016b).

Aranki, T. and Larsson, H. (2019), Fewer home equity withdrawals after amortization requirements, FI Analysis No. 20, Finansinspektionen.

Baker, S. R. (2018), Debt and the response to household income shocks: Validation and application of linked financial account data, *Journal of Political Economy*, 126(4), 1504–1557.

Berger, D., Guerrieri, V., Lorenzoni, G. and Vavra, J. (2018), House prices and consumer spending, *The Review of Economic Studies*, 85(3), 1502–1542.

Bjellerup, M. and Majtorp, L. (2019), The development of Swedish housing prices, Fokus Report November 15, 2019, Riksgälden.

Boije, R. (2019), Swedish household debts at risk: The Council ignores research, Presentation at the European Commission's Swedish Representation, Stockholm, June 12, 2019.

Boije, R., Flam, H., Hassler, J. and Svensson, L. E. O. (2019), Finansinspektionens amorteringskrav saknar påvisbar samhällsnytta, Dagens Nyheter, op-ed, November 9, 2019.

Broadbent, B. (2019), Debt dynamics, speech at London Business School, January 23, 2019, Bank of England.

Bunn, P. and Rostom, M. (2015), Household debt and spending in the United Kingdom, Staff Working Paper No. 554, Bank of England.

Bäckman, C. (2019), Hur påverkar amorteringskravet hushållen? Lärdomar från Danmark, *Ekonomisk Debatt*, 47(2), 22–32.

Bäckman, C. and Khorunzhina, N. (2019), Interest-only mortgages and consumption growth: Evidence from a mortgage market reform, Working Paper.

Bäckman, C. (2020), Finansinspektionen måste gå längre och avskaffa amorteringskravet!, Ekonomistas blog post, April 8, 2020.

Campbell, J. Y. (2016), Restoring rational choice: The challenge of consumer financial regulation, *American Economic Review*, 106(5), 1–30.

Campbell, J. Y. and Mankiw, N. G. (1989), Consumption, income, and interest rates: Reinterpreting the time series evidence, *NBER Macroeconomics Annual 1989*, 4, 185–216.

Cocco, J. F. (2013), Evidence on the benefits of alternative mortgage products, *Journal of Finance*, 68(4), 1663–1690.

Dam, N. A., Saaby Hvolbøl, T., Haller Pedersen, E., Sørensen, P. B. and Hougaard Thamsborg, S. (2011), The housing bubble that burst: Can house prices be explained? And can their fluctuations be dampened?, National Bank of Denmark, *Monetary Review*, 1st Quarter, Part 1, 47–70.

Dermani, E., Lindé, J. and Walentin, K. (2016), Is there an evident bubble in Sweden, *Sveriges Riksbank Economic Review*, 2016:2, 7–55.

Di Casola, P. and Iversen, J. (2019), Monetary policy with high household debt and low interest rates, Staff Memo, October 2019, Sveriges Riksbank.

Ekvall, T. (2019), Stängda dörrar, Report, October 2019, Prognoscentret, HSB.

Emanuelsson, R., Katinic, G. and Spector, E. (2018), Developments in the housing market and their contribution to household debt, *Sveriges Riksbank Economic Commentaries*, (14), 1–11.

Englund, P. and Svensson, L. E. O. (2017), Remissvar till Finansinspektionens förslag till skärpt amorteringskrav för hushåll med höga skuldkvoter, Consultation response, Stockholm School of Economics.

ESRB (2019), Vulnerabilities in the residential real estate sectors of the EEA countries, Report, September 2019, European Systemic Risk Board.

European Commission (2012), Macroeconomic imbalances – Denmark, *European Economy Occasional Papers*, (102).

European Commission (2020), Country report Sweden 2020, Commission Staff Working Document SWD(2020) 526 final, Brussels, February 26.

Evidens (2018), Effekter av kreditbegränsningar för unga förstagångsköpare, Report, October 2018, Evidensgruppen.

FI (2010), Allmänna råd om begränsning av lån mot säkerhet i bostad, Decision Memo, Dnr 10-1533, July 2019, Finansinspektionen.

FI (2013), Individuellt anpassad amorteringsplan, Memo, October 14, 2013, Finansinspektionen.

FI (2016), Regulation regarding mortgage amortisation requirement, Decision Memo FFFS 2016:16, Ref. 14-16628, May 16, 2016, Finansinspektionen.

FI (2017a), Reasoning behind Finansinspektionen's position, Memo, Ref. 17-9236, November 6, 2017, Finansinspektionen.

FI (2017b), Stability in the Financial System May 2017, Finansinspektionen.

FI (2017c), Stability in the Financial System November 2017, Finansinspektionen.

FI (2017d), A stricter amortization requirement for households with high loan-to-income ratios, Decision Memo FFFS 2017:23, Ref. 17–9236, December 11, 2017, Finansinspektionen.

FI (2018a), Finansinspektionen's use of macroprudential tools, Report, June 2018, Finansinspektionen.

FI (2018b), The Swedish Mortgage Market 2018, Finansinspektionen.

FI (2018c), Vissa ändringar av amorteringskraven, Decision Memo, Dnr 18-1119, December 11, 2018, Finansinspektionen.

FI (2019), Finansinspektionen och finansiell stabilitet, Memo, December 19, 2019, Dnr 19–27340, Finansinspektionen.

FI (2020a), Banks may grant all mortgagors amortization exemption, Press release, April 2, 2020.

FI (2020b), Loss of income due to the corona-virus a cause for exemption from amortization, Press release, March 17, 2020, Finansinspektionen.

Flam, H. (2016), Har vi en bostadsbubbla?, *Ekonomisk Debatt,* 44(4), 6–15.

Flodén, M., Kilström, M., Sigurdsson, J. and Vestman, R. (2018), Household debt and monetary policy: Revealing the cash-flow channel, Working Paper.

Friedman, M. (1957), *A theory of the consumption function*, Princeton: Princeton University Press.

Gulbrandsen, M. A. H. and Natvik, G. J. (2020), Monetary Policy and Household Debt, this volume.

Guren, A. M., Krishnamurthy, A. and McQuade, T. J. (2019), Mortgage design in an equilibrium model of the housing market, Working Paper.

Hughson, H., La Cava, G., Ryan, P. and Smith, P. (2016), The household cash flow channel of monetary policy, *Reserve Bank of Australia Bulletin*, September Quarter, 21–29.

Hull, I. (2017), Amortization requirements and household indebtedness: An application to Swedish-style mortgages, *European Economic Review*, 91, 72–88.

Kaplan, G., Mitman, K. and Violante, G. L. (2019), The housing boom and bust: Model meets evidence, *Journal of Political Economy,* forthcoming.

Kaplan, G., Violante, G. L. and Weidner, J. (2014), The wealthy hand-to-mouth, *Brookings Papers on Economic Activity*, Spring 2014, 77–138.

Li, J. and Zhang, X. (2018), House prices, home equity, and personal debt composition, Sveriges Riksbank Working Paper No. 343, Sveriges Riksbank.

Lindenius, M. and Ferm, E. (2017), Marknaden för seniorlån, Report No. PID156969, Pensionsmyndigheten.

Ljung, S. (2018), Unionen efterlyser bostadspolitik för en bättre fungerande arbetsmarknad, Unionen Opinion blog post, October 22, 2018, Novus.

Mian, A., Rao, K. and Sufi, A. (2013), Household balance sheets, consumption, and the economic slump, *Quarterly Journal of Economics*, 128(4), 1687–1726.

Mian, A. and Sufi, A. (2011), House prices, home equity-based borrowing, and the US household leverage crisis, *American Economic Review*, 101(5), 2132–2156.

Mian, A. and Sufi, A. (2018), Finance and business cycles: The credit-driven household demand channel, *Journal of Economic Perspectives*, 32(3), 31–58.
Mian, A., Sufi, A. and Verner, E. (2017), Household debt and business cycles worldwide, *Quarterly Journal of Economics*, 132(4), 1755–1817.

Muellbauer, J. (2012), When is a housing market overheated enough to threaten stability, in Heath, A., Packer, F. and Windsor, C. (eds.), *Property Markets and Financial Stability* (73–105), Sidney: Reserve Bank of Australia.

OECD (2008), *Economic Survey: Denmark,* Paris.

OECD (2017), *Economic Survey: Sweden,* Paris.

OECD (2019), *Economic Surves: Sweden*, Paris.

Olsén Ingefeldt, N. and Thell, V. (2019), Unga vuxnas ställning på bostadsmarknaden, FI Analysis No. 19, Finansinspektionen.

Philiponnet, N. and Turrini, A. (2017), Assessing house price developments in the EU, Discussion Paper 048, May 2017, European Commission.

Piskorski, T. and Tchistyi, A. (2010), Optimal mortgage design, *Review of Financial Studies*, 23(8), 3098–3140.

Price, F., Beckers, B. and La Cava, G. (2019), The effect of mortgage debt on consumer spending: Evidence from household-level data, Research Discussion Paper RDP 2019-06, Reserve Bank of Australia.

Privata affärer (2019), Skandia sänker kalkylräntan på bolån*, Privata affärer*, October 11, 2019.

Rangvid, J. C. (2013), Den finansielle krise i Danmark, Report by the Committee on The Causes of the Financial Crisis in Denmark.

Rangvid, J. C. (2020), How stable is the Nordic financial sector, this volume.

Reinold, K. (2011), Housing equity withdrawal since the financial crisis, *Bank of England Quarterly Bulletin 2011 Q2*, 51(2), 127–133.

SBA (2010), Principer för bolån för att uppnå ett gott konsumentskydd, December 22, 2010, Svenska Bankföreningen.

SBA (2014), Ökat fokus på amortering, March 19, 2014, Svenska Bankföreningen.

SBAB (2018), Svårt köpa bostad för unga i Sveriges 20 största kommuner, Press release, June 7, 2018, SBAB Bank.

SBAB (2019a), Bolånetagare har stort sparkapital och använder inte bostaden som bankomat, Press release, October 18, 2019, SBAB Bank.

SBAB (2019b), Historiska boräntor, SBAB Bank, Retrieved March 5, 2019, from https://www.sbab.se/1/privat/vara_rantor.html#/rantor.

SBAB (2019c), SBAB sänker kalkylräntan till 6,5 procent, Press release, November 7, 2019, SBAB Bank.

Skandia (2019), Lön utan lägenhet, Report, April 2019, Skandia.

Sodini, P., van Nieuwerburgh, S., Vestman, R. and von Lilienfeld-Toal, U. (2017), Identifying the benefits from home ownership: The Swedish experiment, Working Paper.

Stockholm Housing Agency (2018), Bostadskön i siffror, Website, Bostadsförmedlingen.

Sunak, R. (2020), Remit and recommendations for the Financial Policy Committee, Letter from the Chancellor to the Governor, March 11, 2010, HM Treasury.

Svenska Dagbladet (2017), Skuldkvotstak infört hos bankerna: 'väcker irritation', November 1, 2017.

Svenska Dagbladet (2020), Amorteringsgraden växer marginellt efter kravet – FI nöjd med utvecklingen, January 18, 2020.

Svensson, L. E. O. (2016a), Amortization requirements may increase household indebtedness: A simple example, IMF Working Paper WP/16/83, International Monetary Fund.

Svensson, L. E. O. (2016b), Riksbanken, måluppfyllelsen och den demokratiska kontrollen, *Ekonomisk Debatt*, 42(4), 54–66.

Svensson, L. E. O. (2018a), The future of monetary policy and macroprudential policy, in *The future of central banking: Festschrift in honour of Vítor Constâncio*, (69–123), Frankfurt: European Central Bank.

Svensson, L. E. O. (2018b), A natural experiment of premature policy normalization and the neo-fisherian view, Panel presentation slides at the ECB Conference on Monetary Policy: Bridging Science and Practice, October 29-30, 2018, Stockholm School of Economics.

Svensson, L. E. O. (2019a), Amorteringskraven: Felaktiga grunder och negativa effekter, Report, Stockholm Chamber of Commerce.

Svensson, L. E. O. (2019b), Amortization requirements, distortions, and household resilience: Problems of macroprudential policy II, Working Paper, Stockholm School of Economics.

Svensson, L. E. O. (2019c), Housing prices, household debt, and macroeconomic risk: Problems of macroeconomic policy I, Working Paper, Stockholm School of Economics.

Svensson, L. E. O. (2019d), Sverige är inte Danmark – prisfall på 40% kan krävas för att amorteringskraven inte ska utestänga unga, Ekonomistas blog post, April 24 , 2019.

Svensson, L. E. O. (2020a), The European Commission on risks to financial and macroeconomic stability from Swedish housing prices and household debt, Preliminary draft, Stockholm School of Economics.

Svensson, L. E. O. (2020b), High household debt-to-income ratios did *not* cause a larger spending fall during the financial crisis in Denmark, Australia, and the UK, work in progress, Stockholm School of Economics.

Swedish Fiscal Policy Council (2019), Swedish Fiscal Policy – The Fiscal Policy Council Report 2019, Finanspolitiska rådet.

Swedish Ministry of Finance (2013a), Ett förstärkt ramverk för finansiell stabilitet, Memo, August 26, 2013, Finansdepartementet.

Swedish Ministry of Finance (2013b), Förordning om ändring i förordningen (2009:93) med instruktion för Finansinspektionen, Svensk författningssamling SFS 2013:1111.

Swedish Ministry of Finance (2017), Förordning (2009:93) med instruktion för Finansinspektionen, Svensk författningssamling SFS 2009:93, through SFS 2017:1189.

Swedish NAO (2018), Financial stability – macroprudential supervision as it should be? Summary and recommendations, Audit Report RIR 2018:2, January 10, 2018, Riksrevisionen.

Thedéen, E. (2015), Begränsa bolånen till max sex gånger årsinkomsten, *Dagens Nyheter,* op-ed, November 05, 2015.

Thedéen, E. (2016), FI:s förslag på ramverk för makrotillsynen, Speech at the Riksdag's Finance Committee, February 25, 2016, Finansinspektionen.

Thedéen, E. (2019), Amorteringskrav stänger inte ute unga, *Svenska Dagbladet,* op-ed, November 17, 2019.

Valueguard (2019), Nasdaq OMX Valueguard-KTH Housing Index (HOX), Valueguard.

Veidekke (2019), Historiskt ras – mitt i en glödande högkonjunktur, Report, Veidekke.

Appendix: Benchmark assumpions and data

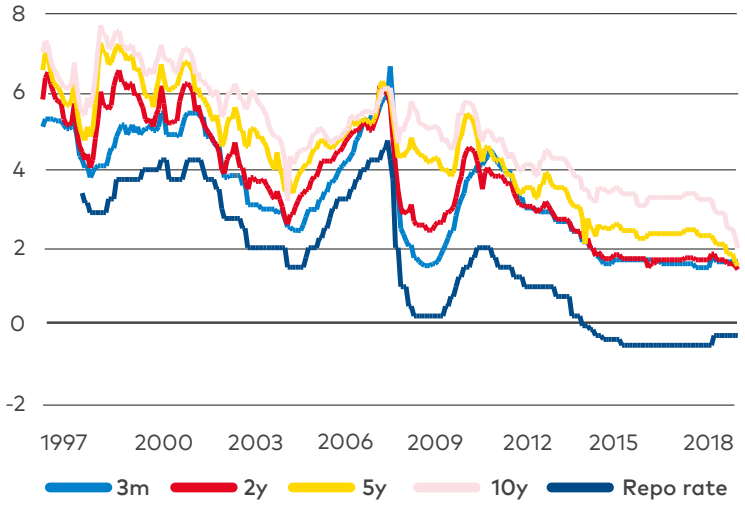
Table A.1 Benchmark assumptions for an average studio in Stockholm Municipality 2017

Price	SEK 2.8 mn
Size	31 m2
Price/m^2	SEK 90 323
Monthly operating and maintenance cost (OMC)	SEK 2 100
Down payment, 15%	SEK 0.42 mn
Mortgage, LTV ratio 85%	SEK 2.38 mn
Interest rate	3.3%
Nominal capital-income tax rate	30%
Nominal capital-gains tax rate	22%
Expected inflation rate	2%
Real after-tax capital gain	0%
Monthly standardized (basic) (non-housing) living expenses	SEK 9 300
Monthly rent on secondary rental	SEK 11 000–13 000

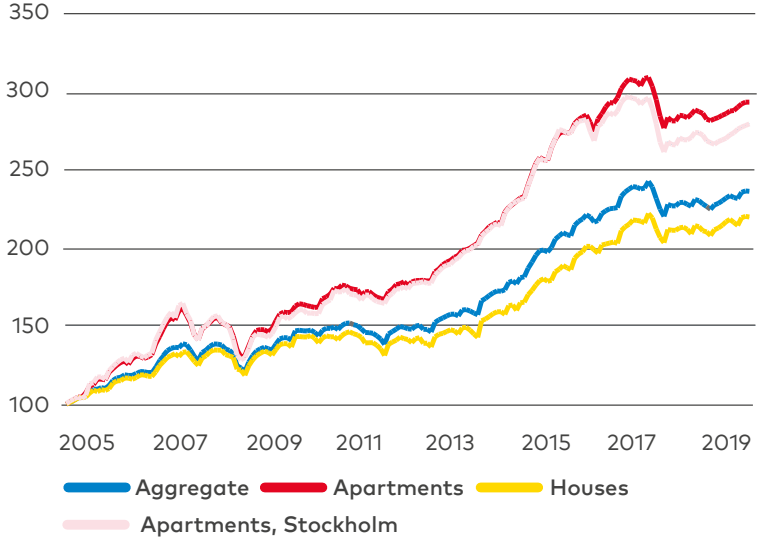
Source: Svensson (2019b).

Figure A.1 Data

a) Mortgage rates and repo rate, percent



b) Housing prices (index)



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

Comment on L. E. O. Svensson: Macroprudential Policy and Household Debt: What Is Wrong with Swedish Macroprudential Policy?

Niels Lynggård Hansen[1]

This is a well-written, structured and insightful paper on macroprudential policy and household debt – it is recommendable and very readable. The paper is an input into a Swedish debate and – after highlighting several features that are right about Swedish macroprudential policy, including the separation from monetary policy – it makes the point that Swedish macroprudential policy is ill-conceived in its focus on potential risks of household debt and housing prices. Amortization requirements and other measures to tighten credit have large individual and social costs and no demonstrable benefits.

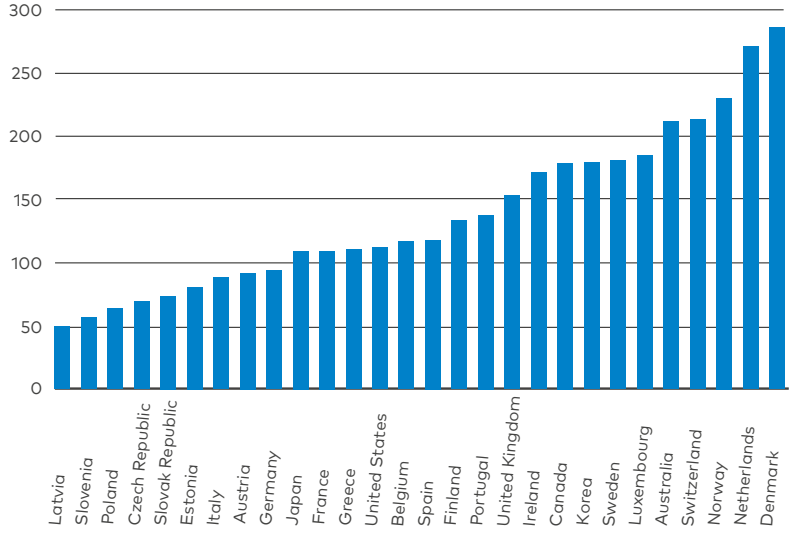
In the following, I will focus on household debt and its interplay with financial and macroeconomic stability, drawing on experiences from Denmark and a large set of analyses of detailed microdata on Danish households' economic and financial behaviour.

Access to credit is the basic building block in modern financial systems. The possibility of obtaining credit and thereby create debt allows households to smooth consumption over time and hence is welfare-improving. Recent decades have witnessed that household debt has increased substantially in many countries. The question is if this represents intertemporal substitution, or whether other mechanisms are at play – and if it poses financial and macroeconomic risks? Answers to these questions are essential for how household debt accumulation should be addressed by economic policy and is basically what Svensson is concerned about.

Danish households built up substantial debt in the decades prior to the financial crisis. It happened alongside the development of a fully funded pensions system covering most of the labour market over

[1] European Stability Mechanism. Email: n.hansen@esm.europa.eu. The discussion of Lars Svensson's paper took place while Hansen was at the Pension Research Center (PeRCent), Copenhagen Business School. The views in the comment are the responsibility of the author, and do not necessarily reflect the views of PeRCent, Copenhagen Business School or the European Stability Mechanism.

Figure 1 Ratio of household debt to disposable income, 2016, percent



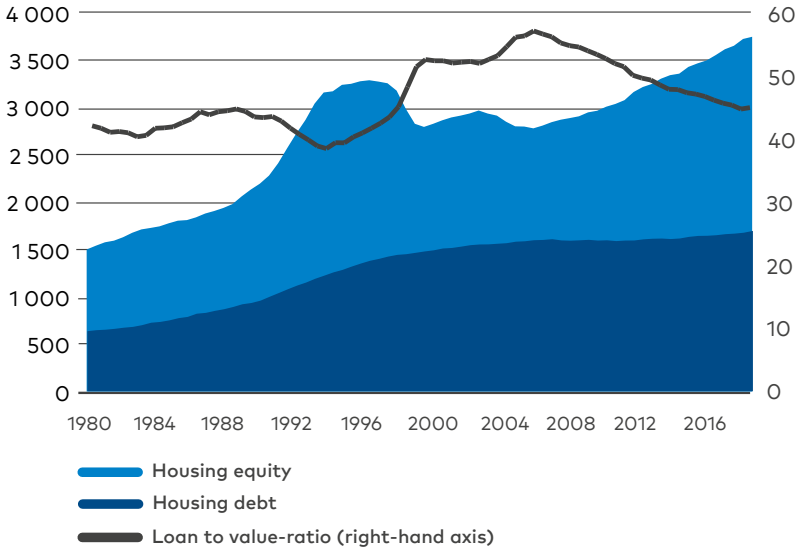
Source: OECD.

the last 30 years. Total pension assets of more than twice GDP are higher than in any other Western country. Hence, many individual households borrow, mainly through the mortgage-credit system, and invest at the same time. At close to 300 percent of disposable incomes, Danish households have the highest level of gross debt in any Western country; see Figure 1. A number of studies have analysed the implications for macroeconomic and financial stability of the high level of household debt, also with an aim to address the concerns of many international organisations like the European Commission, IMF, OECD, and rating agencies. Since debt has been increasing to unprecedented levels in many countries, these studies are also relevant in a broader international context.

1. Increase in household debt in recent decades

Danish household debt increased substantially in the 2000's prior to the financial crisis, as shown in Figure 2. This happened in parallel with a significant surge in house prices. Increased household

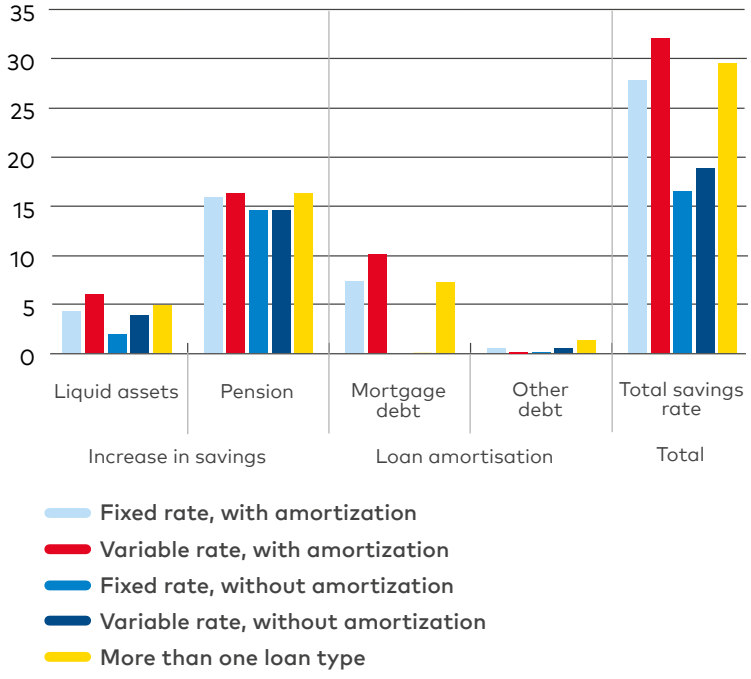
Figure 2 Housing debt, housing equity and loan-to-value ratio



Note: Updated version of Chart 1 in Andersen et al. (2014). Self-employed are excluded. Housing debt consists of all debt secured by real estate. The loan-to-value ratio is defined as the ratio of housing debt to the total value of real estate owned by households in percent. Housing equity and housing debt are billions DKK.
Source: Statistics Denmark and Danmarks Nationalbank.

leverage was facilitated by financial liberalisation in the mortgage market, in particular the introduction of interest-only loans in 2003 that followed the introduction of variable-rate mortgage loans in 1996. Several studies support the view that the housing boom leading up to the financial crisis was to a large extent fuelled by deregulation of the mortgage market (see e.g. Dam et al. 2011). Increases in house prices were accompanied by an increase in credit to households. At first, credit grew less than house prices, but when there was eventually a correction of house prices from an unsustainable level before the financial crisis, the average loan-to-value ratio jumped to unprecedented levels around the crisis (see Figure 2). More recently, the ratio has declined towards the pre-crisis level as house prices have recovered, whereas credit growth has been lower.

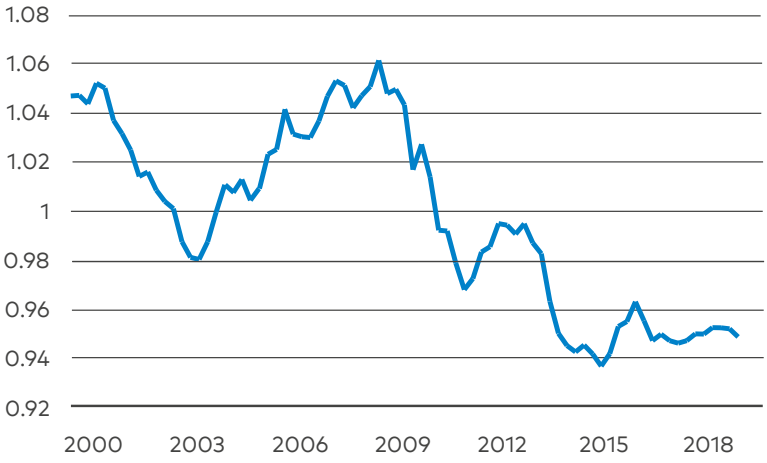
Figure 3 Savings rates for households with different mortgage loan types, 2016, percent of disposable income



Note: Households are included in the sample only when total annual income exceeds DKK 25 000 and the oldest member is under the age of 60. Further, households with self-employed members and households who bought real property in 2016 are excluded. Debt reduction has been calculated on a net basis, i.e. new debt raised is included as negative debt reduction.
Source: Chart 6 in Kuchler (2015) updated with most recent register data from Statistics Denmark.

When interest-only loans were introduced, it was often claimed that they would mainly be used by those borrowers who can employ the savings on principal payments to repay more expensive debt. Studying Danish microdata more carefully, it turns out that this claim was not fully justified (see Kuchler 2015). Households with interest-only loans have substantially lower overall savings rates than households that amortize their loans, as can be seen in Figure 3. This probably partially reflects self-selection into this type of loan by borrowers with a lower propensity to save. Another study, Abildgren et al. (2018a), also finds that households with in-

Figure 4 Consumption ratio, share of disposable income



Note: four-quarter moving averages. The consumption ratio is the ratio of private consumption to disposable income. Disposable income has been adjusted for restructuring of capital pensions and LD (Loenmodtagernes Dyrtidsfond) savings in 2013 and 2015.
Source: Danmarks Nationalbank, Mona Database.

terest-only loans purchased more expensive houses and leveraged more than households that amortized their loans. The introduction of these loans has therefore most likely contributed to the overheating before the financial crisis in 2008. Since interest-only loans do not imply a build-up of equity buffers in the way that loans with amortization do, it is thus important to continuously monitor the size of liquid buffers and, more generally, the resilience of households to adverse shocks.

The main concern about the high level of household debt after the financial crisis was the threat to financial stability. However, stress tests of households' balance sheets and repayment capability showed quite unanimously that the direct risks from high household debt to financial stability were limited (Andersen et al. 2012, Andersen and Duus 2013), although some groups of highly leveraged households, particularly those who had bought real estate at high prices just before the financial crisis, were constrained in their ability to cope with additional shocks.

A number of studies of the very comprehensive microdata on Danish households' economic and financial situation – full-sample, third-party administrative data from Danish authorities and financial institutions – have evidenced that most of outstanding debt is held by households in the top income deciles. The 30 percent of the households with the highest incomes accounted for almost 70 percent of total gross debt in 2016, whereas the 50 percent of the households with the lowest incomes together only accounted for 16 percent. An explanation is that households in the higher income deciles are more likely to be homeowners. Also, the main part of household debt is owed by households with large financial assets. Compared to for example Sweden, where data on the distribution of debt is also available, debt is relatively more concentrated in the higher income deciles in Denmark (Englund et al. 2015).

Whereas household finances were in general resilient to adverse shocks in the years following the financial crisis, the high level of household debt may have had implications for macroeconomic stability. Household consumption has been rather weak as witnessed by the persistently low consumption ratio in the 2010's (see Figure 4). The question is to what extent this is driven by highly indebted households. In the next section, Danish experiences will be analysed in more detail.

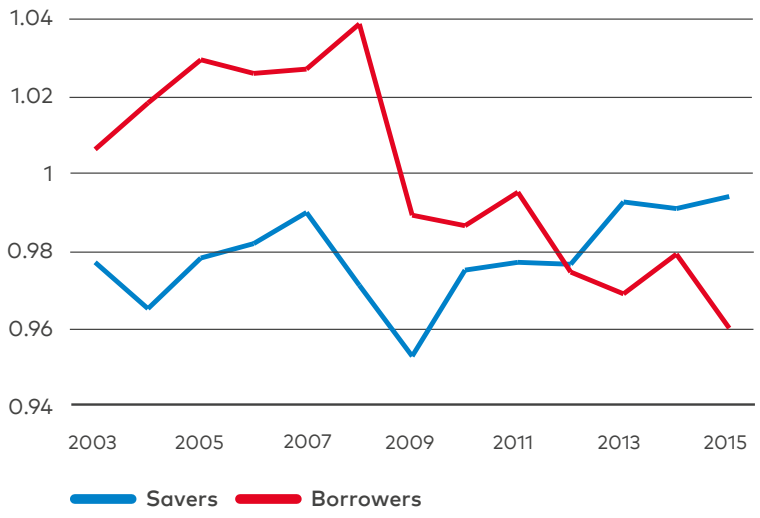
2. Household debt and macroeconomic stability

To study household consumption in Danish microdata, a measure of spending is imputed from changes in net wealth from one year to the next based on the accounting identity

$$C_t \equiv Y_t - S_t = Y_t - \left(W_t - W_{t-1}\right), \qquad (1)$$

where C_t is spending, Y_t is disposable income, S_t is saving and W_t is total wealth in year *t*. The latter is defined as liquid financial assets minus outstanding debt. Imputed spending is found to be a good measure of private consumption when comparing to expenditure surveys and national accounts (Abildgren et al. 2018b). As shown there, data restrictions and filtering are used to derive a measure of individual household spending. Households with members who are self-employed or not fully liable to taxation in Denmark are

Figure 5 Consumption ratios for savers and borrowers

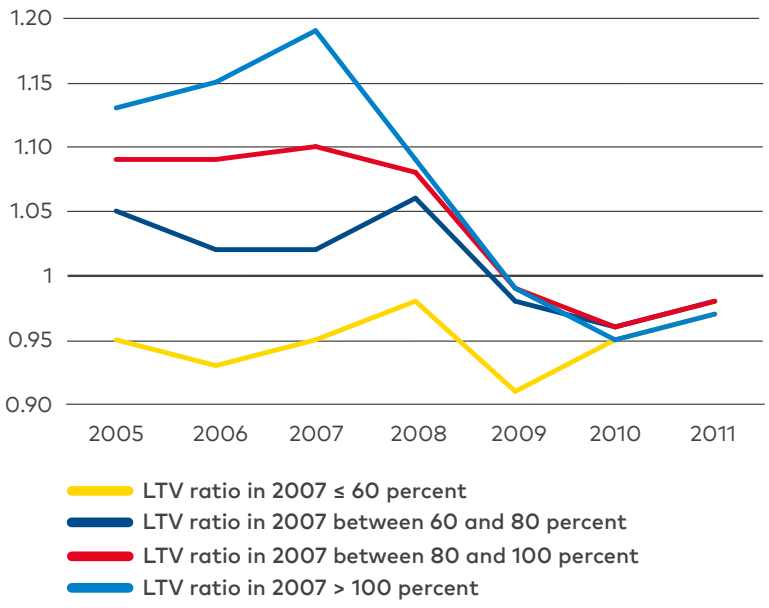


Note: Median consumption ratio for savers and borrowers. The consumption ratio is the ratio of imputed consumption to disposable income. Borrowers are defined as households whose financial liabilities exceed their financial assets (excluding pension savings) and vice versa for savers.
Source: Hviid and Kuchler (2017).

excluded. On aggregate, this filtering implies that the dataset covers 91 per cent of all households in Denmark. Using the imputed measure of household consumption divided by disposable income to scale consumption to each household, the real economic effects of high debt among households are assessed.

A number of studies have shown that the reduction in consumption in the 2010´s for indebted households was in general linked to a higher level of consumption before the crisis (see Hviid and Kuchler 2017, and references therein). Borrowers – households with negative net financial assets (excluding pension savings), 60 per cent of households – had very high consumption ratios prior to the financial crisis. Following the crisis, they have in general consolidated their balance sheets (see Figure 5). Consolidation has continued at an increased speed despite the low-interest-rate period of the past 5–6 years. The

Figure 6 Consumption ratios and loan-to-value ratios



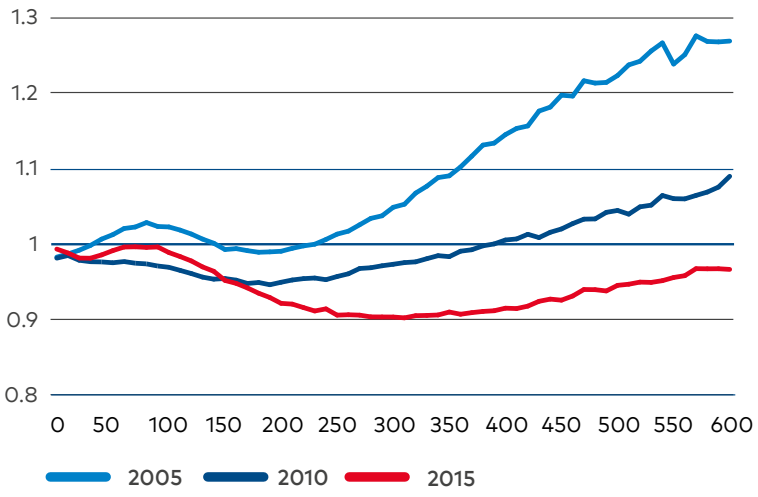
Note: Median consumption to income ratios. The consumption ratio is defined as the ratio of imputed consumption to disposable income. Loan-to-value (LTV) ratios are defined as the ratio of total debt to the value of real estate. Only homeowners with positive gross debt are included.
Source: Andersen et al. (2014).

consumption ratios of savers, on the other hand, were only affected by the financial crisis in a few years.

Households with high pre-crisis loan-to-value ratios reduced consumption substantially more than less leveraged households during the recession (see Figure 6). Specifically, the build-up of debt in the years preceding the crisis most likely contributed to an unsustainable consumption level in these years, prompting a large reduction during the crisis years.

What are the mechanisms explaining this relationship between household leverage and the decline in consumption in the wake of the financial crisis? Does it reflect a gross-debt channel whereby indebted households are more likely to react to macroeconomic shocks or is it rather a reversion to the mean after a boom. Svens-

Figure 7 Consumption ratios and loan-to-income ratios in selected years



Note: Median consumption ratios. The consumption ratio on the vertical axis is defined as the ratio of imputed consumption to disposable income. The loan-to-income ratio on the horizontal axis is defined as the ratio of all debt to gross income and measured in percent.
Source: Hviid and Kuchler (2017).

son ascribes the first view to the Swedish FSA, Finansinspektionen, citing one of its reports: '... highly indebted households may sharply reduce their consumption in the event of a macro-economic shock ...'. In his view, supported by several references in his paper, including Andersen et al. (2016), the fall in consumption seen in countries like Denmark, UK and US with high household debt was due to mortgage-financed overconsumption, not to indebtedness in itself.

Even over a longer horizon, the variation in consumption responses across different loan-to-income (LTI) ratios is striking. This is clear from Figure 7. Across all LTI-levels there was a significant decline in consumption ratios in the years covering the financial crisis, i.e. from 2005 to 2010. For households with low or moderate levels of LTI, the consumption ratio has recovered subsequently. In contrast, households with high levels of LTI have reduced their consumption ratio even further in the 2010–2015 period despite the decline in the interest-rate level and the recovery in the housing market. Such a protracted response seems hard to reconcile with mean reversion after a period of overconsumption. Another potential explanation

of the observed relationship between household leverage and consumption variation in the aftermath of the financial crisis is the so-called leverage channel, implying that leveraged households reduce their debt levels in response to (the risk of) adverse shocks to e.g. income or asset prices (see e.g. Mian et al. 2013, Fagereng and Halvorson 2016, and Mian et al. 2017). Yet another explanation of the slow recovery in consumption could be the consumer-sentiments channel stressing that households reoptimise their consumption behaviour in response to changes in the expected future value of collateral, interest rates or income (see e.g. Carroll et al. 1994, and Gillitzer and Prasad 2018).

3. Concluding remarks

To sum up, Svensson has written an interesting paper with many insights that, although mainly targeted at the Swedish debate on the role of household debt for macroprudential policy, has broader relevance. In particular, he is critical to Swedish macroprudential authorities' concern about high household debt addressed through amortisation requirements and other measures.

In Svensson's view, household indebtedness does not pose a macroeconomic risk in itself – high indebtedness is not directly accountable for the decline in consumption after the financial crisis experienced in various countries, it is rather the reversion from mortgage-financed overconsumption. Looking at the significant decline in consumption in Denmark, primarily driven by highly leveraged households, there seems to be some merit to this position. However, considering how protracted this process has proved to be, it seems difficult to rule out that there is a direct gross-debt channel as well. The Danish experience indicates that high household leverage may increase macroeconomic volatility in times of financial unrest. Balance-sheet adjustments take a long time and may be of large macroeconomic importance.

References

Abildgren, K., Hansen, N. L. and Kuchler, A. (2018a), Overoptimism and house price bubbles, *Journal of Macroeconomics*, 56, 1-14.

Abildgren, K., Kuchler, A., Rasmussen, A. S. L. and Sørensen, H. S. (2018b), Consistency between household-level consumption data from registers and surveys, Danmarks Nationalbank Working Paper, No. 131, December.

Andersen, A. L., Christensen, A. M., Duus, C. and Kaarup, R. (2012), Danish families' financial robustness, variable rates and deferred amortisation, Danmarks Nationalbank Monetary Review, 4th quarter, Part 2.

Andersen, A. L. and Duus, C. (2013), Danish families in mortgage arrears, Danmarks Nationalbank Monetary Review, 3rd quarter, Part 2.

Andersen, A. L., Duus, C. and Jensen, T. L. (2014), Household debt and consumption during the financial crisis, Danmarks Nationalbank Monetary Review, 1st quarter.

Andersen, A. L., Duus, C. and Jensen, T. L. (2016), Household debt and spending during the financial crisis: Evidence from Danish micro data, *European Economic Review*, 89, 96-115.

Carroll, C. D., Fuhrer, J. C. and Wilcox, D. W. (1994), Does consumer sentiments forecast household spending? If so, why?, *American Economic Review*, 84(5), 1397-1408.

Dam, N. A., Hvolbøl, T. S., Pedersen, E. H., Sørensen, P. B. and Thamsborg, S. H. (2011), Developments in the market for owner-occupied housing in recent years – can house prices be explained?, Danmarks Nationalbank Monetary Review, 1st quarter, Part 2.

Englund, P., Becker, B., Becker, T., Bos, M. and Wissén, P. (2015), Den svenska skulden, Konjunkturrådets rapport, SNS Forlag.

Fagereng, A. and Halvorson, E. (2016), Debt and household consumption responses, Norges Bank Staff Memo, No. 1.

Gillitzer, C. and Prasad, N. (2018), The effect of consumer sentiment on consumption: Cross-sectional evidence from elections, *American Economic Journal: Macroeconomics*, 10(4), 234-269.

Hviid, S. J. and Kuchler, A. (2017), Consumption and savings in a low interest rate environment, Danmarks Nationalbank Working Paper, No. 116, June.

Kuchler, A. (2015), Loan types, leverage, and savings behaviour of Danish households, Danmarks Nationalbank Working Paper, No. 97, September.

Mian, A., Rao, K. and Sufi, A. (2013), Household balance sheets, consumption, and the economic slump, *Quarterly Journal of Economics*, 128(4), 1687-1726.

Mian, A., Sufi, A. and Verner, E. (2017), Household debt and business cycles worldwide, *Quarterly Journal of Economics*, 132(4), 1755-1817.

Comment on L. E. O. Svensson: Macroprudential Policy and Household Debt: What Is Wrong with Swedish Macroprudential Policy?

Bryndís Ásbjarnardóttir[1]

The financial crisis of 2007–08 showed that price stability does not guarantee macroeconomic stability. It also became clear how closely connected the real economy is to the financial sector through, amongst other channels, developments in the housing market, interest rates and income. Monetary policy contributes to financial stability by smoothing business cycles and anchoring inflation expectations. A stable and resilient finacial system contributes to healthy household and business balance sheets, thereby fostering price stability. There is a broad consensus among policy makers that monetary policy is primarily aimed at price stability and is not best suited to maintaining financial stability. The macroprudential framework with its own objectives and tools thus provides an important complement to monetary policy.

The role of macroprudential policies is to reduce distortions in the financial system and contain the build-up of systemic risk by constraining agents' incentives for excessive risk-taking. Reflecting the variety of distortions in the financial system, systemic risk can manifest itself in different forms, including excessive leverage, weak lending standards and weak liquidity positions (Praet 2018, ESRB 2019).

1. Household debt and output growth

Much debate still revolves around what constitutes excessive leverage. At the same time as the growth literature has long argued that credit to the private sector is conducive to faster economic growth, the literature on the determinants of financial crises has shown that credit to the private sector predicts financial crises (Popov 2017). The frequency of financial instability episodes has increased globally in the last decades following after a shift towards less stringent financial regulation. As Svensson mentions, lending to housholds is thought to be socially beneficial because of consumption smooth-

[1] Icelandic Financial Stablity Committee. Email: Bryndis.asbjarnardottir@sedlabanki.is.

ing. However, research has shown that a sudden and large increase in household debt could lead to lower subsequent output growth. Financial crises relating to housing can have severe repercussions on the real economy and households' welfare because the consequent recessions tend to be particularly deep and prolonged. In general, households do not internalize the macroeconomic effects of their own borrowing, making the economy vulnerable to excessive credit growth and build-up of imbalances in the housing credit sector (Mian et al. 2017, Baker 2018).

2. Highly-leveraged households and the financial system

Svensson finds that the credit tightening in Sweden has not been undertaken in order to improve financial stability but to reduce macroeconomic risk. Household indebtedness does not only pose an elevated macroeconomic risk. In a situation of weakened economic outlook it can also heighten financial risk through increased defaults and banks' credit losses. Housing is a key sector of the real economy because it accounts for a large share of household wealth. Mortgages are also a large share of lenders' assets and a significant source of their collateral. Furthermore, housing construction is an important component of the real economy, as a source of employment, investment and growth.

Excessive risk taking, leverage and misaligned incentives in the upturn of the real estate cycle may lead to externalities in the downturn, with implications for both financial stability and the real economy. The effect can be both direct and indirect. When house prices fall collateral values drop, which increases the losses that lenders face in the event of default. The indirect effect is associated with household indebtedness. An increase in households' debt service payments or a decrease in income may cause households to adjust their consumption in order to safeguard an owner-occupied dwelling that is mortgaged. This could lead to a spiral where overall economic activity would decrease, leading to higher default rates and potentially fiscal imbalances.

Increased risk of default because of weakened economic outlook diminishes lenders' willingness to provide credit. This can result in second-round effects where less access to financing can slow down the economy even further with a possible increase in defaults (ESRB 2019). Therefore at a certain tipping point, household debt can raise concerns about financial vulnerability. When the debt-to-income ratio rises sharply, it can be followed by a large drop in consumption during crisis. In contrast to Svensson's findings, this could happen not only because of overconsumption, but also because highly leveraged households could be compelled to reduce their spending due to tighter borrowing conditions. Another possible reason is that some households cut their expenditures as a precaution in anticipation of a weaker income and employment outlook (BIS 2017).

As Svensson demonstates, knowledge of financial stability is incomplete in many respects. Macroprudential policy is still increasingly used to reduce excessive leverage and manage financial imbalances. Managing household credit booms and their financial stability implications has, for instance, become a central task for macroprudential policymakers. The intended effect is to increase the resilience of the financial system and to contain feedback between asset prices and credit that can result in unsustainable increases in leverage and debt burdens (IMF 2013, Nier and Kang 2016). As developing macroprudential policies is still a work in progress it is a challenge for authorities to measure financial instability and define efficient responses to market failures or externalities (IMF 2013).

3. The link between monetary and macroprudential policies

It is very important for policy makers to understand the relationship between macroprudential and monetary policies and take into account side effects from monetary policy on macroprudential targets and from macroprudential policies on output and inflation. Svensson highlights that high debt and variable mortgage rates create a strong cash-flow channel of monetary policy. He does not, however, consider the elevated risk it has on the financial system.

Effective macroprudential and monetary policies can enhance each other. The precise interaction will depend on country-specific circum-

stances and will change over time. In open economies, interest rate increases can attract excessive capital flows, lead to an appreciating exchange rate and increased leverage. If macroprudential policies contain potential vulnerabilities arising from these developments, monetary policy can afford to be tighter in response to inflationary pressures (BIS 2017).

In Europe most countries are focused on what effect the prolonged period of low policy rates is having on the build-up of financial imbalances. The effect depends on the stage of the financial cycle and on capital account openness. A low interest rate environment and rising house prices have in the past created incentives for banks to reduce efforts in screening borrowers at the same time as asymmetric information can cause banks to differentiate poorly between good and bad borrowers. Competition between banks and property overvaluation relative to fundamentals can exacerbate this tendency (ESRB 2019). Monetary easing can also induce borrowers to take on more leverage since lower interest rates increase both debt affordability and the prices of assets offered as collateral. This can trigger further increases in leverage and asset prices. This exposes the system to financial stress when asset prices fall.

4. Macroprudential tools and monetary policy actions

Macroprudential policies that are well-calibrated and clearly communicated have the potential to contain the undesirable effects of accommodative monetary policy, creating additional room for monetary policy actions. For instance, where loose monetary policy contributes to a build-up of household debt and asset prices, loan-to-value (LTV), loan-to-income (LTI) or debt-service-to-income (DSTI) limits can contain these dynamics (Nier and Kang 2016). However, tightening macroprudential policy tools can also have some dampening effects on output. As Svensson higlights, it is highly important that regulations that are implemented to strengthen the safety and soundness of the financial system do not stifle the ultimate objective of promoting sustainable long-term economic growth. Imperfectly targeted or excessively tight macroprudential policies could worsen distortions or create stronger incentives for regulatory cir-

cumvention, with the risk of vulnerabilities building up outside of the policymakers' sight (IMF 2013).

As Svensson states, tighter borrower-based measures can make households vulnerable in times of stress. Therefore it can be appropriate to relax macroprudential tools in times of financial stress if it is consistent with ensuring the resilience of the system to future shocks. For instance, tightening of policy rates can adversely affect borrowers' capacity to repay, especially variable-rate borrowers, possibly leading to higher default rates and financial instability. Interest rate increases can also affect economic activities more generally by reducing income flows or reducing borrowers' net worth, thereby curtailing access to debt.

When the policy rate is lowered in the event of financial stress, high-LTV borrowers may be unable to refinance their loans to take advantage of the policy easing. A more stringent LTV constraint prior to the bust may mitigate this and help strengthen the transmission of monetary policy after prices correct. Also, relaxing LTV constraints for new loans and refinancing can help a greater share of potential borrowers refinance their loans at a lower interest rate and by that lessen their debt burden. By relaxing the limits on borrower-based measures in times of stress, macroprudential policy can enhance the effects of accommodative monetary policy by containing the impact on defaults and easing access to credit (IMF 2013, Nier and Kang 2016).

5. Swedish household indebtedness

Svensson finds that there is no risk to the financial stability related to Swedish household indebtedness. However, the reverse could be argued. In Sweden, a highly expansionary monetary policy abroad has created a need for low interest rates to prevent an appreciation of the krona, which would lower import prices and threaten the upturn in inflation (OECD 2017). Household debt in Sweden has been rising faster than disposable income for a long time, due in part to low interest rates and rapid house price increases. Swedish household indebtedness is one of the highest in Europe after a sharp increase in indebtedness since 2011. Household vulnerability is further amplified by the large shares of variable interest rate loans

and non-amortising loans. Changes in interest rates could therefore have a relatively large impact on the margins and consumption of indebted households (FI 2019).

In Sweden, the real estate market is important as housing loans are 47% of bank loans and the home ownership rate is high. High household indebtedness and high levels of home ownership through mortgages may amplify negative feedback loops between, on the one hand, asset prices and, on the other hand, credit and consumption in the event of negative economic developments. The risk of default is most likely somewhat offset by a generous social security system and a large share of young households among new mortgagors (ESRB 2019). As Svensson argues, the main reasons for the increase in equity withdrawal in Sweden are renovations, purchases of summer homes and assistance to family members to buy their own homes. Swedish households are therefore getting even more vulnerable to changes in house prices because of further risk concentration associated with housing.

At the same time as a large part of the Swedish households are resilient to financial stress, borrower-based macroprudential measures have importantly increased the resilience of indebted households against risk associated with dynamics of mortgage credit and house prices.

References

Baker, S. (2018), Debt and the response to household income shocks: Validation and application of linked financial account data, *Journal of Political Economy*, 126(4), 1504–1557.

BIS (2017), Financial systems and the real economy, BIS Papers No 91.

ESRB (2019), Vulnerabilities in the residential real estate sectors of the EEA countries, Report, September, European systemic risk board.

FI (2019), The Swedish Mortgage Market 2019, Finansinspektionen.

IMF (2013), The interaction of monetary and macroprudential policies, IMF Policy Paper, January, International Monetary Fund.

Mian, A., Sufi A. and Verner, E. (2017), Household debt and business cycles worldwide, *Quarterly Journal of Economics*, 132(4), 1755–1817.

Nier, E. and Kang, H. (2016), Monetary and macroprudential policies – exploring interactions, BIS Papers No. 86.

OECD (2017), *OECD Economic Surveys: Sweden*, Paris.

Popov, A. (2017), Evidence on finance and economic growth, ECB Working Paper No. 2115.

Praet, P. (2018), The interacrion between monetary policy and macroprudential policy, Speech at the Money, Macro and Finance Research Group Conference.

Bail-In: EU Rules and Their Applicability in the Nordic Context[1]

Esa Jokivuolle[2]
Vesa Vihriälä[3]
Kimmo Virolainen[4]
Hanna Westman[5]

Abstract

The global financial crisis has led to extensive regulatory reforms around the globe. The bail-in rules introduced in the Bank Recovery and Resolution Directive are an essential part of the new bank crisis management landscape in Europe. The paper seeks to clarify their implications and applicability in three ways. First, we provide a concise overview of the issues involved based on recent – mainly theoretical – literature. Second, we describe the key features of the European resolution framework. Third, we discuss the implications of the bail-in approach for crisis management in the Nordic context.

Keywords: Resolution, bail-out, bail-in, BRRD, systemic risk.
JEL codes: G21, G28.

[1] We are grateful to Lars Calmfors, Peter Englund and two anonymous referees for useful comments on an earlier draft and the participants in the Nordic Economic Policy Review seminar in Helsinki on 12 December 2019 for a discussion of the issues involved. Views expressed are those of the authors and do not necessarily reflect the views of the Bank of Finland or the Financial Stability Authority.
[2] Bank of Finland. Email: esa.jokivuolle@bof.fi.
[3] University of Helsinki. Email: vesa.vihriala@helsinki.fi.
[4] Bank of Finland. Email: kimmo.virolainen@bof.fi.
[5] Financial Stability Authority. Email: hanna.westman@rvv.fi.

1. Introduction

Financial crises where financial intermediation is disturbed have often led to massive 'bail-outs' where states have financially supported the continuation of financial institutions' operations by various means. The obvious motivation of such policy has been to avoid the serious implications of financial instability for economic activity. However, on many occasions these policies have resulted in significant costs to taxpayers while not being able to fully eliminate financial disruption.

Furthermore, bail-outs have been hypothesised to create perverse incentives, moral hazard, in the sense that they encourage bank owners and wholesale creditors to accept excessive risk-taking by bank managements. This problem is particularly significant with regard to large and highly connected institutions, which often are considered 'too big to fail'. Reduction of financial instability in the short run may thus increase it in the long run.

As a result, much effort has been put into developing regulation, supervision and crisis management policies so as to avoid such bail-outs of financial institutions. A key element of this are higher requirements of capital. In addition, steps have been taken to increase financial institutions' loss absorption capacity through the requirement that banks should issue bail-inable debt, i.e. debt which, by the decision of resolution authorities, can be written down or converted into equity capital as needed to restore solvency. The idea is that with a large enough loss absorption capacity even large, systemically important institutions failing or about to fail could be 'resolved' without disturbing financial intermediation too much.

A key constraint for the rigorous application of the bail-in policy is the fear that it could trigger financial instability. Expectation of losses to bank creditors could raise funding costs and weaken liquidity, potentially aggravating the situation by leading to an acute liquidity crisis. Credit losses and declining asset prices could in turn contribute to cascading defaults across the financial system.

Bail-in policy is also associated with practical difficulties. Implementing bank resolution in a prompt and efficient manner can be

difficult, particularly in the context of multinational banks, where resolution requires cooperation of authorities of many jurisdictions. Hence, an essential part of a resolution framework is contingency planning by resolution authorities and banks.

The new approach to the handling of banking crises making use of bail-in is a complex undertaking. This paper seeks to produce some clarity to this complexity in three ways. Section 2 provides a concise overview of the issues involved based on recent – mainly theoretical – literature. Section 3 describes the key features of the European resolution framework, which has emerged over the past five years. Section 4 discusses the implications of the bail-in approach for crisis management in the Nordic context. Section 5, finally, summarises our key observations.

2. Economic analysis of bank resolution and bail-in

In this section, we discuss the economic rationale for bank resolution and bail-in, drawing from the theoretical literature and review the early empirical evidence.

The Financial Stability Board (2015, p. 5) states as the main guiding principle that '[t]here must be sufficient loss absorbing and recapitalisation capacity available to implement an orderly resolution that minimises any impact on financial stability, ensures the continuity of critical functions, and avoids exposing taxpayers (that is, public funds) to loss with a high degree of confidence'.

This principle relates closely to the following questions: What is the optimal amount of total loss absorbing capacity (henceforth TLAC) that banks should have in their balance sheet? Should TLAC consist only of capital requirements or should it include also bail-inable debt? The first question has been extensively studied after the crisis (see e.g. Aikman et al. 2018 for a review). We focus on the second question: how much should bank safety be based on equity capital that reduces the likelihood of failure and how much on bail-inable debt that enables orderly resolution after a failure?

The literature follows two lines of thought. The first emphasises the choice between bail-outs and bail-ins in dealing with bank failures (see e.g. Dell'Ariccia et al. 2018 and Berger et al. 2019). The key trade-off centers on excessive risk-taking incentives (i.e. moral hazard) of banks if bail-outs are to be expected instead of bail-ins. Governments may choose bail-outs if externalities of bank failures cannot otherwise be contained. Hence, bail-in policy is potentially time-inconsistent. Therefore, the challenge is to implement bail-ins so that major externalities are avoided. This would establish the *ex-ante* credibility of resolutions and reduce moral hazard.

The other line of thought emphasises the choice between capital requirements and bail-inable debt. As Dell'Ariccia et al. (2018) note, higher capital ratios reduce likelihood of bank failures and hence the probability that bail-outs or bail-ins are required in the first place. Nonetheless, the optimal mix of total loss absorbing capacity might contain both bail-inable debt and equity.

When considering the optimal mix of bank funding, the Modigliani and Miller (1958) irrelevance theorem is an important starting point (see e.g. Admati et al. 2013). It implies that, although an institution's cost of equity is higher than its cost of debt, it does not follow that more debt is always preferred over equity. This is because the cost of equity and debt adjust to a change in their shares: a reduction in the debt-to-equity ratio reduces financial risk and thereby the cost of both funding sources. In theory, this offset is complete and thus the weighted average cost of capital stays unchanged.[6] This offset appears to be empirically quite high, also in the case of banks (see e.g. references in Aikman et al. 2018 and Gimber and Rajan 2019).

Two traditional reasons why a firm's capital structure *does* matter for the total firm value are (i) tax deductibility of interest payments and (ii) bankruptcy costs. The former implies a preference for a higher and the latter for a lower debt-to-equity ratio. An optimal

[6] The cost of equity is higher than the cost of debt as equity is the residual claim on an institution's assets. When the share of equity in the balance sheet increases, it means that the share of the more costly form of financing increases. However, this is offset by the fact that, as the financial risk of the institution is reduced as a result of less leverage, the risk premium of both equity and debt declines.

capital structure would strike a balance between these factors. These factors are highly relevant also for banks.

Banks are, however, special because their bankruptcy costs entail a high social component, resulting from disruption in financial services and financial stability (see e.g. Admati et al. 2013). This further implies that a bank's optimal capital structure may differ depending on whether one takes a private or public perspective. If bank shareholders do not internalise the social costs of bank failure, they may prefer a higher debt-to-equity ratio and hence tolerate a higher probability of bank failure than is socially optimal. This is an important argument for regulatory capital requirements.

As pointed out by Admati et al. (2013), losing part of the 'tax subsidy' of debt if capital requirements are increased – i.e., there will be less debt and hence less interest payments to deduct from earnings before tax on profits is determined – is a private cost to bank owners but not necessarily a social cost. Nonetheless, the private cost of equity arising from this tax channel (or other channels such as high informational cost of issuing new equity) may provide banks with incentives to shift part of their assets outside their balance sheet to 'shadow banks'. As a result, large risks may shift outside the regulatory perimeter with financial stability implications. Moreover, higher capital requirements, and hence higher private costs of bank equity, may lead to a reduction in bank lending and hence slow down economic activity.[7] This is a factor in determining the socially optimal capital structure for banks, and has been an active area of research.[8]

2.1 Benefits and costs of bail-in

The private costs of bank equity and their potential real implications are important reasons why many authors have advocated hybrid instruments such as contingent capital ('CoCos') or, indeed,

[7] However, e.g. Dagher et al. (2016) suggest that the economic costs of higher capital requirements in the long run are small.
[8] Another important factor that tilts banks' optimal capital structure towards less equity is that banks' demand deposits, which are part of their debt, provide important liquidity services (a recent paper using this argument is Mendicino et al. 2017).

bail-inable debt instead of higher equity requirements (see Flannery 2017). Here we focus on bail-in instruments.[9]

Bail-ins aim to reduce banks' excessive risk-taking behaviour, as mentioned previously.[10] In contrast, bail-outs undermine market discipline and enable banks to transfer losses to taxpayers, thereby encouraging risk-taking.

Moreover, orderly resolution by applying the bail-in tool aims to reduce 'bankruptcy costs' by offering a swift alternative to laborious bankruptcy proceedings and thereby supporting critical functions and maintaining financial stability.

In their analysis of the choice between bail-in, bail-out and no public intervention, Berger et al. (2019) assume that all banks and market participants know which regime the regulator is committed to. In this setting, the authors conclude that the challenges to credibility of bail-in arise from two sources: the need to avoid contagion of problems of one institution to other institutions and the need to act fast. The latter issue concerns implementation of bail-in, which is tackled by contingency planning by resolution authorities and banks alike (see Section 3).

Dell'Ariccia et al. (2018) develop a banking model with both bail-out and bail-in costs to analyse the trade-offs in bank resolution. By arguing that recent regulatory reforms have likely reduced the spill-over costs from bail-ins, they conclude that bail-outs should be the exception, not the rule, in the current framework. However, they also note that the use of some public funds may need to be allowed during systemic crises.

An interesting analysis is provided by Mendicino et al. (2017) who simultaneously model the choice of the level of total loss absorbing capacity as well as its composition in terms of bank equity and

[9] Both CoCos and bail-inable debt convert to equity or absorb losses when certain conditions are met; either a trigger equity level is breached from above (CoCos) or a bank failure triggers resolution authorities' intervention and hence bail-in. CoCos recapitalize the bank before failure whereas bail-inable debt is activated after the failure has happened (see also Chen et al. 2013).
[10] Note that, as pointed out e.g. by Dell'Ariccia et al. (2019), a higher equity level also reduces moral hazard, by making bail-outs less likely and giving bank shareholders more 'skin in the game'.

bail-inable debt. In their formulation, bail-inable debt and equity provide identical loss absorbing capacity. However, too much total loss absorbing capacity can reduce banks' socially valuable liquidity provision via demand deposits. Further, equity and bail-inable debt help solve different incentive problems within the bank. This has an impact on the optimal composition of total loss absorbing capacity. Given their quantitative estimates, they conclude that the current plans for the TLAC size are appropriate and that an important part of that should consist of bail-inable debt.

Contagion

As already pointed out, the key concern in a resolution situation is the potential contagion to other institutions that might lead to a full-scale systemic crisis (see e.g. Beck et al. 2020). Whether the risk of contagion can be credibly contained is vital for the credibility of resolution. The direct contagion channel stems from potential cross-holdings of securities among financial institutions. For instance, if debt to be bailed in is held by other banks, these will incur losses which in turn could jeopardise their financial health. For such reasons, policy proposals such as Liikanen (2012), while strongly supporting the use of bail-in, require that bail-inable debt should be held by investors outside the banking sector.

Using proprietary data of securities cross-holdings by banks, Hüser et al. (2017) conduct a network analysis to simulate the effects of bail-in. Although their baseline loss scenario is relatively severe, they find only muted direct or indirect contagion effects of bail-in. However, as Caballero and Simsek (2013, p. 2549) point out, much of the contagion risk may arise from the 'uncertainty about the financial network of cross exposures' among banks. The effects of such uncertainty may be difficult to quantify.

Whether or not any deposits should be bail-inable has also been actively debated. Currently, as described in Section 3.4, only deposits covered by deposit insurance are excluded from bail-in.

Operational challenges

Admati et al. (2013, p. 5) note that '[b]ail-in mechanisms place extraordinary demands on regulators in crisis situations and present many implementation issues.' Further, Berger et al. (2019) note that at times when financial stability implications of bail-in are of

the greatest concern, several institutions may become subject to financial distress simultaneously, complicating resolution authorities' task further.

One of the most challenging questions is the resolution of multinational institutions which operate through subsidiaries in a number of different countries or jurisdictions which have national or regional regulators. The specific challenge is how the loss absorbing capacity can be pooled and shared when some of the subsidiaries become subject to resolution and bail-in. From the viewpoint of efficient risk diversification, the loss absorbing capacity should be available at the group level. However, this may not be the case in practice as national regulators may start ring-fencing loss absorbing capacity in a crisis situation.

One strategy implies that resolution and the related loss absorption would take place through a single point of entry. An alternative approach is a multiple-point-of-entry resolution where loss absorbing capacity is separately pre-specified to each subsidiary, or group of entities comprising a natural resolution group, in different jurisdictions that the multinational bank operates in.

Bolton and Oehmke (2018) analyse these alternatives.[11] A single-point-of-entry resolution would be the most efficient alternative because it centralises decision-making concerning allocation of loss absorbing capital to the bank holding company level. However, this may not be possible to commit to if the expected transfers needed to absorb losses and recapitalise would be too asymmetrically distributed across different parts of the banking group. In such cases a multiple-point-of-entry resolution strategy may be the more robust arrangement. Given that possible impediments to resolutions are different in case a single-point-of-entry or a multiple-point-of entry approach is planned for, the analysis of Bolton and Oehmke (2018) also has implications for operational structures of global banks. Specifically, opting for a multiple-point-of-entry approach entails at least partial withdrawal from cross-border banking.

[11] Faia and Weder di Mauro (2016) come to the same conclusions, and moreover show that costs for holders of bail-inable debt instruments are generally higher if authorities are unable to cooperate under single-point-of-entry resolution.

2.2 Early evidence of market expectations regarding bail-in

There is increasing evidence of the effects on market expectations and bank behaviour of the new bank resolution and bail-in frameworks both in the US and Europe. Dell'Arricia et al. (2018) and Schäfer et al. (2016) study how other banks' credit default swap (CDS) spreads have been affected by bail-in actions in Europe. Bank CDS spreads have increased as a reaction to bail-ins in the home country but also in other countries although to a lesser extent. Moreover, Schäfer et al. (2016) find that banks in crisis-stricken countries have been more strongly affected than banks in other countries. According to the authors, the likely reason is that the fiscal capacity of the country in which the bank is headquartered is an important determinant of bail-out expectations. Overall, Schäfer et al. (2016) find that market expectations are more strongly affected by bail-in actions than by the legal implementation of resolution frameworks.[12]

The theoretical model of Berger et al. (2019) referred to above suggests that the likelihood of a bail-out policy would diminish as a bail-in framework is implemented. They find empirical evidence of positive changes in the US banks' capital ratios, which is consistent with this prediction. The authors also list a number of other studies that indicate that bail-ins strengthen market discipline, but may also cause undesirable effects such as increased stock market volatility. Gimber and Rajan (2019) study how the relative pricing of different layers of debt and equity in bank balance sheets are affected by the post-2014 reforms in Europe but do not find very strong effects.[13] Lewrick et al. (2019), on the other hand, find a risk premium between bail-inable senior bonds and senior bonds not subject to bail-in risk. The risk premium is higher for riskier banks and for banks in Europe in comparison to banks in other jurisdictions.

Assessments done by the credit rating agencies further inform us about whether the resolution framework is seen as credible. Aikman et al. (2018) report that, while the major UK banks' bondhold-

[12] Note that in general it may be difficult to identify whether the impact of bail-ins in one country on bank spreads in another results from contagion effects or shifts in beliefs regarding future bail-in likelihood.
[13] There is also interesting work in progress using structural Merton-style models to estimate market-implied bail-out and bail-in probabilities for banks by Guennewig and Pennacchi (2019) and Berndt et al. (2018). The latter estimate that there has been a significant decline in the market-based 'too-big-to-fail' expectations for the US systemically important banks.

ers enjoyed around four notches of implied ratings uplift owing to expectations of government support in 2010, the uplift had fallen to less than one notch by 2016. Blix Grimaldi et al. (2019) report a similar trend in a sample of large Swedish banks.

There is also some evidence of the indirect real effects of bail-in. Beck et al. (2018) use bank-firm matched Portuguese data to show that banks more exposed to the bail-in of a major Portuguese bank that unexpectedly collapsed tightened their credit conditions more than other banks, and that this had an impact on investment and employment in small and medium-sized enterprises dependent on these affected banks.

This sub-section has reviewed what previous research has to tell about the optimal mix of capital requirements and bail-in capacity to secure bank safety and, ultimately, maximise social welfare. According to Aikman et al. (2018), the current bank capital requirements may have been calibrated at a somewhat lower level than would appear optimal on the basis of research literature. But if the agreed bail-inable debt requirements (see Financial Stability Board 2015) are taken as a substitute to capital requirements, the total loss absorbing capacity may be close to the estimates of optimal capital requirements in the literature. Aikman et al. (2018) further note that whether bail-inable debt truly works as a substitute for capital requirements largely depends on how credible bail-in would be as an enabler of orderly bank resolution, particularly in a systemic crisis. Although historical evidence raises concerns in this regard, the new resolution powers granted to authorities may provide grounds to be more optimistic in the future (Philippon and Salord 2017 and Aikman et al. 2018).

3. The bank resolution framework in Europe

An EU legal framework for bank crises was introduced in 2014. It consists of the Bank Recovery and Resolution Directive (BRRD) and is complemented by the Single Resolution Mechanism Regulation (SRMR). The BRRD had to be transposed into national law by each

EU member state and each European Economic Area country[14], while the SRMR is a directly applicable regulation, which centralises certain resolution functions in the banking union. Overall, the resolution frameworks differ somewhat across the Nordic countries according to their membership in the EU and participation in the banking union.

In addition to introducing new tools for bank resolution, the BRRD is also aimed at better crisis prevention by providing for enhanced early intervention powers to supervisors and requiring banks themselves to prepare recovery plans to overcome financial distress. In what follows, we focus on the resolution function.

3.1 Institutional setup and decision-making procedures[15]

The institutional setup and decision-making procedures play a key role in ensuring a speedy management of distressed banks. First, each EU member state has to designate a national resolution authority. Second, for cross-border banking groups, resolution colleges have to be set up with participation by all relevant national resolution authorities.[16] The European Banking Authority (EBA) is an observer ensuring the consistent functioning of the colleges across Europe and will take on a mediation role in case the participants to the joint decision cannot agree. There might be disagreement on measures to be taken; whether the preferred resolution strategy is to be implemented or refined; or how losses incurred are to be allocated across countries.[17]

[14] The European Economic Area (EEA) consists of the EU member states and three countries of the European Free Trade Association (EFTA) (Iceland, Liechtenstein and Norway; excluding Switzerland). The BRRD was fully and formally implemented into the EEA agreement on 1 January 2020 (https://www.efta.int/eea-lex/32014L0059).
[15] See also Ekholm (2020) in this volume for a discussion of resolution procedures in the banking union.
[16] The home resolution authority is the chair of the college and commonly takes the lead in the annual resolution planning cycle and in outlining the group resolution scheme at the time of resolution. A national resolution authority has a voting right in a joint decision regarding a bank in case it has a subsidiary in the particular member state.
[17] On the condition that participation to the resolution scheme would pose a national financial stability threat, a host resolution authority can opt out and exclude a subsidiary from the group resolution scheme.

In the banking union, most of the decision-making power has been shifted to the Single Resolution Board.[18] Together with national resolution authorities, it forms the Single Resolution Mechanism. In deliberating on a specific bank, the Single Resolution Board convenes in an extended executive session (the chair and the four full-time board members as well as representatives from the Commission and the ECB as observers) with representatives of the relevant national resolution authorities. No resolution colleges are set up for cross-border banks operating only within the banking union. For cross-border banks with activity both within and outside the banking union, decisions are made both by the extended executive session of the Single Resolution Board and the joint decision members of the relevant resolution college.

Once the Single Resolution Board has adopted a resolution scheme, it sends it to the European Commission. The scheme may enter into force only if no objection is expressed by the Commission or the Council of the European Union within 24 hours. If the Commission objects to some aspects of the scheme, the Single Resolution Board must modify it accordingly, after which it is approved and enters into force.[19] When the resolution action involves a use of the resolution funds or the granting of state aid, the resolution scheme is adopted after the Commission has decided positively on the compatibility of such aid with the internal market. Eventually, relevant national resolution authorities will take the necessary actions to implement the resolution scheme at the national level with the Single Resolution Board monitoring the execution of the scheme.

[18] The Single Resolution Board is the resolution authority for significant banks and other cross-border banking groups in the banking union. The national resolution authorities are responsible for all banks which are not under the direct remit of the Single Resolution Board. However, the Single Resolution Board can decide, or a national resolution authority can request the Single Resolution Board, to exercise its powers with regard to banks falling within a national resolution authority's remit in cases where it is necessary to ensure a consistent application of resolution standards.

[19] The Commission can also propose to the Council that the latter should object to the scheme because there is no public interest, or the latter should require a material modification to the use of the Single Resolution Fund. If the Council objects to the scheme because it is not in the public interest, the bank will be wound up in an orderly manner in accordance with the applicable national law. If the Council approves the modification to the use of the Single Resolution Fund, the Single Resolution Board modifies the scheme accordingly, after which it is approved and enters into force. If the Council rejects the proposal of the Commission, the scheme enters into force in its original form.

3.2 Resolution strategy and tools

Resolution authorities can take resolution actions only if three conditions are met. First, there is an assessment that a bank is 'failing or likely to fail' by the supervisory authority. Second, there is no reasonable prospect that any alternative private sector or supervisory measures would prevent the failure within a reasonable time frame. Third, a resolution action is deemed necessary from a public interest point of view (also fulfilling the 'no-creditor-worse-off' principle which requires that creditors would not have been worse off in normal insolvency proceeding).

If conditions for putting a bank into resolution are met, the resolution authority decides on the appropriate resolution strategy and on the application of resolution tools, of which bail-in is one. The other resolution tools are the sale of business, the bridge institution, and the asset separation tool.[20] When deciding on the appropriate tool, resolution authorities have to abide by the least-cost principle and avoid destruction of value unless necessary to achieve the resolution objectives set out in EU legislation.[21]

3.3 Annual resolution planning

The resolution authority takes a decision on the resolution plan (including an assessment of critical functions, a description of the preferred resolution strategy and measures needed to ensure financial and operational continuity) and on the minimum requirement for own funds and eligible liabilities (MREL) annually. The MREL, aiming to ensure sufficient resources that can absorb losses and provide for recapitalisation, is one of the key tools in enhancing banks' resolvability and it applies to all EU banks.[22] It is institution-specific and reflects the preferred

[20] See Single Resolution Board home page (https://srb.europa.eu/en/content/tasks-tools).
[21] The resolution objectives are: (i) to ensure the continuity of critical functions; (ii) to avoid significant adverse effects on financial stability; (iii) to protect public funds; (iv) to protect depositors; and (v) to protect client funds and client assets. The Single Resolution Board approach to public interest assessment was published in July 2019 (https://srb.europa.eu/en/node/799).
[22] For details on how the MREL requirement is determined, see the Single Resolution Board MREL policy (https://srb.europa.eu/en/content/mrel). Global systemically important banks must also comply with the international standard for total loss absorbing capacity (TLAC). Currently, none of the Nordic banks is classified as a global systemically important bank.

resolution strategy as outlined in the resolution plan. The MREL can be met by a bank's own funds and specific debt instruments.[23]

In the annual resolution planning process, the resolution authorities also identify possible impediments to orderly resolution and have the mandate to ask the bank to take steps to remove them, including setting the MREL and monitoring that banks build up eligible liabilities in the agreed time frame.[24]

3.4 Application of the bail-in tool

When the bail-in tool is applied, debt is written down or converted to equity according to a predefined creditor hierarchy (see Table 1).

The bail-in tool excludes deposits covered by the deposit guarantee scheme. In addition, several other types of instruments are excluded, including covered bonds and certain other debt instruments that are fully secured.[25] Retail and small-and-medium-sized firms' deposits in excess of the deposit guarantee scheme limit are preferred to senior unsecured debt and only touched in case the bail-in of securities in the latter class is not sufficient.

Some member states have altered the national insolvency ranking to make non-preferred, non-covered deposits, i.e. primarily corporate deposits, senior to senior unsecured debt.[26] The unfortunate consequence is that the treatment of deposits is different across Europe, with implications for the predictability of loss waterfall in case of bail-in, but also for the assessment of possible breach of the 'no-creditor-worse-off' principle.

Regulatory steps to protect retail investors from bail-in have been taken. In the implementation of the Second Bank Recovery and Res-

[23] Common Tier 1 capital, Additional Tier 1 capital, and Tier 2 capital; and debt instruments with a remaining maturity of at least one year, not related to derivatives, issued and fully paid using funds not financed by the bank itself, not collateralised or guaranteed, and not related to preferential deposits.
[24] The Single Resolution Board has outlined its expectations that banks are to meet in order to become resolvable (see public consultation: https://srb.europa.eu/en/node/866).
[25] These include client assets, liabilities to unrelated institutions with an original maturity of less than seven days, liabilities arising under payment and settlement systems, liabilities to employees, liabilities to certain trade creditors, tax and social security claims, and claims of deposit guarantee schemes.
[26] For the insolvency ranking in the banking union member states, see the listing published by the Single Resolution Board (https://srb.europa.eu/sites/srbsite/files/ldr_-_annex_on_insolvency_ranking_2020_v1.1.pdf).

Table 1 Order of loss absorption in bail-in

Common Tier 1 capital	Shareholders' equity and retained earnings
Additional Tier 1 capital	Preferred shares, perpetual term contingent convertible securities
Tier 2 capital	Hybrid instruments, deeply subordinated debt
Senior non-preferred debt	Subordinated debt instruments senior to tier 2 capital, but junior to senior unsecured debt
Senior unsecured debt	Corporate (non-SME) deposits, bonds and other instruments
Deposits not covered by the Deposit Guarantee Scheme, but preferential	Retail and SME deposits in excess of 100 000 €

Liabilities legally excluded from bail-in

Covered deposits (≤ 100 000 €)	Secured debt such as covered bonds and secured derivatives	Customer funds, salaries etc.

olution Directive, the member states are given alternative means of restricting retail investors' investments in bail-inable instruments (for example a cap on the proportion of such instruments in the retail investor's portfolio, and a minimum required initial investment amount). To mitigate the risk of contagion across the banking sector, measures have been taken to disincentivise the most systemically important banks to hold bail-inable instruments.[27]

The introduction of the senior non-preferred debt class in the insolvency ranking aims to ensure that the extent to which senior unsecured debt is touched by bail-in is limited, thus helping to avoid

[27] Specifically, the global systemically important banks need to deduct their holdings of bail-inable instruments issued by other global systemically important banks from their own eligible liabilities.

triggering contagion. Furthermore, improved predictability of the treatment of different debt instruments at the time of resolution is expected to facilitate pricing and support market discipline. The credit rating agencies have amended their rating methodologies to account for the new credit hierarchy.

The valuation to determine the extent of the bail-in needed to cover losses and recapitalise the bank is to be done by an independent party. Resolution authorities, in close dialogue with the supervisor, decide on the level of capital that is necessary following a bail-in. The level should not only reflect the minimum capital requirement of the institution post the resolution weekend, but also the need to ensure market confidence, thus enabling the resolved bank to rely on market funding as soon as possible.

3.5 Funding in resolution[28]

In addition to the bail-in of creditors, the Single Resolution Fund or any of the national resolution funds outside the banking union may contribute to the recapitalisation of a failing bank. The resolution fund's contribution to the recapitalisation of a resolved bank is subject to several strict conditions. Losses totalling at least eight per cent of total liabilities including own funds must already have been covered by the use of the bail-in tool, and the contribution of the fund may not exceed five per cent of total liabilities including own funds of the institution under resolution.[29] The European Stability Mechanism will act as a backstop to the Single Resolution Fund in case it would be depleted.[30]

The capacity of the resolution funds is calibrated with a view to cover losses and recapitalise banks in a severe crisis situation, such

[28] See also Ekholm (2020) in this volume for further discussion.
[29] In case the member state has chosen to have a larger ex-ante-funded resolution fund amounting to three per cent of covered deposits rather than one per cent thereof, the use of the resolution fund is conditioned on covering by the bail-in tool losses of at least 20 per cent of risk-weighted assets of the institution concerned rather than the stricter requirement of eight per cent of total liabilities. The requirement to apply bail-in before the use of the fund does not apply in case the fund is only used as liquidity support in a situation when the bail-in tool is not applied.
[30] The common backstop provided by the European Stability Mechanism will be in place at the latest by 1 January 2024. The size of the backstop will be aligned with the target level of the Single Resolution Fund, thus effectively doubling the estimated 60 billion euros capacity of the Single Resolution Fund. If the credit line is used, the Single Resolution Fund will pay back the European Stability Mechanism loan with money from bank contributions within three years.

as a global financial crisis.[31] However, the resources of the resolution funds, including the Single Resolution Fund and the backstop provided by the European Stability Mechanism, are not necessarily sufficient for the provision of liquidity in resolution, particularly in case of very large banks. Even if a bank would be recapitalised, access to market funding might be limited for days or weeks. Adding to the challenge, collateral enabling participation in normal central bank operations is not necessarily available and the provision of emergency liquidity assistance[32] may be constrained by existing rules and regulations. In the banking union, it is commonly understood that the existing arrangements are not entirely fit-for-purpose and a number of potential solutions are being discussed in political fora.[33]

In some EU member states, in case of a systemic crisis, resolution authorities may also seek funding from so called governmental stabilisation tools.[34] However, this is only possible after bailing-in at least eight per cent of total liabilities including own funds. Hence, it is apparent that there has been a fundamental regime switch from bail-out to bail-in with very limited room to use public funds.

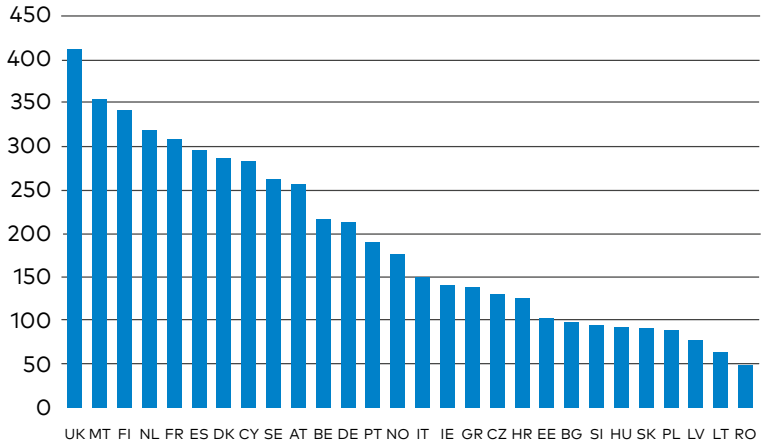
4. Bail-in in the Nordic context

4.1 The Nordic financial system and the institutional set-up for resolution

The Nordic financial systems are bank-centred and dominated by a few large institutions that are highly interconnected (see Figures 1 and 2). The strong interconnectedness implies that cross-border collaboration is an essential part of bank resolution in the Nordic countries. Indeed, resolution colleges have been set up for six Nordic banking groups (see Box 1). The work of the colleges builds on the long tradition of supervisory colleges in the Nordic-Baltic region.

[31] See the Bank Recovery and Resolution Directive impact assessment and de Groen and Gros (2015).
[32] Emergency liquidity assistance refers to exceptional situations in which a central bank provides funding to a financial institution facing liquidity problems with operations that are not standard monetary policy operations.
[33] For more information, see European Parliament (2019).
[34] This requires that the relevant articles of the BRRD have been transposed to national legislation. It is not recognised in the SRMR and, therefore, does not apply in all member states.

Figure 1 Banking sector size in selected European countries, 2018, percent of GDP



Sources: ECB, Finance Norway and Statistics Norway.

Figure 2 Cross-border claims of Nordic banking sectors, third quarter 2019

Note: The thickness of the arrows reflects the share of bilateral foreign claims in the total claims of the banking sector extending the loans.
Sources: BIS and Bank of Finland calculations.

The resolution planning cycle is well-established in the Nordic countries as a number of cycles have already been completed by the resolution colleges. With the re-domiciliation of Nordea from Sweden to Finland, the responsibility for Nordea was transferred from the Swedish resolution authority to the Single Resolution Board in the autumn of 2018. Given that the Bank Recovery and Resolution Directive has now been transposed into national legislation in Norway, the resolution college for DNB has been established and its first joint decisions on the resolution plan and the MREL were taken at the end of 2019.

Given the systemic importance and centralised business models of the large Nordic banking groups, a single-point-of-entry approach where bail-in is implemented at the parent level while ensuring the continuation of the (healthy parts of the) whole group, is foreseen. To ensure sufficient loss absorption capacity, it is assessed that a recapitalisation amount roughly equal to the capital requirement currently set to cover losses is needed. This effectively doubles (the euro amount of) a bank's loss absorbing capital compared to the supervisory capital requirement. While the regulatory capital requirement is set in relation to a bank's risk-weighted assets[35], the MREL is set in relation to total liabilities and own funds (see Table 3). Currently, all the Nordic banking groups fulfil the minimum requirements that have been set.

While the large Nordic banks are all well capitalised, the MRELs exceed the leverage ratio (capital requirement set in relation to unweighted assets rather than to the risk exposure amount) significantly. The difference between the MREL and leverage ratio requirement tells us what role bail-inable debt plays for a bank's total loss absorption capacity.

To date there is no real-life experience of the use of the bail-in tool in the new EU framework. Specifically, senior unsecured debt has not been touched in the recent cases of bank distress, either because other resolution tools than bail-in have been applied or because the Single Resolution Board did not see that resolution was

[35] Banks must calculate a total risk exposure amount which is the sum of their credit risk, operational risk, market risk, and the risk of a credit valuation adjustment. The total risk exposure amount is compared to own funds to yield the bank's capital ratio.

Box 1 The institutional set-up for resolution

In the Nordics, the institutional set-up for the resolution authority varies:

- Finland (FI): The Financial Stability Authority, which is an independent authority, while administratively under the Ministry of Finance, is responsible for both resolution and deposit guarantee scheme.
- Sweden (SE): The Swedish National Debt Office is responsible for both resolution and the deposit guarantee scheme.
- Denmark (DK): The Danish Financial Supervisory Authority and the state-owned Financial Stability Company are resolution authorities. The latter is responsible for resolution execution, and also for the deposit guarantee scheme.
- Norway (NO): The Norwegian Financial Supervisory Authority is responsible for resolution.

The number of members and observers in the resolution colleges reflect the geographic scope of the bank (see Table 2). Whether or not a resolution authority in a host country takes part in the joint decision-making depends on whether the bank operates as a branch or a subsidiary there. For countries within the banking union, whether the national resolution authority or the SRB is the joint decision party depends on whether or not the subsidiary is significant enough to be under the direct supervision of the ECB. In case the SRB is the party to the joint decision, the national resolution authority participates in the college as an observer.

Table 2 Composition of resolution colleges for the largest Nordic banks

Bank	Group level resolution authority	National resolution authority participating in the joint decision	National resolution authority as member not participating in joint decision or as observer
Nordea	SRB	SE, DK	FI, NO
Svenska Handelsbanken	SE	FI, UK	DK, NO
SEB	SE	SRB	DE, DK, EE, FI, LI, LT, LU, NO, PO
Swedbank	SE	SRB	EE, DK, LI, LT, NO
Danske Bank	DK	FI, LU, SE, UK	EE, LI, NO
DNB	NO	LU, PO	FI, SE, UK

Table 3 Capital requirement and Minimum Requirement for own funds and Eligible Liabilities (MREL) in the largest Nordic banks, percent

	Capital requirement in terms of total capital to risk exposure amount	Capital ratio in terms of total capital to risk exposure amount	Leverage ratio	MREL as of total liabilities and own funds	MREL eligible resources as of total liabilities and own funds
Nordea	16.7	20.8	5.3	8.0	n.a.
Svenska Handels-banken	19.1*	23.2	4.9	5.8	12.6*
SEB	18.7*	23.3	5.1	7.3	11.1*
Swedbank	18.9	21.8	5.4	6.5	10.9*
Danske Bank	19.4	22.7	4.6	10.8	11.5**
DNB	16.1	22.9	7.4	36.7 (of risk-weighted assets)	n.a.

Sources: Information on capital requirements, capital ratio as well as leverage ratio is based on the fourth-quarter and full-year 2019 reports of the six banks. Information on MREL in force from the beginning of 2020 (30 June 2020 for DNB) is based on Nordea Debt Investor Presentation Q4 and full year 2019; Swedish National Debt Office, Annual Decisions Taken on Planning for Crisis Management of Swedish Banks https://www.riksgalden.se/fi/press-and-publications/press-releases-and-news/press-releases/2018/annual-decisions-taken-on-planning-for-crisis-management-of-banks/ 18.12.2019; Danske bank, Fastsættelse af krav til nedskrivningsegnede passiver, jf. § 266 i lov om finansiel virksomhed, and DNB Debt Investor Presentation February 2020. Information on MREL eligible resources of Swedish banks in the third quarter of 2019 has been published by the Swedish National Debt Office in Crisis Preparedness of Swedish Banks Q3 2019. * Data from the third quarter of 2019 rather than the fourth quarter of 2019 as used elsewhere in the table. ** Estimation based on the amount in terms of risk-weighted assets reported by the bank.

in the public interest resulting in a normal insolvency proceeding for the distressed bank.[36] Also there have been cases where funds of the deposit guarantee scheme have been used to take preventive measures and thus avoiding a situation in which the bank would have been deemed failing or likely to fail.

[36] For information on recent cases, see the Single Resolution Board home page (https://srb.europa.eu/en/content/resolution-cases) and Schäfer et al. (2016).

There is, however, valuable experience gained from crisis simulation exercises. In January 2019, the Nordic and Baltic financial stability authorities and relevant authorities from the European Union conducted a joint exercise. This tested the authorities' crisis management capabilities and regional cooperation in the new European framework in a hypothetical crisis scenario involving fictitious financial institutions in the Nordic and Baltic countries. The findings of the exercise will be used to enhance the practical crisis management preparedness of the authorities involved. Work is underway to develop the necessary technical means for efficient collaboration and communication. The Nordic and Baltic countries have agreed to conduct regular financial crisis simulation exercises going forward.

4.2 Bail-in in the Nordic environment: what do we know?

Given the structure of the Nordic banking system, the failure of any major bank in the Nordic area can have systemic implications for the home country as well as the other Nordic countries. Therefore, whether or not the EU bail-in framework works in systemic crises is crucial for the Nordics.

It is, however, very difficult to determine how bail-in would play out in a systemic crisis. First, there is no test case of a systemically important bank failing or being under an acute risk of failure in Europe since the enactment of the BRRD. Second, the little evidence that exists about bail-ins of systemically important banks prior to BRRD and recent bail-ins of non-systemic banks is unlikely to provide reliable guidance as to what would happen in a bail-in applied to a major Nordic bank.

The resolution of two undoubtedly systemic Cypriot banks in 2013 is the most extensive bail-in case in Europe in the recent past. The disruption of the financial system was significant as was the associated economic crisis. GDP declined by 6% in the year of the bail-in. Nevertheless, by 2019 Cyprus' GDP is forecast to have grown by the same rate of 11 % relative to 2012 as that of the euro area as a whole. Thus, there was a major shock to the real economy but not one that set Cyprus clearly apart from the neighbouring countries which did not experience a similar bail-in shock. The impact on banks outside Cyprus was also statistically significant in terms

of changes in banks' stock prices and CDS spreads (Schäfer et al. 2016). But these effects were not long-lasting.

There was an important mitigating factor, though. A large fraction of the bail-in losses was borne by foreign (mainly Russian) creditors and stock owners. This limited the impact on the Cyprus economy. Similarly, its small size and its relatively weak links to other EU countries' banking systems (except for Greece) reduced the impact on other countries.

Other less extensive bail-in events in Europe suggest that other banks, their stock prices and CDS spreads, can be affected widely by bail-in actions (Dell'Ariccia et al. 2018, Schäfer et al. 2016). The real economy consequences have not been systematically analysed. There are, however, no indications that they have been significant.

The Danish bail-in cases, Amagerbanken in 2011 and Andelsbanken in 2015, are of special interest from the Nordic perspective. Importantly, as in Cyprus, in both cases the bail-in extended to senior debt. There is evidence of some reactions in the financial markets. Dell'Ariccia et al. (2018) report statistically significant changes in bank stock prices and CDS spreads, as in other bail-in cases. Also the ratings of systemically important financial institutions weakened somewhat following the bail-ins. The effects were nevertheless modest.

The few recent bail-in cases discussed do not point to overwhelming consequences. But, as noted, the examples may not be very informative about contagion effects if bail-ins were to be implemented in highly interconnected large banking institutions. Some insight into such effects is provided by Hüser et al. (2017) in the simulation analysis referred to in Section 2. Two key findings emerge in the baseline scenario: (i) there are no bank defaults as a consequence of the bail-in of any other bank, and (ii) in all cases subordinated debt is affected (in 75% of the cases bail-in is extended to senior unsecured debt, but only in one case deposits are hit).

The analysis is obviously partial as it only considers the direct impacts on other large banks through cross-holdings. The direct impacts on smaller banks and other holders of debt are not considered. Even more importantly, the effects through fire sales of

assets and confidence are excluded from the analysis. Therefore, while the direct contagion effects appear subdued (the expression used by authors), the results should be regarded as a lower bound of the contagion effects a shock to the capital of a single bank can lead to.

While there are bank failures which stem from truly idiosyncratic shocks in the presence of otherwise normal financial market conditions, failures tend to cluster in times of generalised economic weakness. The attempts of the individual banks and other financial market players to reduce risks and improve their liquidity positions may in such circumstances lead to significant reduction of lending and to fire sales of assets. Such coinciding reactions may compound the initial shocks significantly.

These worries about the contagion spreading in fragile financial market and macroeconomic conditions have led some experienced observers to raise doubts about the feasibility of bail-in in situations of systemic vulnerability. Former US Treasury Secretary Timothy Geithner for example writes: '...imposing haircuts on bank creditors during a systemic panic is a sure way to accelerate the panic' (Geithner 2014, p. 214). In the same vein, Goodhart and Avgouleas (2014, p. 37) conclude that bail-in could be used for systemically important banks only if the problem was idiosyncratic. In other circumstances, 'contagion may be uncontainable'.

Whatever the final assessment of the contagion effects of a bail-in of a major institution during generalised financial and economic weakness may be, such effects can be reduced by good resolution planning. First, the planning needs to make sure that the financial institutions are in practice resolvable in the very short time typically available for effective resolution and that the institutions have sufficient amounts of bail-inable liabilities. Second, to reduce uncertainty, the investors and depositors need to be made clear of the potential of resolution and how different assets are treated in resolution situations. Third, an effective collaboration of the respective authorities is essential for a smooth resolution of institutions operating in several jurisdictions. Fourth, there needs to be ample liquidity available for solvent institutions.

It seems to us that the factors helping to contain spillover effects are in a relatively good shape in the Nordic area. Banks are in general well-capitalised and all significant institutions meet the minimum requirement of bail-inable liabilities. The cooperation between the competent authorities is close; resolution colleges have been set up for all significant institutions and resolution based on the single-point-of-entry approach is foreseen. The resolution authorities have conducted crisis simulation exercises and continue to do so on a regular basis.

5. Conclusions

The global financial crisis led to regulatory reforms, which have enhanced both the resilience of the banking sector and the crisis management abilities of authorities. The bail-in rules introduced in the EU legislation are an essential part of the bank crisis management reform in Europe. Instead of bail-outs of bank creditors by public authorities, bank creditors along with owners are now foreseen to share the burden of bank failures.

The analyses surveyed suggest that the crisis resolution approach based on bail-in could reduce taxpayers' costs in the short run and improve risk-taking incentives in the long run. However, it is not equally clear to what extent the loss absorption capacity should take the form of equity capital and various hybrid instruments and to what extent that of bail-inable liabilities.

The European resolution framework sets clear rules for the planning and execution of bank resolution, including bail-in of creditors. The institutions foreseen for the implementation of bank resolution are largely in place. Nevertheless, not all banks in Europe have yet modified their liability structures to meet the requirements set by the authorities, nor is the supporting legislation, e.g. on national insolvency procedures, harmonised as would be useful. The empirical evidence on the application of the new rules is scanty and does not give reliable guidance about how bail-in would work in the future.

The key challenge is contagion when a major – systemically important – institution is subject to bail-in, particularly in the circumstances of generalised economic weakness. Because of this, it cannot be excluded that public money will need to be used to safeguard financial stability also in future banking crises. However, even if some public funds may be deemed necessary, the need for public funds will most likely be less than what it has historically been.

The systemic challenge of bail-in is very important in the Nordic countries with a concentrated and highly interconnected banking system. Fortunately, the resolution planning of authorities as well as the banks is well-advanced. This gives some confidence that the resolution of even a large Nordic bank should be doable without devastating financial stability consequences, at least when the failure has idiosyncratic roots.

References

Admati, A., DeMarzo, P. M., Hellwig, M. and Pfleiderer, P. (2013), Fallacies, irrelevant facts, and myths in the discussion of capital regulation: Why bank equity is not socially expensive, Max Planck Institute for Research on Collective Goods, No. 2013/23.

Aikman, D., Haldane, A. G., Hinterschweiger, M. and Kapadia, S. (2018), Rethinking financial stability, Bank of England Staff Working Paper No. 712.

Beck, T., Da-Rocha-Lopes, S. and Silva, A. F. (2018), Sharing the pain? Credit supply and real effects of bank bail-ins, https://ssrn.com/abstract=3186544.

Beck, T., Radev, D. and Schnabel, I. (2020), Bank resolution regimes and systemic risk, CEPR Discussion Paper DP14724.

Berger, A. N., Himmelberg, C. P., Roman, R. A. and Tsyplakov, S. (2019), Bank bailouts, bail-ins, or no regulatory intervention? A dynamic model and empirical tests of optimal regulation, https://ssrn.com/abstract=3179226.

Berndt, A., Duffie, D. and Zhu, Y. (2019), The decline of too big to fail. Available at SSRN: https://ssrn.com/abstract=3497897 or http://dx.doi.org/10.2139/ssrn.3497897.

Blix Grimaldi, M., Crosta, A., David, Å. and Linder, J. (2019), The value of an implicit state guarantee for systemic banks, FI Analysis, No. 15.

Bolton, P. and Oehmke, M. (2018), Bank Resolution and the Structure of Global Banks, *Review of Financial Studies*, 32(6), 2384–2421.

Caballero, R. J. and Simsek, A. (2013), Fire sales in a model of complexity, *Journal of Finance*, 68(6), 2549-2587.

Chen, N., Glasserman, P., Nouri, B. and Pelger, M. (2013), CoCos, bail-in, and tail risk, Office of Financial Research Working Paper No.13-04.

Dagher, J., Dell'Ariccia, G., Laeven, L., Ratnovski, L. and Tong, H. (2016), Benefits and costs of bank capital, IMF Staff Discussion Note 16/04.

De Groen, W. P. and Gros, D. (2015), Estimating the bridge financing needs of the Single Resolution Fund: How expensive is it to resolve a bank?, CEPS Special Report No. 122.

Dell'Ariccia, G., Martinez Peria, M. S., Igan, D., Awadzi, E. A., Dobler, M. and Sandri, D. (2018), Trade-offs in Bank Resolution, IMF Staff Discussion Note 18/02.

Faia, E. and Weder di Mauro, B. (2016), Cross-border resolution of global banks: Bail in under single point of entry versus multiple points of entry, CEPR Discussion Paper No. 11171.

Financial Stability Board (2015), Principles on loss-absorbing and recapitalization capacity of g-sibs in resolution, Total Loss-absorbing Capacity (TLAC) Term Sheet, 9 November 2015.

Flannery, M. J. (2017), Stabilizing large financial institutions with contingent capital certificates, in Gup, B. E. (ed.), *The Most Important Concepts in Finance* (277-300), Elgaronline.

Geithner, T. (2014), *Stress test: Reflections on financial crises*, London: Random House Business Books.

Gimber, A. R. and Rajan, A. (2019), Bank funding costs and capital structure, Bank of England Staff Working Paper No. 805.

Goodhart, C. and Avgouleas, E. (2014), A critical evaluation of bail-ins as bank recapitalisation mechanisms, CEPR Discussion Paper No. 10065.

Guennewig, M. and Pennacchi, G. (2019), Measuring bail-in credibility, Discussion note.

Hüser, A.-C., Halaj, G., Kok, C., Perales, C. and van der Kraaij, A. (2017), The systemic implications of bail-in: A multi-layered network approach, ECB Working Paper No. 2010.

Lewrick, U., Serena Garralda, J. M. and Turner, G. (2019), Believing in bail-in? Market discipline and the pricing of bail-in bonds, BIS Working Papers No. 831.

Liikanen, E. (2012), High-level Expert Group on reforming the structure of the EU banking sector, Brussels, 2 October 2012.

Mendicino, C., Nikolov, K. and Suarez, J. (2017), Equity versus bail-in debt in banking: An agency perspective, European Systematic Risk Board Working Paper Series No. 50.

Modigliani, F. and Miller, M. H. (1958), The cost of capital, corporation finance, and the theory of investment, *American Economic Review*, 48(3), 261-297.

Philippon, T. and Salord, A. (2017), Bail-ins and bank resolution in Europe: A progress report, *Geneva Reports on the World Economy* Special Report 4.

Schäfer, A., Schnabel, I. and Weder di Mauro, B. (2016), Bail-in expectations for European banks: Actions speak louder than words, European Systemic Risk Board Working Paper Series No. 7.

Comment on E. Jokivuolle, V. Vihriälä, K. Virolainen and H. Westman: Bail-In: EU Rules and Their Applicability in the Nordic Context

Pär Holmbäck Adelwald[1]

The paper provides a number of interesting perspectives on the new financial crisis management framework called resolution which is now being established throughout all major economies. For a practitioner, the literature review in the paper is very helpful when contemplating some of the fundamental questions underpinning crisis management in general and the new resolution and bail-in framework in particular.

Two such questions addressed in the paper concern first whether the bail-in of banks' creditors will lead to substantial contagion, especially if applied in a systemic crisis, and second how liquidity is to be ensured through a resolution procedure. My opinion is that the concerns expressed in relation to contagion are exaggerated, whereas the issue of funding in resolution is more serious and warrants further discussion.

1. Will bail-in cause contagion?

The introduction of a resolution framework was mandated by G20 leaders in 2009 following the massive disruption to the financial system and world economy caused by first the demise of Lehman Brothers and, subsequently, the costly bail-outs of banking groups by governments around the globe. Whereas the case of Lehman made it clear that systemically important institutions could not be allowed to fail in a disorderly way, the bail-outs proved not to be a workable strategy because of the substantial damage they caused to public finances in places like Ireland and Iceland. There was a need for a third way, as the authors put it, between non-intervention and bail-out. That third way is resolution, which in its core is

[1] Swedish National Debt Office. Email: par.holmback@riksgalden.se.

nothing short of the reinstitution of the fundamental principles of the market economy to the banking system.[2]

While most people seem to agree resolution and bail-in is a good idea in principle, some are concerned it might lead to an amplification of the problems if applied in a systemic event (see for instance Goodhart and Avgouleas 2014, Geithner 2017 and Borg 2019). The risk perceived is that, while the bail-in might restore the solvency of one firm, it will spread the problems to other firms because of (a) cross-holdings and (b) general uncertainty gripping the market. Although due caution should of course be paid when discussing matters as complex as financial crises, these concerns are exaggerated as I see it.

Take cross-holdings: will the bail-in of firm A risk to impose losses on firm B at such proportions that B also becomes insolvent? That will only happen if B is holding the instruments issued by A that will be subject to bail-in. It is true that banks typically hold large amounts of one another's instruments, not least in the Nordics, but it is crucial to differentiate between what types of instruments they are holding. Mostly, these are covered bonds which are statutorily exempt from bail-in. They cannot be bailed in. And further, in addition to the capital instruments already in place banks are now required to issue large amounts of subordinated debt. That is debt instruments which will rank in between capital and senior unsecured instruments, i.e. the normal funding of a bank which is dependent on wholesale markets or large corporates' deposits. These are the instruments which primarily will be carrying the risk of being bailed in, not senior unsecured funding and certainly not covered bonds. The risks of direct contagion, therefore, will be very limited.[3]

To the other cause for concern then: what about general uncertainty when writing down capital and converting debt instruments into equity? Will investors not stop funding the bank out of sheer panic, as argued by Caballero and Simsek (2013) and cited by the authors? This argument draws upon the 2008 experience when the failure

[2] I will be elaborating on this theme in a forthcoming publication.
[3] It is striking that Hüser et al. (2017), as cited by the authors, show that even before the introduction of the subordinated debt requirements none of the 26 banks included in the study would have become insolvent when bail-in is applied. In terms of the issuances of subordinated debt by Swedish bank to date, they are typically taken up by non-Scandinavian institutional investors.

and non-intervention in Lehman caught market actors with total surprise. No one had expected the US authorities to let a systemic institution fail. But when that happened, investors worried who might be next and sought to get out of whatever exposures they could. This is the crucial point: no one expected this to happen. The purpose of resolution, on the other hand, is to achieve a paradigm shift whereby the expectations are moved from the paradigm of bail-out to the paradigm of bail-in. It is to be made crystal clear that debt instruments might face losses after capital instruments in accordance with the hierarchy of claims. Also in this regard does subordinated debt, therefore, become important. By separating this chunk out of the broad senior unsecured step of the insolvency ladder, investors will know ex ante what kind of risk they are buying and thereby be able to price it correctly. Provided that the subordinated debt layer becomes adequately sizeable, investors will then de facto be able to choose whether they want to buy a debt instrument which has a contingent capital feature to it or if they want to buy a normal funding instrument. There should be no more surprises.

This paradigm shift is now in the making. Most institutional investors in Europe and the US are, according to my experience, nowadays quite clear on this route of travel. Standard & Poor's (2019) says that '[...] Europe and the U.S. will complete the transition from bail-out to bail-in and so, in time, will deliver substantially resolvable systemic banks'. Tucker (2013) was of the opinion already five years after Lehman that the US had come to the point where resolving systemically important institutions was fully possible. What is necessary to complete this transition also in Europe is that politicians and policy makers stay firm in their ambition to abolish too–big-to-fail and not risk ending up in the Irish predicament once more.

2. Liquidity funding in resolution – central banks need to move

The second item I want to focus on, and where I think the authors could have elaborated further, is the issue of temporary liquidity

funding. In this regard there is a need in Europe and the Nordics to get clarity around how a bank in resolution might draw on the central banks' liquidity facilities.

A common reaction from the central banking community when this issue is raised is that further clarity cannot be provided since it would further moral hazard, citing the well-known arguments of Thornton and Bagehot on the risks of having a too generous lender of last resort.[4] However, in the case of lending to a bank which has been put into resolution, there is no risk of moral hazard.

Why is that? For the rather simple reason that in most cases resolving a bank will entail the application of bail-in, thereby wiping out the shareholders and facing subordinated bondholders with a loss or conversion of their holdings into equity. And obviously, the senior management which steered the bank into failure will be replaced and whatever incentive program they enjoyed will not be as shiny following the bail-in procedure. So the question then is whose moral it is that would be hazarded if the central bank were to support a resolution procedure? It is hard to see the case. If anything, resolution will strengthen the central bank's position before the point of failure since it will enable it to actually say no when an insolvent bank applies for lender of last resort support as it can be put into resolution instead.

Rather, what is happening is that another public body in the shape of the resolution authority comes in to manage the failure and restore the bank's viability and reorganize it on behalf of the state. Quite another thing than a privately controlled firm which gambles for its resurrection.

Even though discussions on this matter have been ongoing for a couple of years now, there has not been much movement in terms of public statements on how central banks' facilities might be used in resolution. In contrast, The Bank of England, the Reserve Bank of Canada and the Hong Kong Monetary Authority are among those central banks who have publicly declared being open for busi-

[4] Thornton (1802) and Bagehot (1873) argued, in essence, that central banks should lend to banks in trouble only as long as they were solvent, against adequate collateral and at penal interest rates. Otherwise, they argued, there was a risk that banks might take excessive risks while betting on being saved by the central bank in the end.

ness. From a crisis management perspective these are very helpful statements.

Elsewhere, such as at the ECB and the IMF, there seems to still be a lot of focus on the moral hazard argument. And also closer to home, I have to admit. But for the reasons just mentioned, I would argue this is flawed thinking.

The issue of how to ensure the temporary funding of a bank in resolution is a crucial element in successfully applying the new framework. Resolution authorities will need some time for the dust to settle from the resolution weekend when they take control and communicate what is to happen. It may be that the bank's own liquidity resources and collateral pools are exhausted and that regular counterparties are not inclined to resume lending immediately. Extending a guarantee or bilateral loan from the resolution funds may be an option, but it might take some time for it to be operational. That creates a gap which someone has to fill and that someone should be the central bank.

So, I would concur with Tucker (2018) in his recommendation to central banks that they should reconsider their polices in this regard and, as he put it, start 'shouting from the rooftops' what the conditions for access to resolution facilities would be.

References

Bagehot, W. (1873), *Lombard street: A description of the money market*, Henry S. King & Co.

Borg, A. (2019), *Finansministern*, Mondial.

Caballero, R. J. and Simsek, A. (2013), Fire sales in a model of complexity, *Journal of Finance*, 68(6), 2549-2587.

Geithner, T. (2017), Are we safe yet? How to manage financial crises, *Foreign Affairs*, 96(1), 54-72.

Goodhart, C. and Avgouleas, E. (2014), A critical evaluation of bail-ins as bank recapitalisation mechanisms, CEPR Discussion Paper No. 10065.

Hüser, A.-C., Halaj, G., Kok, C., Perales, C. and van der Kraaij, A. (2017), The systemic implications of bail-in: A multi-layered network approach, ECB Working Paper No. 2010.

Standard & Poor's (2019), Ending too big to fail: Different journeys, different destinations, RatingsDirect, 4 April.

Thornton, H. (1802), *An enquiry into the nature and effects of the paper credit of Great Britain,* Rinehart and Co.

Tucker, P. (2013), Solving too big to fail: Where do things stand on resolution, Remarks at the Institute of International Finance 2013 Annual Membership Meeting, Washington DC, 12 October.

Tucker, P. (2018), Resolution policy and resolvability at the centre of financial stability regimes, Remarks at IADI/BIS/FSI Conference, Basel, 1 February.

Comment on E. Jokivuolle, V. Vihriälä, K. Virolainen and H. Westman: Bail-In: EU Rules and Their Applicability in the Nordic Context

Kim Ristolainen[1]

The authors succeed in a demanding task of clarifying the economic theory, empirical results and practical issues related to bail-in policies. For the first time, bail-in is discussed specifically in the Nordic context. The paper provides a very thorough picture of how bail-in is implemented in Europe and what the economic literature says on the possible benefits, costs and uncertainty related to these policies. I will focus on two issues. The first one is related to bail-in policies and the bail-in literature in general. The second one is more focused on the conclusions of the paper at hand.

1. Anything else but equity!

As a critique of the bail-in literature in general, it seems that the point of view from which bail-in policies are studied can be at least roughly described as *anything but equity* type of thinking. This quote is from the best-selling book *The bankers' new clothes* by Admati and Hellwig (2013), where the authors claim that bail-inable debt is also a form of bankers' new clothes or at least an instrument created to avoid regulation implying significantly higher equity requirements for banks.

Jokivuolle et al. provide a really good and comprehensive literature review of the research that tries to figure out the role and consequences of bail-inable debt in bank capital regulation. The review gives more support for the view that the question academics and policy makers are currently focused on is '*How much of banks' total loss absorbing capacity (TLAC) should be bail-inable debt?*' rather than on '*How much bail-inable debt should banks have, if any, given that equity is at a sufficient level?*'. For example, only Mendicino et al. (2017) study simultaneously the level of TLAC and the shares of equity and bail-inable debt in it. In other words, can we really talk

[1] University of Turku. Email: kim.ristolainen@utu.fi.

about the role of bail-inable debt in TLAC (relative to equity), if we are not taking into account the whole level of TLAC? Clearly the higher the level of TLAC is, the smaller is the need for bail-inable debt within TLAC, assuming that the purpose of bail-inable debt is to improve the resolution process.

In a way, bail-inable debt is seen as a substitute for equity rather than a complement. We are preparing for the worst (a banking crisis) without doing the necessary things (higher equity requirements) to prevent it in the first place. Instead, we are creating something more complex with uncertain effects (bail-inable debt substituting for equity in capital requirements). As the paper concludes – especially in the context of a systemic event – there are many uncertainties regarding bail-in. There might be turmoil in the market due to trigger points where bail-inable debt is converted to equity. Although bail-in is included in the regulators' toolbox, there might be a bailout anyway! On top of these issues, there will be operational challenges, spillovers etc.

One must ask, why equity and bail-inable debt are not used separately so that the probability of a crisis is minimized with larger equity to total assets requirements and on top of this, bail-inable debt requirements to improve the resolution process if needed? There could be concerns that raising capital requirements would dampen economic activity via reduced bank lending. The argument for this view is usually that equity would be a more costly way for a bank to fund its business (lending etc.) than debt funding.

Many studies (e.g. Modigliani and Miller 1958, Cecchetti 2014, Aikman et al. 2018) give strong either theoretical or empirical arguments for the opposite view, namely that higher capital requirements do not affect the cost of capital and, hence, should have no negative effects on bank lending and economic activity. Although it is still under debate whether higher capital requirements will affect the cost of bank lending and bank profitability, there seems to be at least some consensus on the benefits and costs of higher capital requirements for society. The former are large (lower probability of crisis and lower costs if it occurs) and the latter are small or close to none (bank lending not affected significantly). A recent survey by Ambrocio et al. (forthcoming) of the views of leading academic experts on bank capital regulation provides similar conclusions.

Due to the likely positive effects of higher equity requirements, uncertainty related to the effects of bail-in policies and the fact that the Basel III requirement for the leverage ratio is currently 3%, it is quite hard to see why bail-inable debt is regarded as part of the solution for bank capital regulation. The question that needs to be answered in the first place is whether higher bank capital requirements have (socially) negative effects and how large these effects are relative to the positive ones. Only when these questions have been clarified and it has been concluded that the negative effects are larger than the positive effects, new forms of capital such as bail-inable debt should be considered in capital requirements. In the light of current regulation, where a fall of 3% in a bank's asset value would result in insolvency, it can hardly be seen as socially optimal to introduce an uncertain policy instrument to substitute for a much more certain instrument.

2. Nordic bail-in uncertainty

The most significant contribution of Jokivuolle et al. is the discussion of possible benefits and costs of bail-in in the Nordic context. The authors emphasize that the Nordic financial system is interconnected and consists of a small number of large banks, which implies that systemic events are more likely in the Nordics than in other financial systems. Although banks and financial authorities in the Nordics are well-advanced in their resolution planning, the effects of bail-in still remain uncertain. This relates to the fact there has been hardly any experience of bail-in in the context of systemic events in the Nordics or even in Europe after the imposition of the Bank Recovery and Resolution Directive (BRRD) in 2014.

The authors discuss the bail-in of a systemic bank in Cyprus in 2013, where the bail-in had some effects on banks' stock prices and CDS spreads outside Cyprus. However, Russian investors carried most of the bail-in losses, which together with the fact that Cyprus is neither a large economy nor has banks interconnected with EU banking systems may be a reason why the feared contagion effects were not substantial.

Jokivuolle et al. also discuss two Danish bail-in cases where the banks were not systemic, but the stock markets and the ratings

of systemically important financial institutions nevertheless reacted clearly to the bail-in. The authors add that the spillover effects were small, probably due to the small size of both banks. In addition to these results, the only evidence of the effects of bailing-in interconnected banks is a simulation study that does not take into account several important things such as effects on small banks and other creditors, fire sales of assets etc.

The points made in the previous part of this comment are even more relevant in the Nordic context as the uncertainties regarding bail-in are greater in the case of a highly interconnected financial system consisting of a few large banks. The benefits of higher equity requirements are somewhat agreed on: both smaller probability of and smaller cost associated with a crisis (the latter being more certain). The benefits of bail-in are more uncertain - equity is still equity and investors know this. Due to these uncertainties, the role of both bail-inable debt and equity capital as preservers of financial stability should be studied more. This paper has been a clear step in the correct direction.

References

Admati, A. and Hellwig, M. (2013), *The bankers' new clothes: What's wrong with banking and what to do about it*, Princeton University Press.

Aikman, D., Haldane, A. G., Hinterschweiger, M. and Kapadia, S. (2018), Rethinking financial stability, Bank of England Staff Working Paper No. 712.

Ambrocio, G., Hasan, I., Jokivuolle, E. and Ristolainen, K. (forthcoming), Are bank capital requirements optimally set? Evidence from researchers' views, Bank of Finland Discussion Paper.

Cecchetti, S. G. (2014), The jury is in, CEPR Policy Insight No. 76.

Mendicino, C., Nikolov, K. and Suarez, J. (2017), Equity vs. bail-in debt in banking: An agency perspective, ESRB Working Paper Series No. 50.

Modigliani, F. and Miller, M. (1958), The cost of capital, corporation finance, and the theory of investment, *American Economic Review*, 48(3), 261–297.

Pros and Cons of Participating in the Banking Union[1]

Karolina Ekholm[2]

Abstract

This paper discusses pros and cons of participating in the banking union from the perspective of non-euro countries. Expanding the banking union with home and host countries of European banks is likely to bring overall benefits in terms of more efficient bank resolution. But net benefits of participating seem smaller for countries outside than inside the euro area. At the same time, strong safeguards for non-euro countries suggest that costs of participating are low. Ultimately, the assessment of net benefits depends on the value put on closer cooperation with euro area members in matters related to financial integration and stability.

Keywords: Bank regulation, bailout, bank bail-in, supervision, European Union.
JEL codes: F55, G28.

[1] I am grateful to Svend Erik Hougaard Jensen and Tuomas Saarenheimo for insightful comments when they discussed an earlier draft of this paper at the seminar 'Financial Regulation and Macroeconomic Stability in the Nordics' in Helsinki, 12 December 2019. I have also benefitted from helpful comments and suggestions by the editors Peter Englund and Lars Calmfors and two anonymous referees. Finally, I would like to thank Fredrik Bystedt and Lars Lundberg for helpful comments and discussions.
[2] Department of Economics, Stockholm University. Email: karolina.ekholm@ne.su.se.

1. Introduction

The European banking union is a project that has been ongoing since 2012 – a time when the euro area was rocked by financial and sovereign debt crises in several of its members.[3] In 2012, a number of initiatives at EU level brought forward parts of the project. A first report by the president of the European Council published in June 2012 and written in close collaboration with the presidents of the Commission, the European Central Bank (ECB), and the Eurogroup, presented a vision for a strengthened Economic and Monetary Union (EMU), which included an integrated financial framework (Van Rompuy 2012a). This integrated framework comprised of common supervision, a common resolution scheme and a common deposit insurance scheme. A statement of the Euro summit (2012) held on June 29 launched the political process towards a banking union. A follow-up report published in December 2012, often referred to as the 'Four presidents' report', set out a detailed roadmap, where the first step involved the creation of a single supervisory mechanism (Van Rompuy 2012b).

Today, the project has reached a point where two out of the three proposed components have been put into place. The Single Supervisory Mechanism (SSM) was set up in the fall of 2014 and the Single Resolution Mechanism (SRM) became operational in January 2016.[4] The third proposed component of a common European Deposit Insurance Scheme (EDIS) has been discussed extensively, but so far not agreed on.

Other elements considered as integrated parts of the European banking union are a single rulebook, which provides legal and administrative standards to regulate, supervise and govern the financial sector, a common capital requirements regulation (set out in the fourth Capital Requirements Directive, CRD IV, and the Capital Requirements Regulation, CRR) and a common framework for bank resolution (set out in the Bank Recovery and Resolution Directive, BRRD). However, these parts of the relevant legislation and

[3] The term 'banking union' is usually attributed to Nicolas Véron, who in a Vox column in December 2011 argued in favour of the creation of a banking union in parallel with the creation of a fiscal union for the euro area (Véron 2011).
[4] The relevant council regulation for the creation of the SSM was adopted 15 October 2013 (Council of the European Union 2013).

regulation apply to all EU member states, irrespective of whether they participate in the banking union or not.

So far, only euro area members participate in the banking union, although other EU members can choose to opt in. For EU states aiming to adopt the euro as its currency, such as Bulgaria, Croatia, and Romania, membership in the banking union will be a required step on the path towards membership in the euro area. But for countries with either an opt-out from adopting the common currency, such as Denmark, or clear public opposition to it, such as Sweden, any possible participation in the banking union would have to be an active choice based on the assessment that the benefits outweigh the costs.

The governments in both Denmark and Sweden have conducted inquiries into the consequences of possible participation in the banking union, resulting in the publication of reports in December 2019.[5] In the Swedish case, an assessment of whether benefits outweigh costs was not part of the remit, which was only to provide a thorough analysis of the consequences of a possible membership. But the Danish report quite clearly leans towards a positive assessment of the net benefits. On the other hand, the Danish government's response on receiving the report was restrained, citing the need for more clarity on a number of issues and a referendum in the event that the government decides to recommend joining the banking union (Erhvervsministeriet 2019).

There are essentially two ways to view the key driver behind the creation of the European banking union. The first is the need to put into place mechanisms that would end the crisis dynamics that threatened to break up the euro area during the euro crisis. In particular, elements of the banking union can be viewed as tools to weaken the so-called 'doom loop', which refers to the interaction between debt crises of sovereign states and weakened financial positions of their banks. This doom loop was an important factor behind the crisis dynamics in the euro area 2010–2012 and the

[5] See Arbejdsgruppen vedrørende mulig dansk deltagelse i det styrkede banksamarbejde (Bankunionen) (2019) and Utredningen om ett eventuellt svenskt deltagande i Europeiska bankunionen (2019).

decision to create the banking union may very well have contributed to ending it.

The other way to view the key driver is the needs that arise as financial markets become increasingly integrated. With increased market integration and more extensive cross-border operations of financial institutions, fragmented supervision and crisis management is likely inefficient. Creating a unified system for supervision and crisis management would then be important for promoting a single market in financial services and also to avoid financial crises.

This article discusses the pros and cons of being a member of the banking union, mainly from the perspective of a country that is not obliged to participate because of its adoption of the euro as its currency. How attractive participation in the European banking union appears to be for this type of country depends to a large extent on whether you view the banking union as a construction intended to save the euro or as a construction to promote integration and stability for the single market in financial services. The clearest economic benefit of enlarging the banking union is the prospect of more efficient resolution of cross-border banks. However, whether that would actually benefit a joining member depends on how the gains from more efficient resolution are distributed. There is also the issue of entering into a banking union in a situation where the risks of bank failure appear to be elevated in some of the existing members. This might lead to transfers to those members, depending on to what extent risks are effectively mutualized in the banking union. The clearest cost is otherwise the loss of regulatory and supervisory independence. However, the size of that cost may be small in a world where financial markets are highly integrated.

I will start by describing more in detail what the banking union comprises of today and what additional elements might be included in the future. Thereafter, I will discuss first potential benefits and then potential costs of participating in the banking union. The final section concludes.

2. What is the banking union?

Today the banking union rests on two pillars: the Single Supervisory Mechanism, SSM, and the Single Resolution Mechanism, SRM.

2.1 The Single Supervisory Mechanism

The establishment of the SSM constitutes a shift of prudential powers from national supervisors to the ECB, which under SSM regulation is responsible for all supervisory tasks in the participating member states. In practice, the mechanism involves the national supervisory authorities of the participating countries as well as the ECB in the sense that the national supervisors assist the ECB in carrying out the actual supervision. The ECB is responsible for directly supervising banks that are considered to be 'significant', which according to the ECB's webpage at the end of 2019 included 116 banks covering more than 80 percent of total banking assets in the banking union. For these banks, supervision is carried out by teams comprising staff from ECB as well as national supervisors.[6] The other banks in the banking union are directly supervised by national authorities. However, the ECB can at any time decide to supervise such banks directly as well.

Decision-making in the Single Supervisory Mechanism

Decision-making in the SSM is somewhat complicated. There is a supervisory board (SSB) consisting of a chair, a vice-chair selected from the Executive Board of the ECB, four other representatives of the ECB and representatives of each of the national supervisory authorities. All in all, the board consists of 25 voting members (19 from national supervisors and 6 others). The number of people on the board, however, is larger because when the supervisory authority is not the central bank, the member state can choose to let the representative from the supervisory authority be accompanied by a representative from the national central bank. Since supervision is separated from the central bank in several countries, this has resulted in the board being made up of 32 people.

The SSB meets every three weeks and proposes draft supervisory decisions for the ECB's Governing Council. Such decisions may

[6] This is set out in Regulation (EU) No 468/2014 of the European Central Bank.

involve requirements of capital buffers, the granting and revoking of banking licenses and the imposition of sanctions. The formal decisions are then taken by the Governing Council under a so-called non-objection procedure. This procedure means that the draft supervisory decisions will be adopted if the Governing Council does not object within a pre-set time period.

This decision procedure stands out as being unnecessarily roundabout. Since it is the SSB that has done all the deliberations on the decisions, it would seem more straightforward to let the formal decisions be taken there. The procedure is also an obvious sticking point for non-euro countries contemplating membership in the banking union, since these countries have no representation in the Governing Council. So why couldn't the supervisory decisions simply be taken at the SSB, where non-euro countries participating in the banking union would be represented?

It is stated in article 129(1) of the Treaty on the Functioning of the European Union that the decision-making bodies of the European Central Bank are the Governing Council and the Executive Board. Conferring supervisory powers on the ECB thus would automatically result in supervisory decisions being taken by these bodies unless the treaty is changed. Since there is little appetite for trying to get national parliaments to accept changes in the EU treaty – a process that experience shows very well may result in a rejection – trying to work around what the treaty states about decision-making has probably appeared to be a preferable solution.

An alternative solution, however, would have been to establish SSM as a separate EU agency outside the ECB. But this alternative could have been challenged on the grounds of being in breach of the so-called Meroni doctrine, which has its name after a ruling by the European Court of Justice in 1958.[7] According to the doctrine, discretionary powers that involve an element of political judgement cannot be delegated to agencies by EU institutions.[8] It may therefore have been considered necessary to task one of the EU institutions with final decision-making in the SSM. However, whether

[7] Judgment of the Court of 13 June 1958. Case 9-56 and 10-56.
[8] I am grateful to Tuomas Saarenheimo for pointing this out in his discussion of an earlier draft of this paper.

the Meroni case-law indeed warrants such an interpretation of the legal situation may be debated. For instance, when the UK brought a case against the European Parliament and the Council of the European Union for conferring powers of intervention on the European Securities and Markets Authority (ESMA), it lost that case.[9] The Court found that those powers were sufficiently circumscribed by clearly stated conditions and criteria to be compatible with the Meroni judgment. A similar reasoning might be applicable to interventions related to bank supervision.

But the fact that the creation of the SSM was part of crisis management in the euro area is likely to have led to a sense of urgency to establish an operation that would be up and running. From this perspective, to establish the SSM within a well-functioning existing authority must have seemed like an attractive option. The decision may also have been influenced by the view that financial supervision should be carried out at the central bank. A wide-spread view is that the objectives of monetary policy and financial stability are intertwined because of the importance of financial stability for stable macroeconomic developments.[10] In Denmark as well as Sweden, however, financial supervision is separated from the central banks.

In any case, it would have been much better for non-euro countries if the SSM had been established outside the ECB. The decision whether to participate in the banking union would then not have to depend on the obviously sensitive issue of transferring decision power to a body where the member state has no representation.

Safeguards for non-euro countries

To take these concerns into account to some extent, there are safeguards for non-euro countries participating in the banking union.[11] To begin with, a non-euro member has the right to leave the banking union after three years – a right not enjoyed by euro members.

[9] Judgment of the Court (Grand Chamber), 22 January 2014. Case C-270/12.
[10] See, for instance, Goodhart (2003). There are also proponents of the view that central banks are not very well-suited to take on the responsibility of financial supervision because it could compromise the high degree of independence enjoyed regarding monetary policy. Such concerns have led to requirements of a complete organizational separation between monetary policy and financial supervision at the ECB, including a requirement that the governing council holds separated meetings on monetary policy and financial supervision (Article 25(4) of Council Regulation (EU) No. 1024/2013).
[11] These safeguards are set out in Article 7 of Council Regulation (EU) No 1024/2013.

Furthermore, if a non-euro member disagrees with a draft decision of the SSB, it can notify the Governing Council. If the Governing Council decides to uphold the decision, the member state can leave the SSM and declare itself not bound by the decision. This is a right enjoyed by a non-euro member even before three years as a member have passed. In the case where the Governing Council decides to change a draft decision by the SSB and this is opposed by a non-euro member, the non-euro member can notify the Governing Council that it is not going to consider itself bound by the changed decision. In that situation, it is up to the ECB to decide whether it wants to suspend or terminate the member state's participation in the SSM. A non-euro member that has left the banking union can apply to re-enter if it wishes to do so, but only after at least three years have passed since exiting.

An additional reason for the safeguards provided for non-euro countries is that these countries would not have access to crisis management tools available to euro countries, most notably the European Stability Mechanism (ESM). The ESM is an institution that has a lending capacity of 500 billion euro that can be employed to support a euro country in financial distress. Tools with similar financial capacity may not be available for non-euro countries for general crisis management, although funds from the ESM could be available for dealing with bank resolution, as will be discussed further down in Section 2.3.[12] This creates the potentially uncomfortable situation of having a supranational body such as the SSM decide that a bank is insolvent – a decision that might trigger a financial crisis – but the costs resulting from this decision would be borne by the country's own taxpayers.

2.2 The Single Resolution Mechanism

The single resolution mechanism, SRM, comes into play when banks supervised by the SSM experience problems.[13] It has at its centre the Single Resolution Board (SRB), which is an EU agency responsible for resolution preparation and execution regarding significant banks and other cross-border groups within the banking union. The board is thus directly responsible for resolution preparation and ex-

[12] A balance-of-payments assistance facility is available to EU countries outside the euro area. The outstanding amount of loans under this facility is limited to 50 billion euro (European Commission 2009).
[13] It was established by Regulation (EU) No 806/2014, which came into force in 2016.

ecution regarding the banks that are under direct SSM supervision plus a number of additional banks with cross-border operations.

The aim of the resolution mechanism is to reduce costs to taxpayers and to minimize any negative effects on the real economy. The SRB is responsible for determining whether a bank needs to be placed under resolution. There are a number of conditions that need to be fulfilled for this to happen. To begin with, the bank has to be assessed to be failing or likely to fail. Since the ECB is the supervisor of most of the banks under the SRB's remit, the assessment of this would in most cases come from the ECB.[14] Furthermore, it has to be assessed that there are no reasonable prospects for alternative private sector measures that would prevent failure. Finally, resolution must be assessed to be in the public interest. Otherwise, the institution should be liquidated under normal insolvency proceedings.

Resolution tools

The SRB has a number of tools available for dealing with a bank that needs to be resolved. It can sell the bank, put it into a bridge institution, divide its assets into different entities (i.e., separating out bad assets into a 'bad bank') and use the so-called bail-in tool. Before any of these tools are used, however, the bank's capital needs to be written down and the owners incur losses.

The bail-in tool was introduced with the Bank Recovery and Resolution Directive (BRRD) in 2014. It allows for writing down debt held by the bank's creditors or converting it into equity before the bank then can continue functioning with its liabilities now consisting of more capital and less debt, be sold, put into a bridge institution or divided up into a good and bad bank. By imposing losses on the creditors, while maintaining the critical functions of the bank, taxpayers would be protected from having to cover the bank's liabilities.

The introduction of the bail-in tool is not specific to the banking union and SRM. All EU member states are obliged to use the tool

[14] The SRB may in some instances determine that a bank is considered failing or likely to fail if it has informed the ECB of its intention to do so and the ECB has not reacted within three days (Article 18 SRM Regulation).

according to BRRD, which defines how losses should be allocated in a resolution situation: Shareholders should take losses first, creditors second (in accordance with the priority of their claims under normal insolvency proceedings) and management should be replaced unless that would jeopardize reaching the resolution objectives. The requirement to impose losses on shareholders and junior bondholders should remove the implicit government guarantee of too-big-to-fail banks and encourage better risk management and financial strength.[15]

The Single Resolution Fund

The SRM also includes the Single Resolution Fund (SRF), which may be used to ensure orderly resolution of banks. A precondition for using resources from the SRF in resolution cases for loss absorption or recapitalization is the application of the bail-in rules and principles laid down in BRRD.[16] According to the SRM Regulation, for resources from SRF or other public sources to be used in order to absorb losses or for recapitalization, at least 8% of total liabilities have to be bailed in. According to BRRD, an alternative requirement of bailing in at least 20% of risk-weighted assets is available under certain conditions, an alternative that may have relevance for non-euro countries contemplating membership in the banking union and that will be discussed further in Section 4.

The SRF is established through the SRM Regulation (No 806/2014), but also through an intergovernmental agreement (Council of the European Union 2014). The intergovernmental agreement regulates the transfer and mutualization of funds and was signed by all EU member states except Sweden and the United Kingdom.

The SRF is being built up gradually by fees paid by banks in the participating member states. It is supposed to reach a target level of at least 1% of the amount of covered deposits of all credit institutions in the banking union by 2024. The collection of fees is done at the national level and then transferred to the fund. Where the

[15] For a thorough discussion of the applicability of the bail-in tool, particularly in a Nordic context, see Jokivuolle et al. (2020) in this volume.
[16] The contribution from the resolution fund should not exceed 5% of the total liabilities including own funds unless all unsecured, non-preferred liabilities, other than eligible deposits, have been written down or converted in full.

paid-in fees are insufficient to cover the losses or costs incurred by the use of the SRF, additional ex-post fees should be collected.

During the transition period when the SRF is being built up, the contributions are put into national compartments. The compartments are successively mutualized and at the end of the build-up phase, they will cease to exist.

If resources from the SRF are needed for successful resolution, they will primarily be taken from the national compartments during the transition period. In the case of cross-border banks, resources from several national compartments may be used. The relative size of these will be in proportion to how much the different parts of the cross-border bank under resolution have contributed to the respective national compartments.

If the resources available in the national compartments relevant for the bank under resolution are not sufficient, the mutualized part or other members' compartments may be used. In the latter case, other members may object and thereby prevent the use of resources from their respective compartments. According to Article 7(4c) of the intergovernmental agreement, a reason for doing so could be that the member whose compartment has been exhausted has not been able to provide sufficient guarantees that it can refund the resources used from national sources or from support by the ESM.

If a non-euro country joins the banking union, it will have to transfer an amount of contributions to the SRF corresponding to what it would have transferred if it had participated in the SSM and SRM from the outset. If a non-euro country participating in the banking union decides to leave, the contributions transferred to the SRF will be transferred back.

Decision-making procedure
In the case where the SSM has assessed that a bank is failing or likely to fail, the SRB assesses whether resolution is in the public interest. If not, the bank is wound up in accordance with national law under normal insolvency procedures. If it is decided that the bank should be placed under resolution, the SRB adopts a resolu-

tion scheme, which determines the resolution tools to be used and whether resources from the SRF are needed. The SRB sends the resolution scheme to the Commission immediately after adopting it. This scheme enters into force within 24 hours of its approval by SRB unless a number of steps by the Commission and the Council are taken to block or alter it. The Commission can, for instance, propose to the Council to object to the decision to place the bank under resolution or to modify the amount of resources used from the SRF. The Commission has to deliver its proposal to the Council within twelve hours after the SRB's decision and the Council has to make its decision within twelve hours after that.

Through this procedure, the Commission and the Council have power to veto approval of the SRB's resolution strategy. The Council's involvement, however, depends on the Commission's proposal to act. If there is an objection, the SRB has eight hours to modify the resolution scheme. If the Council objects because it does not consider resolution to be justified in light of the public interest test, the procedure is stopped and the institution wound down under regular national insolvency procedure. If there are no objections, the resolution scheme enters into force.

As should be clear from this description, the decision procedure is not only quite complex but also has to take place within a very short time span. Several decision-making bodies are involved and they have extremely limited time to prepare their decisions. One should bear in mind, however, that in cases where financial institutions need to be restructured or wound down, there will probably always be a need for swift decision-making involving several stakeholders. The fact that the Council is one of the decision-making bodies creates special challenges. The Council consists of national representatives who are based in their respective capitals. Nonetheless, they would need to be reached and have time to prepare a decision within a twelve hours window.

If funds from SRF or other public sources were to be included in the resolution scheme, there is also an issue regarding compliance with state-aid rules. The scheme should not be adopted until the Commission has decided, at least conditionally, that it is compatible with internal-market rules on state aid.

2.3 Back-stop for SRF

A main reason for the slow progress in completing the banking union is that it is being built before legacy problems have been properly addressed. The elements of risk-sharing that have been foreseen – i.e. a common deposit insurance, a fully mutualised resolution fund and a common backstop for the resolution fund – have been difficult to put in place because risks are unevenly distributed across member states. Figure 1 shows non-performing-loans ratios for the euro countries as well as for Denmark and Sweden in the third quarter of 2019. The share of non-performing loans in the banking union varies as much as between just above 1% in Luxemburg to more than 37% in Greece. Non-performing-loans ratios in Denmark and Sweden are at the lower end of this distribution. In fact, Sweden has the lowest ratio of all countries of about 0.5%.

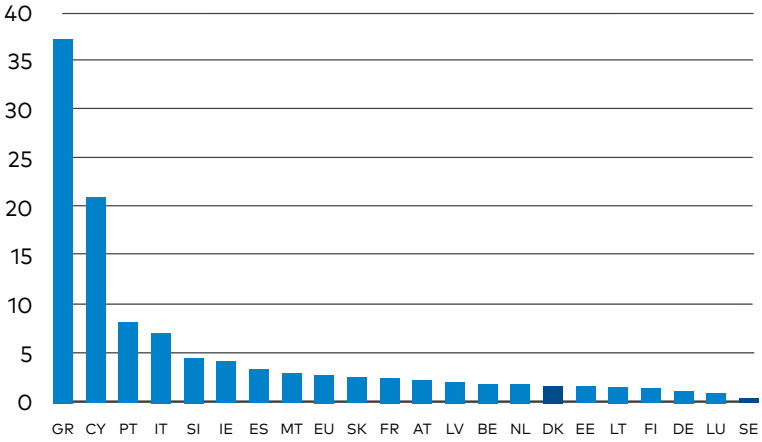
However, the members of the banking union have agreed in principle on one important risk-sharing element, which is to use the ESM as a backstop for SRF.[17] This will require revisions of the ESM Treaty, which is an intergovernmental agreement between the euro area members. A final decision is still pending (April 2020) due to some unresolved legal issues, which have been put on hold due to the coronavirus crisis. After the final decision is taken, a ratification process of the revised Treaty will take place.[18]

According to the agreed revision, the backstop will be in place at the latest by 1 January 2024, but may be introduced earlier if there is sufficient progress regarding risk reduction among the member states. After the backstop has come into force, the ESM can lend the necessary funds to the SRF to finance a resolution in the event that the fund is depleted and the SRB is unable to raise sufficient ex-post contributions or borrow funds from other sources at acceptable rates.

The overall scope of the backstop is an amount equal to the size of the SRF, which is expected to be around 60 billion euro when it has reached its target level. This implies a maximum amount available

[17] The main features of the backstop to the SRF were agreed at a Euro summit in December 2018 (Euro summit 2018).
[18] Agreement has also been reached on some changes in the financial assistance instruments and the role of the ESM.

Figure 1 Ratio of non-performing loans and advances, third quarter 2019, percent



Source: European Banking Authority Risk Dashboard.

for financing resolution of around 120 billion euro.[19] It is difficult to determine whether this is sufficient to cover financing needs arising from bank resolution in the banking union. However, according to an analysis by De Groen and Gros (2015) based on the bank resolutions that actually occurred between 2007 and 2014, it would be sufficient by a relatively wide margin.[20] Lending by ESM will be done through a revolving credit line. If the credit line is used, the SRF will pay back the ESM with money from bank contributions within three years so that the backstop is fiscally neutral over the medium term.[21]

If a non-euro member state joins the banking union, the ESM and the member state are supposed to provide the common backstop to the SRF together, through parallel credit lines. As indicated in Section 2.1, this means that banks in a non-euro country participating in the banking union may have access to ESM funds through the backstop. However, since the SRF will be completely mutualized

[19] A nominal cap is set to be initially 68 billion euro (European Stability Mechanism, 2019).
[20] They find that the financing needs, after having taken the bail-in rules in BRRD into account, would amount to about 72 billion euro.
[21] This period can be extended by up to another two years.

from 2024 onwards it will not be possible to determine whether a particular contribution from the fund originates from ESM or a parallel credit line.

2.4 A possible European deposit insurance

The third pillar of the banking union, as it was envisaged in 2012, is the common deposit guarantee scheme. In November 2015, the Commission presented a proposal for a European Deposit Insurance Scheme (EDIS). It built on the system of national deposit guarantee schemes (DGS), which ensures that deposits up to 100 000 euro are protected all over the EU.[22] According to the proposal, the national DGS and EDIS would intervene when a bank is placed into insolvency or resolution and it would be necessary to pay out deposits or finance their transfer to another bank.

Because of lack of progress in adopting this proposal the Commission proposed a somewhat less far-reaching alternative in October 2017 (European Commission 2017). With this alternative proposal, EDIS would be introduced in a more gradual manner. It would start with a re-insurance phase where EDIS would provide only liquidity coverage if needed by a national DGS, but no loss coverage. Gradually, EDIS would then turn into a co-insurance scheme that also covers losses. The start of such a process could be made contingent on the fulfilment of a number of conditions in order to mitigate legacy problems. So far, however, there has not been any agreement on even this less far-reaching proposal. However, the German minister of finance has indicated that a scheme providing re-insurance for national DGSs might be acceptable to Germany (Sholz 2019).[23]

How important is this third pillar for the overall functioning of the banking union? Many observers consider the common deposit insurance as a key component, emphasizing the mis-match between supranational bodies deciding whether an institution should be resolved or wound down and national resources paying the cost for

[22] The system of national deposit guarantee schemes is regulated by Directive 2014/49/EU.
[23] An obstacle to reach an agreement is the linking together of the creation of EDIS with restrictions on exposures to domestic sovereign debt in the banks, a proposal opposed by countries such as Italy (see e.g. Reuters 2019).

that decision.[24] Since the national DGSs are based on fees from the banks, taxpayer money would not be involved as long as the national DGSs can cover the liabilities from insured deposits. In this case, there is little risk that decisions to resolve or wind down banks put pressure on public finances. However, if the liabilities exceed what is available through the national DGS, the national government would be expected to make up for the difference through its budget. This means that national governments could find themselves in situations where the cost of borrowing increases and sustainability of public finances becomes an issue as a result of decisions outside their control. To what extent this is a real risk is difficult to assess. With an adequate level of funds available in the DGS and/or a strong financial position of the government at the outset, the risk may be low. Therefore, the creation of EDIS may not be completely critical for the long-run viability of the banking union, although the mismatch between the level of decisions about whether banks are allowed to continue to operate and the level where costs are incurred is likely to be perceived as problematic for most members.

3. Potential benefits of a banking union

The potential benefits of participating in the European banking union will differ depending on whether the country is a euro area member or not. However, irrespective of this, the potential benefits are mainly related to cross-border externalities that arise because of cross-border operations of financial institutions.

3.1 Cross-border externalities and lender-of-last-resort functions

Possible benefits from centralized supervision in the euro area have been discussed at least since the single currency was launched. For instance, Vives (2001) argued that more centralized supervision would be needed in the monetary union in order to preserve stability and foster financial integration. Without such centralized supervision, the ECB might not have access to timely information in

[24] EDIS was, for instance, considered part of the core of the proposal brought forward by a group of French and German economists in an attempt to contribute constructively to euro area reform (see Bénassy-Quéré et al. 2018). Gros and Schoenmaker (2012) also early on warned against a banking union with a single supervisor but without a common deposit insurance scheme.

a crisis and might therefore struggle to carry out the central bank's role as lender of last resort. Moreover, it would be unclear how losses should be shared among the member states if a cross-border bank that received emergency lending assistance (ELA) turned out to be insolvent. The lack of consideration of spillover effects from liquidation on other member states might also lead to inefficient outcomes regarding whether an institution would receive financial support or not.

The issue of whether centralized supervision is needed in order for the central bank of a monetary union to be able to efficiently carry out its functions as lender of last resort is obviously an aspect that only arises in the context of a monetary union. For countries with their own currency, emergency lending and other lender-of-last-resort measures would be carried out by the national central bank.[25] There could still be an issue with liquidity assistance given to cross-border banks that turn out to be insolvent, since the central bank that has given ELA most likely has to bear all the losses if the bank were to be liquidated. However, ELA is supposed only to be given against good collateral, so losses would only occur to the extent that it turns out to be of significantly lower quality than expected.

An exception might be when a resolved bank needs liquidity and temporarily lacks sufficient collateral. But exactly how liquidity support is supposed to be given in such situations is currently unclear even in the context of the banking union. For obvious reasons, the ECB is hesitant to guarantee liquidity support (see e.g. Mersch 2018). But since the ECB would be the institution with the most detailed knowledge of the capital and liquidity position of the bank, it would at the same time not be very appealing for other stakeholders to step in if the ECB declines to participate.

3.2 Cross-border externalities and the doom loop

For euro area members, an important potential benefit of membership in the banking union is a weakening of the doom loop mentioned in the introduction. The mechanism behind the doom loop is

[25] An interesting fact in this context is that currently it is the national central banks within the euro area that gives ELA. However, the ECB can set limits to the amount of ELA that national central banks are allowed to extend.

that the value of banks' holdings of sovereign debt decreases when the sovereign faces adverse conditions and this reduces the net worth of the banks. This weakening of the balance sheets of the banks increases the implicit liabilities of the sovereign because it raises the probability of bank bailouts. The increase in implicit liabilities depresses the value of sovereign debt further, which weakens the balance sheets of the banks further, and so on.

In a recent analysis, Farhi and Tirole (2018) show how the risk of a doom loop may create a rationale for centralized supervision. In their analysis, banks hold sovereign bonds as a store of liquidity. When they can count on bailouts, they optimally diversify their holdings of sovereign bonds as little as supervision allows them to. This way, they enjoy the maximum value of the implicit bailout protection against the downside risk of their domestic sovereign debt holdings. In risky situations, this value becomes higher and the banks have incentives to try to concentrate their debt holdings more than they are allowed to. A sovereign which is closely integrated with other countries may expect that a default would be so costly for these other countries because of cross-border spillovers that they would rather give assistance or debt forgiveness. In that case, the sovereign may have an incentive to be lenient in its supervision and let the banks build up large concentrations of sovereign debt since it would share the potential cost of the domestic banks' risk-taking with other countries. The banks thus shift their risks from creditors to taxpayers and the sovereign shifts risks from its taxpayers to the taxpayers of other countries.

In this setting, a negative shock to either public finances or the balance sheets of the banks generates a feedback loop through the sovereign and financial balance sheets. For instance, a negative fiscal shock leads to a decrease in the value of domestic bonds, which reduces the net worth of the banks. This, in turn, leads to an increase in the required bailout of the banks and to an increase in the additional bonds that need to be issued, which further decreases the value of domestic bonds.

The rationale for centralized supervision in this analysis arises partly because of cross-border externalities from sovereign default that are sufficiently large to justify transfers from foreign countries. In a monetary union such as the euro area, the externalities may indeed

be sufficiently large because a sovereign default may threaten the whole existence of the monetary union. For countries outside the monetary union, however, the cross-border externalities of a sovereign default may be much smaller.

3.3 The financial trilemma and ringfencing

But there are also potential benefits from participating in a banking union that are unrelated to the use of currency. As an analogy to the monetary trilemma well-known from the literature on international macroeconomics,[26] Schoenmaker (2011) presents an analysis of a financial trilemma relevant for considering how to organize financial policy. The financial trilemma states that financial stability, financial integration and national financial policies are incompatible. Two of the three objectives can be achieved, but not all three at the same time. The underlying reason in Schoenmaker's model is the cross-border externalities created by cross-border banking. Avoiding failure of a cross-border bank may benefit all the countries in which the bank has operations. But neither of these countries may individually have an incentive to bear the cost of saving the bank from liquidation. Because of this, cross-border banks in difficulties will be liquidated, even when it is optimal to save the banks to maintain financial stability. The more extensive the banks' cross-border operations are, the less likely it is that banks are saved when it would benefit financial stability to do so.

More generally, the interests of home and host countries of cross-border banks are likely to deviate in distressed situations. When it becomes apparent that there will be losses, the national authorities in the respective countries have incentives to try to prevent the losses from being borne by the creditors, bank clients and taxpayers residing in their own country. The supervisors have incentive to ensure that parent banks with subsidiaries abroad repatriate as much capital and liquidity as possible, while preventing domestic subsidiaries from transferring capital and liquidity to their parents abroad – a phenomenon referred to as 'ringfencing'

[26] According to the monetary trilemma, a country cannot simultaneously have a stable exchange rate, integrated financial markets and use monetary policy to stabilize the domestic economy. The country can achieve two out of these three objectives, but not all three of them. For a recent discussion about the monetary as well as the financial trilemma, see Obstfeld and Taylor (2017).

(Gros 2012). The outcome in such situations is likely to be larger overall losses than in a cooperative solution.

Different resolution strategies

A somewhat related issue regarding resolution of cross-border banks is whether a single-point-of-entry (SPE) or a multiple-point-of-entry (MPE) strategy should be pursued. With a SPE strategy, resolution tools and powers are applied by a single resolution authority at the level of the parent or holding company. The losses related to bail-in are borne by the parent's shareholders and creditors. This strategy requires that the parent absorbs the losses of its subsidiaries. Loss-absorbing capital and bail-inable debt would thus be shared across jurisdictions and cross-country transfers during resolution could arise. This resolution strategy is likely to be efficient in the sense of minimizing overall losses, in particular if the bank has a centralized structure with subsidiaries carrying out complementary functions (see e.g. Faia and Weder di Mauro 2016 and Schoenmaker 2016).

With an MPE strategy, resolution tools and powers are applied to several entities, e.g. the parent and foreign subsidiaries, possibly by several resolution authorities. To plan for such resolution, loss-absorbing capital and bail-inable debt have to be separately issued by such entities in each jurisdiction. In resolution the cross-border bank is split up, drawing on the loss-absorbing capital and bail-inable debt available in each jurisdiction. For a cross-border bank with a highly decentralized structure, such a strategy may be efficient. It is also an appealing strategy for host countries because it protects them from ringfencing, in particular by the home country of the parent.

Which strategy should be used is supposed to be determined ex ante in group recovery and resolution plans agreed on by all the involved resolution authorities. According to an analysis by Bolton and Oehmke (2019), even if the SPE strategy is the most efficient one, it may not be possible to carry out when several national resolution authorities are involved. If expected cross-country transfers are sufficiently asymmetric, the national authority that makes the larger expected transfer has no incentive to participate. Moreover, if the cross-country transfers required for a successful SPE reso-

lution turns out to be too large ex post, national authorities may prefer ringfencing to carrying out the required transfers.

In principle, the introduction of a common framework for bank resolution through BRRD should reduce the risk of inefficient outcomes regarding cross-border banks in financial distress. The general principles on cross-border resolution laid down in Article 87 BRRD oblige the authorities concerned to cooperate closely. There is however no legal certainty provided under BRRD that resolution plans will be carried out as foreseen and that a common cross-border resolution strategy will be applied (Lintner et al. 2016). Because of this, a benefit of participation in the banking union, with a centralized resolution authority, is likely to be more efficient resolution of cross-border banks. Participation in the banking union would facilitate using SPE strategies for resolution when they are the most efficient ones. Furthermore, stronger confidence on the part of cross-border banks that the SPE strategy would be used in a crisis might lead them to organize their activities in a more efficient way – at least inside the banking union – thereby promoting an efficient internal market for banking services.

Membership in the banking union may thus lead to more efficient outcomes of resolution processes involving cross-border banks in the non-euro countries. Whether the distribution of the gains from such more efficient resolution processes would benefit a particular country joining the banking union is however far from certain. The distribution of the gains will depend on the specific circumstances and may be affected by the negotiating power of the involved member states. A possible worry for non-euro countries is that their negotiating power may be weak in situations where resolutions of cross-border banks involve losses that pose financial-stability risks in the euro area. There might thus be overall benefits from a non-euro country joining the banking union resulting from more efficient resolution of cross-border banks without the joining country receiving any part of those benefits.

3.4 Other potential benefits

For members with deficiencies in the way national supervision works there may of course be a benefit from simply getting better supervision. The SSM has significant resources and will over time gain extensive experience in supervising different types of institu-

tions (Beck 2019). The fact that the ECB is located far from most of the institutions that it supervises may also contribute to reducing the risk of *regulatory capture*, which in this context means the risk that the institutions influence the supervisors so that they act more in the interest of the financial industry than in that of the public (Dal Bó 2006).

The financial sector is a sector with significant lobbying as well as what is sometimes referred to as a 'revolving door' between the government and the private sector. The latter means that employees tend to move from supervision to the financial industry and vice versa. Whether these features lead supervision to be less stringent than it should be is debated. Recent empirical evidence from the US does not seem to support that a revolving door between regulators and the financial industry affects the application of rules and regulations in a lenient direction (Lucca et al. 2014, Shive and Forster 2017).

There is, however, some evidence that social identification with the financial sector, which is related to prior working experience there, affects supervisory task performance negatively, especially when professional identity as a supervisor is weak (Veltrop and de Haan 2014). If that is correct, the establishment of a well-resourced supervisor with a highly competent staff that does not belong to the same social groups as industry employees could reduce potential regulatory capture, in particular by creating a strong sense of professional identity among its employees.

In this context, a particular issue is how effective procedures are for preventing that the financial system is used for money laundering and terrorism financing. Effective prevention presupposes well-functioning cooperation and exchange of information between domestic money-laundering supervisors and financial supervisors as well as between relevant supervisors in different countries. Since fighting money laundering involves law-enforcing authorities, which are not part of the banking union, there is no clear-cut case for arguing that anti-money-laundering activities would be carried out more effectively in the banking union. However, there could be advantages from having centralized financial supervision in the sense that information might flow more easily between one institution and the relevant national law-enforcing authorities.

There may also be important benefits from participating in the banking union of a more subtle nature that has to do with the country's influence on the development of the European Union. Arguably, the banking union is an important project for enhancing market integration in Europe and by having a seat at the table the members of the banking union would have a say in how the project should evolve in the future (see Beck 2019). For countries outside the euro area there is a risk that many of the important issues related to financial integration in Europe are discussed and effectively determined during processes in which they do not take part.

4. Potential costs of a banking union

4.1 Independence and governance

The most obvious potential cost of joining the banking union is loss of regulatory and supervisory independence. How one assesses this cost depends among other things on how one assesses the quality of national regulation and supervision. If that quality is relatively low, it may even be a benefit rather than cost, as noted in the section above.

For countries with their own currency, emergency lending and other lender-of-last-resort measures will be carried out by the national central bank. Membership in a banking union means that the national central bank becomes dependent on the supranational supervisory authority for timely information about the capital and liquidity positions of distressed banks. This could be more difficult to obtain compared with the case when supervision is the responsibility of a national authority because there may be less day-to-day interaction between staff in the national central bank and the supervisory authority. On the other hand, when cross-border banks are involved, the need for information from other sources than national authorities is likely to be very large, and it is not clear that the central bank benefits very much from smooth information-sharing with the national supervisor.

A related potential cost is a generally poorer governance of resolution procedures. As explained in Section 2.2, resolution procedures in the banking union involve several instances and a relatively

complex decision tree that needs to be worked through. But resolution cases are rarely easy to deal with, so whether or not this constitutes a cost depends on how smooth a process carried out by national authorities is. Since the rules regarding bail-in and other possible resolution tools are the same, the issue should essentially be about how efficiently the decision-making process works when an institution needs to be resolved. But, as suggested previously, there may also be an issue about how losses are allocated across countries when a cross-border bank is resolved. The legal framework is sufficiently flexible for there being scope for negotiations and this opens up for national interests to play a role.

In 2017, two Italian regional banks where liquidated and their acquisition by the bank Intesa was accompanied by a cash injection of 4.8 billion euro and state guarantees of a maximum of 12 billion euro. The same year, Monte dei Paschi di Siena was subject to a precautionary recapitalization using taxpayer money. These cases, which were not in breach of the rules in BRRD, nevertheless do not seem to be in accordance with the spirit of the legislation. It is clear that the legislation allows for some flexibility that can be used to meet national interests. However, the extent to which smaller countries would be able to utilize this flexibility is an open question.

4.2 Bail-in and contagion risk

A difference between the SRM regulation and BRRD is the required bail-in of own funds and debt before any resources from the resolution fund or other public sources can be used. The BRRD allows for 20% of risk-weighted assets as an alternative to 8% of total liabilities, while the SRM regulation does not include any such alternative. The alternative of bailing in 20% of risk-weighted assets follows from Article 44(8) of BRRD (Directive 2014/59/EU), which also makes clear that a provision is that the member state's resolution financing arrangement has at its disposal an amount which is at least equal to 3% of covered deposits of all the credit institutions.[27] Since the target level of SRF is only 1% of covered deposits, this provision could under no circumstances be fulfilled by members of the banking union.[28]

[27] Another provision is that the institution concerned has assets below EUR 900 billion on a consolidated basis.
[28] The alternative available according to BRRD is mainly applicable to Sweden which has a national resolution fund with a target level of 3% of covered deposits.

For banks that hold large amounts of low-risk assets on their balance sheets – for instance large amounts of mortgage loans with full recourse,[29] which is the case for Swedish and to some extent Danish banks – their common equity tier 1 capital alone may be almost sufficient for covering the 20% of risk-weighted assets, but not the 8% of total liabilities.[30] With the 8% requirement, subordinated creditors run a much higher risk of being bailed-in if such a bank needs to be resolved. This should in theory not cause any problems, since all EU banks are bound by minimum requirements for own funds and eligible liabilities (MREL), which means that they are required to hold bail-inable debt instruments that together with the own funds cover the needs for bail-in in any resolution. But since losses borne by creditors are a possible channel of contagion of financial distress, to include a significant share of these creditors in a bail-in operation probably increases the risk of financial instability. The cost of using the required bail-inable debt instruments might also become higher for a low-risk bank inside the banking union, since the creditors may demand compensation for the higher risk of being bailed in.

4.3 Legacy issues

An issue regarding participating in the European banking union that merits consideration is the existence of legacy problems discussed in Section 2.3. To enter into risk-sharing arrangements with countries whose banks appear to have weak balance sheets is to expose domestic taxpayers to higher risk. There is an on-going process trying to deal with the legacy problems, with regular reports on indicators on the health of banks, including the share of non-performing loans, and to what extent the member states have undertaken measures to reduce risks in the financial sector (see e.g. European Commission, European Central Bank, Single Resolution Board 2019). So far, there has been a downward trend in non-performing loans, although with large variations across countries. This trend is unlikely to continue in the current situation (April 2020), since the downturn in connection with the coronavirus crisis and spread of COVID-19 inevitably will lead to increased credit losses.

[29] With full recourse, the lender has a right to other assets than the secured collateral specified in the loan contract to cover repayment in the event of default on the loan.
[30] Common equity tier 1 capital is the highest quality of regulatory capital and consists of common shares and stock surplus, retained earnings, other comprehensive income, qualifying minority interest and regulatory adjustment (Bank for International Settlements 2019).

The current apparent weaknesses of the banking sectors in parts of the banking union and the ongoing efforts to reduce these weaknesses may speak in favour of a wait-and-see strategy to possible membership for non-euro countries. However, the extent to which joining the banking union really would expose domestic taxpayers to higher risk depends primarily on the risk of a systemic event occurring in any of the present member states. Non-systemic events are unlikely to result in the need for funds exceeding what is possible to get access to through bail-in, the national deposit guarantee schemes and the SRF.

Moreover, the fortunes of national banking systems may shift and what seems to be a strong banking system today can suddenly become a weak one if hit by financial stress. The cost of potentially having to contribute to dealing with failing banks in other countries has to be weighed against the benefit of being able to share the costs of dealing with failing banks at home. With well-functioning common supervision, the ex-ante probability of bank failure should be roughly similar across participating countries. The risk of being a net contributor to bank crises abroad should then be fairly similar across the different members. It is not a foregone conclusion that countries with seemingly strong banking systems joining the banking union would end up being net payers of banking crises abroad.

A further drawback with adopting a wait-and-see approach is that it prevents being able to influence the design of the remaining elements of the banking union. Suppose that the potential long-run benefits outweigh the long-run costs of participating in a European banking union. Delaying participation, thereby relinquishing the right to take part in negotiations about finalizing the banking union, may then result in an outcome with less long-run net benefits and perhaps even long-run net costs.

5. Conclusions

A conclusion from the discussion above is that the case for or against non-euro countries joining the European banking union is far from clear-cut. Neither the potential benefits nor the potential costs are particularly certain.

The potential benefits are mainly based on more efficient resolution of cross-border banks, with less ringfencing and therefore smaller overall losses. Moreover, the losses from having to resolve domestic systemically important banks may potentially be shared with other countries. Joining the banking union would also enable non-euro countries to take an active part in an important project for enhancing market integration in Europe.

The potential costs are mainly based on losing national control over how systemically important banks are resolved and the possible need to contribute financially to dealing with failing systemically important banks abroad. The presence of legacy problems in parts of the banking union, with high levels of non-performing loans, makes the latter appear a pertinent concern.

On paper, the difference between being in or out of the banking union should be small, since the legal framework guiding how resolution is carried out is essentially the same and any risk-sharing elements in the banking union are supposed to be fiscally neutral in the long run. In practice, however, the difference may be large because resolution cases are typically very complex and it matters which decision-making bodies are involved and which information is available when decisions have to be made.

What seems clear, however, is that the net benefits of participating in the banking union are considerably smaller for non-euro countries than for countries in the euro area. Even if the non-euro countries have banks with extensive cross-border operations in members of the banking union – which is the case for Sweden as well as Denmark – and therefore might benefit more from efficient resolution of such banks than some euro area countries, non-euro countries do not benefit from weakening the existential threat to the common currency itself.

Without clear net benefits from such a large step as participating in a banking union, it may seem as a natural conclusion to recommend staying out or at least delay joining until risks in the parts of the banking union with significant legacy problems seem more contained. However, this conclusion is not completely obvious since the potential cost of participating in the banking union seems to be fairly low. The main reason for this is the existence of safeguards

for non-euro countries that make it easier to oppose decisions that would be counter to their national interests. Apart from the potential political repercussions, it even seems quite easy for non-euro countries to simply leave the banking union if it turns out that the costs outweigh the benefits. My conclusion is therefore that whether it makes sense for non-euro countries to participate in the banking union is really an open question that crucially depends on the value put on closer cooperation with euro area members in matters related to financial integration and financial stability.

References

Arbejdsgruppen vedrørende mulig dansk deltagelse i det styrkede banksamarbejde (Bankunionen) (2019), Rapport om mulig dansk deltagelse i det styrkede banksamarbejde – Erfaringer siden 2015, Retrieved February 26, 2020, from www.regeringen.dk/media/8778/rapport_endelig.pdf.

Bank for International Settlements (2019), Definition of capital in Basel III – Executive Summary, Retrieved March 8, 2020, from www.bis.org/fsi/fsisummaries/defcap_b3.pdf.

Beck, T. (2019), Better in or better out: Weighing Sweden's options vis-à-vis the banking union, Committee on potential participation in the European Banking Union, Fi 2017:10.

Bénassy-Quéré, A., Brunnermeier, M., Enderlein, H., Farhi, E., Fratzscher, M., Fuest, C., Gourinchas, P.-O., Martin, P., Pisani-Ferry, J., Rey, H., Schnabel, I., Véron, N., Weder di Mauro, B. and Zettelmeyer, J. (2018), Reconciling risk sharing with market discipline: A constructive approach to euro area reform, CEPR Policy Insight No. 91.

Bolton, P. and Oehmke, M. (2019), Bank resolution and the structure of global banks, *Review of Financial Studies*, 32(6), 2384–2421.

Centeno, M. (2020), Summing-up letter, Eurogroup in inclusive format, 20 January 2020, Retrieved March 8, 2020, from www.consilium.europa.eu/media/42359/20200120-eg-inclusive-format-summing-up-letter.pdf.

Council of the European Union (2013), Council Regulation (EU) No 1024/2013 of 15 October 2013 conferring specific tasks on the European Central Bank concerning policies relating to the prudential supervision of credit institutions.

Council of the European Union (2014), Agreement on the transfer and mutualisation of contributions to the Single Resolution fund, Legislative Acts and Other Instruments 8457/14.

Dal Bó, E. (2006), Regulatory capture: A review, *Oxford Review of Economic Policy*, 22(2), 203–225, doi:10.1093/oxrep/grj013.

De Groen, W. P. and Gros D. (2015), Estimating the Bridge Financing Needs of the Single Resolution Fund: How expensive is it to resolve a bank?, CEPS Special Report No. 122, Brussels: CEPS.

Directive 2014/49/EU of the European Parliament and of the Council of 16 April 2014 on deposit guarantee schemes.

Directive 2014/59/EU of the European Parliament and of the Council of 15 May 2014 establishing a framework for the recovery and resolution of credit institutions and investment firms.

Erhvervsministeriet (2019), Rapport fra Arbejdsgruppen om mulig dansk deltagelse i det styrkede banksamarbejde, Retrieved February 26, 2020, from em.dk/nyhedsarkiv/2019/december/rapport-fra-arbejdsgruppen-om-mulig-dansk-deltagelse-i-det-styrkede-banksamarbejde/.

European Commission (2009), Commission raises overall ceiling in balance-of-payments assistance facility, press release 8 April 2009, Retrieved March 6, 2020, from ec.europa.eu/commission/presscorner/detail/en/IP_09_559.

European Commission (2017), Communication to the European Parliament, the Council, the European Central Bank, the European Economic and Social Committee of the Regions on completing the Banking Union, Brussels, 11.10.2017, COM(2017) 592.

European Commission, European Central Bank, Single Resolution Board (2019), Monitoring report on risk reduction indicators, November 2019, Retrieved March 8, 2020, from www.consilium.europa.eu/media/41645/joint-risk-reduction-monitoring-report-to-eg_november-2019_for-publication.pdf.

European Stability Mechanism (2019), Draft Board of Governors resolution to grant the backstop facility, Retrieved March 6, 2020, from www.consilium.europa.eu/media/41670/20191206-draft-bog-resolution-2-key-financial-terms.pdf.

Euro summit (2012), Euro area summit statement 29 June 2012, Retrieved March 6, 2020, from www.consilium.europa.eu/media/21400/20120629-euro-area-summit-statement-en.pdf.

Euro summit (2018), Euro area summit statement 14 December 2018, Retrieved March 8, 2020, from www.consilium.europa.eu/media/37563/20181214-euro-summit-statement.pdf.

Faia, E. and Weder di Mauro, B. (2016), Cross-border resolution of global banks: Bail-in under single point of entry versus multiple points of entry, CEPR Discussion Paper No. 11171.

Farhi, E. and Tirole, J. (2018), Deadly embrace: Sovereign and financial balance sheets doom loops, *Review of Economic Studies*, 85(3), 1781–1823.

Goodhart, C. A. E. (2003), The organizational structure of banking supervision, *Economic Notes*, 31(1), 1-32.

Gros, D. (2012), The single European market in banking in decline – ECB to the rescue?, in Beck, T. (ed.), *Banking Union for Europe – risks and challenges* (51-55), VoxEU e-book.

Gros, D. and Schoenmaker, D. (2012), The case for euro deposit insurance, Vox (voxeu.org), 24 September 2012, Retrived 8 March, 2020, from voxeu.org/article/case-euro-deposit-insurance.

Jokivuolle, E., Vihriälä, V., Virolainen, K. and Westman, H. (2020), Bail-in: EU rules and their applicability in the Nordic context, this volume.

Lintner, P., Lincoln Nagy, M. A. J., Pyziak, P., Godwin, A. J., Schroeder, S. C. and Irsalieva, N. (2016), Understanding bank recovery and resolution in the EU: A guidebook to the BRRD, Washington, D.C.: World Bank Group.

Lucca, D., Seru, A. and Trebbi, F. (2014), The revolving door and worker flows in banking regulation, *Journal of Monetary Economics*, 65, 17–32.

Mersch, Y. (2018), The limits of central bank financing in resolution, IMFS Distinguished Lecture Series Goethe Universität Frankfurt, 30 January 2018.

Obstfeld, M. and Taylor, A. M. (2017), International Monetary Relations: Taking Finance Seriously, *Journal of Economic Perspectives*, 31(3), 3-28.

Regulation (No 806/2014) of the European Parliament and of the Council establishing uniform rules and a uniform procedure for the resolution of credit institutions and certain investment firms in the framework of a Single Resolution Mechanism and a Single Resolution Fund and amending Regulation (EU) No 1093/2010.

Reuters (2019), Italy against German proposal of regulating sovereign holdings in banks, Bonds news 7 November 2019, Retrieved February 26, 2020, from www.reuters.com/article/eurozone-italy-banks/italy-against-german-proposal-of-regulating-sovereign-holdings-in-banks-idUSB5N27A004.

Schoenmaker, D. (2011), The financial trilemma, *Economics Letters*, 111(1), 57-59.

Schoenmaker, D. (2016), The impact of the legal and operational structures of euro-area banks on their resolvability, Bruegel Policy Contribution No. 23, Brussels: Bruegel.

Shive, S. and Forster, M. (2017), The revolving door for financial regulators, *Review of Finance*, 21(4), 1445–1484.

Sholz, O. (2019), Germany will consider EU-wide bank deposit reinsurance, *Financial Times*, 5 November 2019.

Utredningen om ett eventuellt svenskt deltagande i Europeiska bankunionen (2019), Sverige och bankunionen (SOU 2019:52), Stockholm: Finansdepartementet.

Van Rompuy, H. (2012a), Towards a genuine Economic and Monetary Union: Report by President of the European Council Herman Van Rompuy, 26 June 2012, Retrieved February 26, 2020, from www.consilium.europa.eu/media/33785/131201.pdf.

Van Rompuy, H. (2012b), Towards a genuine Economic and Monetary Union: Report by President of the European Council Herman van Rompuy, 5 December 2012, Retrieved February 26, 2020, from www.consilium.europa.eu/media/23818/134069.pdf.

Veltrop, D. and de Haan, J. (2014), I just cannot get you out of my head: Regulatory capture of financial sector supervisors, De Nederlandsche Bank Working Paper No. 410, doi: 10.2139/ssrn.2391123.

Véron, N. (2011), Europe must change course on banks, Vox (voxeu.org), 22 December 2011, Retrieved February 26, 2020, from www.voxeu.org/article/europe-must-change-course-banks.

Vives, X. (2001), Restructuring financial regulation in the European Monetary Union, *Journal of Financial Services Research*, 19(1), 57–82, doi.org/10.1023/A:1011133401170.

Comment on K. Ekholm: Pros and Cons of Participating in the Banking Union

Svend E. Hougaard Jensen[1]

The paper by Karolina Ekholm offers a balanced and insightful discussion of pros and cons of entering the European banking union. The assessment is made from the perspective of a country that is a member of the European Union (EU) but which has not yet adopted the euro as its currency. Essentially, the focus of the paper is on whether it would pay for Sweden and/or Denmark to join the banking union.

1. Cross-border banking and the banking union

The perceived need for a banking union in Europe has been widely motivated by the negative spiral that can result when banks hold sovereign bonds and governments bail out banks. This close link between banks and government solvency has since the European sovereign debt crisis been seen as one of the biggest threats to financial stability in Europe. Therefore, creating a supranational supervisor and bank resolution regime seemed a logical response to this threat.

However, the academic literature has for a long time, and long before the European sovereign debt crisis, pointed to the need for a banking union when there is cross-border banking. Early papers include Folkerts-Landau and Garber (1992), Schoenmaker (1997) and Vives (2001). With cross-border banking, there is a 'financial trilemma' stating that the three objectives of financial stability, cross-border banking and national financial policy cannot be achieved at the same time (Schoenmaker 2011). More generally, the interests of home and host countries of cross-border banks are likely to deviate in distressed situations.

[1] Copenhagen Business School, PeRCent and the Systemic Risk Council in Demark. Email: shj.eco@cbs.dk.

Table 1 Cross-border penetration of European banking, percent of total banking assets

			Of which: (in percent)		
	Number of banks	Total assets (in billion euro)	Home	Other EU	Third country
Banking Union	5 516	30 772	83	14	3
Non-Banking Union	1 752	12 196	57	19	24
European Union	7 268	42 968	76	16	9
United States	5 643	12 360	84		16

Source: Schoenmaker (2016).

The key point can be illustrated as follows: Suppose country A is not only the *home* country of banks from country A but also host country of banks from country B. In order to provide financial stability in country A, the authorities in country A would need information (about capital and liquidity positions of distressed banks) from the supervisory authorities of country B. However, country B may have reasons to hold back such information. Failure to get this information, fully and on time, might (seriously) jeopardize the possibility for country A to deliver financial stability in country A. So, there is a need for a supranational authority.

Against this background, the pros and cons of taking part in the banking union should be assessed in terms of the magnitude of cross-border banking. While it is widely agreed that a currency union does not work without a banking union, the question is if EU member states outside of the Eurozone have a large foreign component of their total banking assets.

Table 1 seeks to illuminate this. Apparently, the foreign component is significantly larger in the EU countries outside the Eurozone (non-banking union) than in the countries within the Eurozone. From this perspective, the case for joining the banking union is strong. The question is whether the numbers for Denmark and Sweden are well represented by the average numbers for the non-banking union.
Table 2 offers a closer look at individual EU countries outside of the

Table 2 Cross-border banking penetration in non-euro area member states, end of 2018

		Of which: (in percent)		
	Total assets (in billion euro)	Home	Other EU	Third country
Bulgaria	58	24	72	4
Denmark	1 173	86	14	0
Hungary	127	54	41	6
Poland	484	56	41	4
Romania	104	37	63	0
Sweden	1 296	82	17	1
United Kingdom	9 169	51	15	34
Non-euro area	12 785	57	19	25

Source: De Haan et al. (2020).

Eurozone. Two observations leap to the eye: First, the magnitude of cross-border banking penetration in Denmark and Sweden is much lower than in non-banking-union EU countries in Eastern Europe. Specifically, the home share of total banking assets in Denmark and Sweden is 86% and 82%, respectively.

Second, the pattern found for Denmark and Sweden does not deviate much from what is found for members of the Eurozone. Therefore, the degree of cross-border penetration of Scandinavian banking is likely to be high enough to constitute a (strong) case for joining the banking union. Yet, in future work, it would be interesting to study more closely if there is a critical level of cross-border banking such that if a country's cross-border banking exceeds a certain 'threshold' (e.g., 15%), the country would benefit from joining the banking union. The outcome of such a study would be very important for assessing what Ekholm reports as the clearest cost of joining banking union: the loss of regulatory and supervisory independence. However, as also noted by Ekholm, the size of that cost may be small in a world where financial markets are highly integrated. With a sufficiently high degree of financial interdependence, the scope for regulatory

and supervisory independence at the national level may cease to exist.

2. Monetary union, monetary policy and decision-making in the banking union

The European banking union was introduced in 2012 to address the bank-sovereign 'doom loop'. The rationale for centralized supervision in this case arises partly because of cross-border externalities from sovereign default that are sufficiently large to justify cross-border transfers. Whereas the Eurozone can be at stake for members of the Eurozone, for small stand-alone countries, such as Denmark and Sweden, the risks associated with a doom loop may be much smaller. In principle, their central banks are not constrained in the same way to act as lenders of last resort to the government as is ECB vis-à-vis the governments in the Eurozone.

This insight might weaken the case for Danish and Swedish membership of the banking union, as there is no currency union for them to defend and their access to lender-of-last-resort activities seems more straightforward. However, there is a substantive difference between the two countries' exchange rate policy, potentially implying a (big) difference in the pro-versus-con calculation. While Sweden pursues inflation targeting, Denmark pegs the krone to the euro, as part of ERM-2. The peg is a cornerstone of Danish economic policy and there is widespread support for the fixed exchange rate policy. It implies that monetary policy interest rates are solely used to keep the Danish krone stable against the euro, while other considerations are not taken into account. Therefore, stability of the Eurozone is more important for Denmark than Sweden.

This takes me to discuss the role of decision-making in the banking union. The point is that the location of the supervisory authority in the European banking union will ultimately be in the ECB. This may well present a challenge, as Denmark and Sweden have no representation on the ECB's Governing Council. Clearly, Denmark and Sweden would prefer a location of the Single Supervisory Mechanism (SSM) outside of the ECB, but this is hardly realistic at this stage of development of the banking union. Also, as monetary policy and macroprudential polices are intertwined, it can from a broader point

of view be debated whether a separate location of the SSM is desirable.

Again, a difference between Denmark and Sweden can be pointed out. Indeed, Denmark has two decades of experience with taking part in such an arrangement, by being *de facto* in the Eurozone when it comes to monetary policy but without having a representation in the Governing Council. Apparently, membership of the decision-making bodies has not proven to be decisive for reaping benefits in terms of macroeconomic stability. In the same vein, participation in the banking union, without joining the Eurozone, could be a combination likely to generate important benefits in terms of financial stability.

That said, let me point out an example where it could make a huge difference if a country is not only a member of the banking union but also of the Eurozone. Suppose Denmark joins the banking union and a Danish bank – e.g., Danske Bank – runs into big trouble. In the first round, decisions about resolution would be taken by the SSM, a body where Denmark has no representation. As for resolution, this might happen in a situation where resources would need to come from the European Stability Mechanism (ESM), the (likely) fiscal backstop for the Single Resolution Fund (SRF). However, the ESM is a pure Eurozone institution and, therefore, it might not be entitled to make transfers to countries outside of the Eurozone.

Thus, ultimately, the decision about resolution of Danske Bank might have been taken by a body without Danish representation, and the necessary sources for resolution would come from the Danish taxpayers rather than the funds created within the banking union. Admittedly, this might be regarded as a rather extreme case, but it illustrates the importance - for Denmark and Sweden - of knowing in advance whether their treatment would be the same as for members of the Eurozone.

3. Other considerations

Let me finally mention an (often neglected) area where I find the case for joining the banking union particularly strong. Indeed, the SSM already has significant resources and will over time gain exten-

sive experience in supervising different types of institutions (Beck 2019). The fact that it is located far from most of the institutions that it supervises may also reduce the risk of regulatory capture. The SSM, based in the ECB, would be able to not only attract talent at the junior level but also to develop and maintain senior staff, thereby having a very experienced and highly competent staff. FSAs in smaller countries, such as Denmark and Sweden, typically have high turnover rates, with the best and most ambitious staff moving to the private financial sector.

The point is that supervision is complex, and makes heavy demands on skills to match the expertise available in commercial banks etc. To me, this is a key benefit of joining the banking union, and perhaps the most important one.

Overall, I share Ekholm's view that the clearest economic benefit of enlarging the banking union is the prospect of more efficient resolution of cross-border banks. I also agree with her that there is a serious concern as to how the gains are distributed. Maybe a 'flexible' membership should be considered, by joining now and exiting later without big costs if membership does not live up to expectations.

References

Beck, T. (2019), Better in or better out: Weighing Sweden's Options vis-à-vis the banking union, Committee on Potential Participation in the European Banking Union, Fi 2017:10.

De Haan, J., Schoenmaker, D. and Wierts, P. (2020), *Financial markets and institutions: A European perspective*, Fourth Edition, Cambridge: Cambridge University Press, forthcoming.

Folkerts-Landau, D. and Garber, P. (1992), The European Central Bank: A bank or a monetary policy rule, NEBR Workings Paper No. 4016.

Schoenmaker, D. (1997), Banking supervision and lender of last resort in EMU, in Adenas, M., Gormley, L. and Harden, I. (eds.), *European Economic and Monetary Union: The Institutional Framework*, London: Kluwer.

Schoenmaker, D. (2011), The Financial Trilemma, *Economics Letters*, 111(1), 57–59.

Schoenmaker, D. (2016), The banking union: An overview and open issues, in Beck, T. and Casu, B. (eds.), *The Palgrave Handbook of European Banking* (451-474), London: Palgrave Macmillan.

Vives, X. (2001), Restructuring financial regulation in the European Monetary Union, *Journal of Financial Services Research*, 19(1), 57-82.

Nordic Council of Ministers
Nordens Hus
Ved Stranden 18
DK-1061 Copenhagen K
www.norden.org

FINANCIAL REGULATION AND MACROECONOMIC STABILITY in the Nordics

Nordic Economic Policy Review 2020