STAFF MEMO

Transmission channels from high household debt to bank losses

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Transmission channels from high household debt to bank losses

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We identify three transmission channels from high household debt to bank losses. Banks can incur losses on lending to households directly (direct channel), on lending to consumption-sensitive industries if traditional household demand declines (demand channel) or on lending to commercial property and construction if households reduce demand for housing (property channel). We regard the risk in the direct channel as small compared with the other two channels. We find that the importance of the property channel has increased, while the demand channel has become relatively less important. Our findings indicate that it is important to monitor developments in the property market closely to understand banks' vulnerabilities. This is in line with experience in Spain and Ireland in connection with the financial crisis in 2008-09.

At end-2013, Norwegian households held debt equivalent to twice their disposable income. Loans to households account for approximately half of total bank lending, and the proportion has risen in recent years. Many of banks' corporate customers are also affected by developments in household borrowing. If the vulnerability of Norwegian households should later materialise as bank losses, banks' role as credit provider will weaken. Previous experience shows that this can trigger or amplify a downturn.

In this *Staff Memo*, we establish a framework to gain a better understanding of the transmission channels from high household debt to bank losses. On the basis of households' budget constraints, we show that bank losses are closely related to adjustments households make when they are subjected to income and wealth shocks. We identify three channels from households' adjustments to bank losses. Banks can incur losses on household lending directly (*direct channel*), on lending to consumption-sensitive sectors if households curb traditional demand (*demand channel*) or on lending to commercial property and construction if households reduce their demand for housing (*property channel*).

When household debt increases relative to income, the necessary adjustment to a shock increases. Higher debt-to-income ratios always entail, in isolation, a reduction in households' room for manoeuvre, since a larger share of income is tied to debt servicing. If households are not to default on their debts, they will need to cut other expenses accordingly. Nevertheless, the *relative* importance of the channels from changes in households' adjustments to bank losses can change over time.

Despite the fact that banks have increased their lending to the household sector, we continue to regard the risk of heavy losses in the direct channel as small. Waiving future liability for repayment of a loan is seldom an option for Norwegian households and declaring bankruptcy can therefore involve substantial losses. Higher margins have also made it easier for households to adapt their behaviour by adjusting other spending (see Solheim and Vatne (2013)).

Problems in the corporate sector have a greater potential for inflicting losses on banks. Unlike households, owners of businesses have limited liability in the event of bankruptcy. However, we find that, with regard to relative importance, the demand and property channels have shown opposite developments. While the demand channel has probably become less important in the period from 1997 to 2013, the potential for substantial losses through the property channel has increased. There has, for

* We would like to thank Ida Wolden Bache, Magdalena D. Riiser, Frank Hansen, Bjørne-Dyre Syversten and Kjersti-Gro Lindquist for useful input and comments.

example, been a marked shift in bank lending from traditional consumption-related industries towards commercial property and building project development.

Our findings are in line with trends observed internationally. Even in the wake of the financial crisis in 2008-09, direct losses on lending to households have been low in most European countries. However, in countries where banks were particularly hard hit, such as Ireland and Spain, household debt accumulation coincided with rapid growth in the property market. Many of the largest losses have occurred in precisely these sectors. This underscores the importance of focusing on the housing and property markets when assessing banks' risk. Periods of high household debt accumulation combined with an elevated level of activity in the property market may indicate an especially high degree of vulnerability.

Household behaviour

The basis of our analysis is households' budget constraints. After-tax income can be roughly divided into three main expenditure items:

1. **Net financial flows**:
   Interest and net financial saving (debt repayments and other saving minus borrowing)
2. **Demand for goods and services**:
   Consumption and investment, including investment in owner-occupied housing[1]
3. **Net purchase of housing**

If we assume that household investment in its entirety is related to housing, the following identity results:

$$\text{After-tax income} = \underbrace{\text{Income} + \text{Net fin. saving}}_{\text{Net financial flows}} + \underbrace{\text{Consump.} + \text{Housing inv.}}_{\text{Demand}} + \text{Net purchase of housing}$$

Households adjust their spending in the event of an income or wealth shock.[2] An income shock reduces households' disposable income through increased interest rates, higher taxes or a decline in gross income. A wealth shock is typically related to a fall in house prices, since housing is households' dominant asset.

In this framework, banks are exposed to household behaviour via three channels. Banks incur direct losses on lending to the household sector if households choose to default on their interest and principal payments (direct channel). If households choose instead to reduce demand for consumption and/or owner-occupied housing investment, this may create problems for firms that are sensitive to changes in household demand (demand channel). Losses in the property channel arise if households adjust to a shock by reducing their demand for housing (property channel). This will pull down house prices, and firms that are closely linked to developments in the property market may then inflict losses on banks.

When household debt rises relative to income, the necessary adjustment to a shock also increases. Therefore, in isolation, the probability of bank losses will rise in pace with higher debt-to-income ratios. However, the relative importance of each channel depends both on the likelihood of losses in each channel and banks' exposure to each of them. Nor is the marginal effect of higher debt-to-income ratios on the probability of losses in each channel clear cut. Households' choice of behaviour will

[1] Renovation, expansion and maintenance.
[2] A shock to households' expectations is an example of another important shock that is beyond the scope of this article.

depend on debt levels, available margin after interest and standard living expenses have been paid and the ratio of debt to collateral value (see e.g. Solheim and Vatne (2013)).

Direct channel

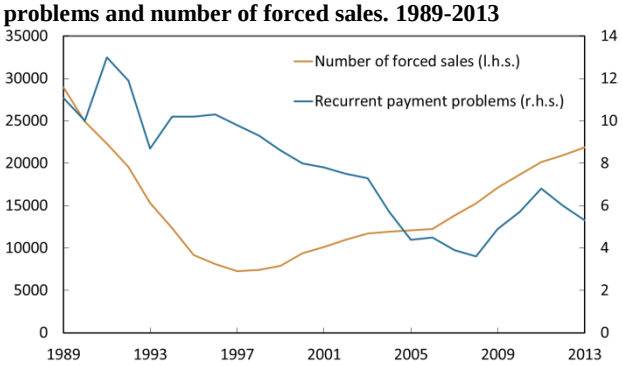
Households may choose to default on loans if they regard the cost of meeting their obligations as higher than the costs associated with default. However, the costs associated with default are considerable, since households must expect i) to lose their collateral, ii) to be forced to set up a repayment plan for the portion of the loan not covered by the collateral amount[3] and iii) to be blacklisted in the credit market.

A decline in income or wealth may contribute to higher direct bank losses. A decline in income reduces the funds available for interest and principal payments. A decline in house prices may amplify the effect of an income shock by making it more difficult to renegotiate loan terms and obtain loans secured by residential property. With limited equity, the value of a dwelling no longer functions as a buffer against bad times.

Whether a loan is in default also depends on banks' assessments. In the event of payment problems, a bank can choose either to initiate bankruptcy proceedings against the customer or to agree to revise the terms of the loan to give the customer temporary relief in exchange for upholding the original obligation. Since a bank's costs in connection with a customer bankruptcy can also be substantial, it will normally be more appropriate to make changes to the terms of the loan.

Experience from previous crises, both in Norway and internationally, suggests that households rarely default on their obligations (see Kragh-Sørensen and Solheim (2014)). Even in countries where house prices fall markedly and unemployment rises, losses on loans to the household sector secured by residential property are moderate. An exception was subprime mortgages in the US in the period following the financial crisis, although this was an example of loans backed by collateral that fell sharply in value. In Norway, borrowers are liable for a larger share of the amount borrowed.

Chart 1: Share of households with recurrent payment problems and number of forced sales. 1989-2013



Sources: Grindaker (2013) and SIFO

Despite the fact that banks have increased their lending to the household sector, we still regard the risk of substantial losses through the direct channel as small, as long as the cost of a personal bankruptcy is high. At the same time, increased margins over an extended period have made it easier for Norwegian households to adjust other spending (see Solheim and Vatne (2013)). On the other hand, there are signs that Norwegian households have recently become less concerned about meeting their

[3] Norwegian bankruptcy procedures require that certain percentage of income is deducted until the loan is repaid.

obligations. Grindaker (2013) finds that the number of forced sales has risen. There are also signs of a rising trend in the number of negative credit reports (see Chart 1).

Demand channel

Lower consumption and housing investment will reduce the profitability of firms that are sensitive to changes in household demand. Owners of a limited liability company are liable only for the equity in the event of bankruptcy. There is therefore greater reason to fear losses on corporate loans than on loans to the household sector.

The demand channel will be affected by both an income and a wealth shock. A fall in income will limit households' possibilities for consumption and housing investment. Following a decline in house prices, households may choose to pay down debt (increase saving) to prevent the value of their collateral from falling below the amount of the loan or find that their ability to borrow more is limited because they have less available collateral. Various Norwegian studies find, for example, that a one percent reduction in wealth (primarily housing) reduces consumption by between 0.15 percent and 0.27 percent (see Jansen (2009)).

Banks' sensitivity to the demand channel depends on their exposure to consumption-sensitive industries and the probability of losses on loans to these industries. For the purpose of our analysis, we define consumption-sensitive industries as consumer goods[4], furniture, wholesale and retail trade, other transport[5], construction (excluding building project development) and hotel and restaurant services. This follows a division that was first made in the December 2006 *Financial Stability* report (FS 2/2006). These industries were chosen on the basis of experience from the banking crisis at the end of the 1980s and early 1990s, but provide a reasonable starting point for our analyses.

The analysis in FS 2/2006 sought to show the effects of a shock to consumption by simulating changes in losses in consumption-sensitive industries in the event of a 5 percent drop in consumption relative to the baseline scenario.[6] The findings showed relatively minor losses overall, but wholesale and retail trade and hotel and restaurant services stood out as having somewhat higher losses than the other industries.[7]

Historical loss data provide an alternative basis for estimating the probability of losses on loans to consumption-sensitive industries. We use annual bank data for loans and losses in the period 1997–2013 that banks report directly to Norges Bank and Finanstilsynet (Financial Supervisory Authority of Norway). The data covers all banks in Norway except for branches and subsidiaries[8] of foreign banks. Table 1 shows average loss ratios by sector.[9] Chart 2 shows that consumption-sensitive industries have on average a higher loss ratio than other industries in the period 1997–2013, a loss ratio of approximately 0.5 percent compared with 0.4 percent for other industries.

[4] Consumer goods industries are defined as the manufacture of food products, beverages, tobacco products, textiles, clothing, luggage, saddlery and harness, footwear and tanning and dressing of leather and dressing and dyeing of fur.
[5] Transportation excluding pipelines and foreign shipping.
[6] This decline is in the same order as the decline during the financial crisis, when growth in consumption fell from around 5 percent to zero. Nevertheless, this somewhat less than the decline in consumption during the banking crisis, when growth in consumption fell from well over 9 percent in 1985 to about 2 percent three years later. The estimate takes into consideration the breakdown of consumption across industries based on their respective shares of consumption expenditure in the national accounts and estimated elasticity of demand in Statistics Norway's macroeconomic model MODAG.
[7] Since the sector-specific model that was used is no longer used by Norges Bank, it is difficult to update the results.
[8] As there are considerable gaps in the data for most subsidiaries of foreign banks, we have chosen to omit them.
[9] This is a simple process for all industries in Table 1 except consumer goods and the furniture industry, which are subgroups of the manufacturing and mining sector. For the sake of simplicity, we assume that they have the same loss ratio as the manufacturing and mining sector as a whole.

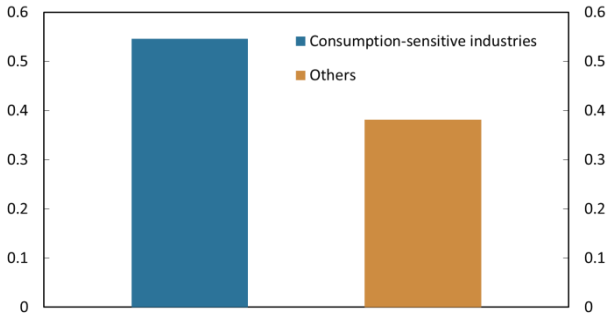
One drawback of the historical loss data is that the period we examine does not cover a severe banking crisis. There is reason to believe that losses in a crisis will deviate from losses in normal periods. To compensate for this, we compare actual losses with DNB's risk weights as published in its Pillar 3 report for 2012. These risk weights shall, in principle, also take into account the losses that arose during the banking crisis in Norway in the period 1988–1993.[10] Both estimated loss ratios and DNB's risk weights are shown in Table 1.

Table 1: Estimated loss ratios (average 1997 – 2013) and DNB's risk weights (2012). By industry

Industry	Estimated loss ratio (percent)[1)]	Risk weights DNB (divided by 100)
Primary industries[2)]	0.568	0.471
Extraction of crude oil and natural gas	0.045	0.367
Manufacturing and mining	0.667	0.477
Power and water supply	0.162	0.287
Construction excl. building project dev.	0.659	0.459
Retail trade, hotels and restaurants[3)]	0.506	0.549
Shipping	0.599	0.702
Other transport	0.400	0.426
Services	0.458	0.529
Commercial property incl. building project dev.	0.143	0.428
Consumer goods (same as manufacturing)	0.667	0.477
Furniture industry (same as manufacturing)	0.667	0.477

1) Loss as a percentage of lending to each industry. Applies to all banks except branches and subsidiaries of foreign banks in Norway.
2) The DNB risk weight is the weighted average of the risk weight for "Agriculture and forestry" and "Seafood".
3) The DNB risk weight is the weighted average of the risk weight for "Trade" and "Hotels and restaurants".
Sources: DNB Pillar 3 report 2012 and Norges Bank.

Chart 2: Estimated average loss ratio[1)] for consumption-sensitive[2)] and other industries. All banks except branches and subsidiaries of foreign banks in Norway. 1997-2013



1) Loss as a percentage of lending to each industry.
2) Consumption-sensitive industries comprise the following: consumer goods, the furniture industry, retail trade, other transport, construction excl. building project development and hotels and restaurants.
Source: Norges Bank

[10] The benefit of using DNB's risk weights is apparent when we note that commercial property is shown to be far riskier relative to other sectors that if we base our analysis on estimated loss ratios. The likely explanation is that losses on commercial property loans are lower in more normal times, since the value of the collateral will as a rule be high enough to cover minor fluctuations in property prices. However, in a crisis period, the value of the collateral may fall sharply, resulting in substantial bank losses.

To better understand the risk of bank losses, we combine industry-specific loss probabilities with information about the composition of banks' loan portfolios. Chart 3 shows the distribution of bank lending across industries.[11] In 1997, consumption-sensitive industries accounted for around 28 percent of bank lending. This share was 16 percent in 2013. The commercial property industry (including building project development) has shown the strongest growth, where the share of bank lending has increased from 21 percent in 1997 to 46 percent in 2013. Chart 4 shows the distribution of bank lending based on ORBOF statistics (banks and financial undertakings' financial reporting to the Norwegian authorities), which include mortgage companies and foreign subsidiaries in Norway. These statistics paint the same picture.[12]

Based on estimated loss ratios, DNB's risk weights and bank lending portfolios, we estimate a measure of banks' sensitivity to the demand channel. We multiply the average loss ratio for each industry in Table 1 by the share of bank lending to that industry each year. Lending is based on annual reported data from the banking sector with the exception of branches and subsidiaries of foreign banks in Norway. Risk-weighted lending to each industry is the product of the loss ratio and the share of bank lending. We then calculate total risk-weighted lending for consumption-sensitive industries and for all other industries.

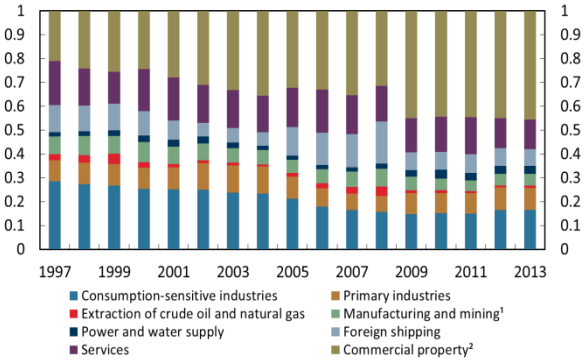
Chart 5 shows that risk-weighted lending to consumption-sensitive industries is lower than for other industries. Chart 5 also shows that risk-weighted lending to consumption-sensitive industries decreased by almost half between 1997 and 2013. Since risk-weighted lending for other industries has not fallen to the same extent, the share of risk-weighted lending to consumption-sensitive industries fell from 34 percent in 1997 to 25 percent in 2013. In Chart 6, we let the loss ratios remain constant, while shares of bank lending are estimated based on the lending portfolio shown in Chart 4. Chart 6 shows largely the same result as in Chart 5. If mortgage companies and subsidiaries of foreign banks in Norway are included, the fall in risk-weighted lending to consumption-sensitive industries is even larger.

Chart 7 shows the results of a similar exercise where the shares of bank lending in Chart 4 are multiplied by DNB's risk weights. There is little difference in the result. Risk-weighted lending to consumption-sensitive industries has fallen, both in absolute and relative terms. Risk-weighted lending to consumption-sensitive industries is also considerably lower than for the other industries as a whole. The latter is also reflected in the historical loss distribution between 1997 and 2013, which shows that other industries have accounted for most of the losses in virtually every year (see Chart 8).

[11] This is a simple process for all industries in Table 1 except consumer goods and the furniture industry, which are subgroups under manufacturing and mining. For the period 1997–2008, more detailed data are available in the ORBOF statistics. We can thus find out the proportion of lending to manufacturing and mining accounted for by consumer goods and the furniture industry for all banks and mortgage companies in Norway with the exception of branches of foreign banks in Norway. For the period 2009–2013, the share of the manufacturing and mining group accounted for by consumer goods and the furniture industry is estimated based on their respective shares in this group in the national accounts.

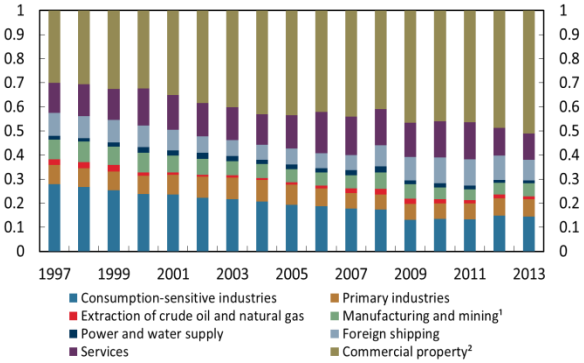
[12] We must emphasise that banks' actual exposure to commercial property may have increased less than the increase in lending to this sector would imply. It is likely that many firms have sold or spun off the property-related part of their activities in pace with the increased focus on outsourcing and specialisation. While property loans could previously be rolled into firms' total loans and thus be entered in the accounts as industry-specific, these loans can now to a greater extent be entered as lending to commercial property firms.

Chart 3: Estimated share of lending to industries. All banks except branches and subsidiaries of foreign banks in Norway. 1997-2013



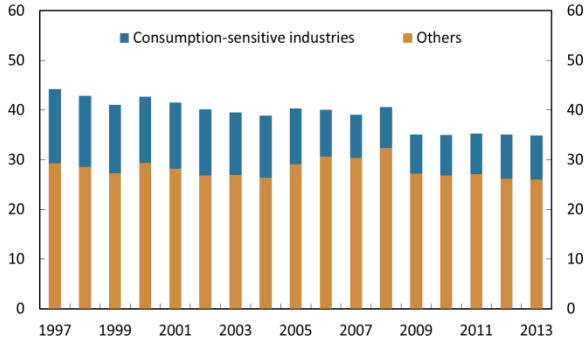
1) Adjusted for consumer goods and the furniture industry.
2) Incl. building project development.
Source: Norges Bank

Chart 4: Estimated share of lending to industries. All banks and mortgage companies in Norway except branches of foreign banks in Norway. 1997-2013



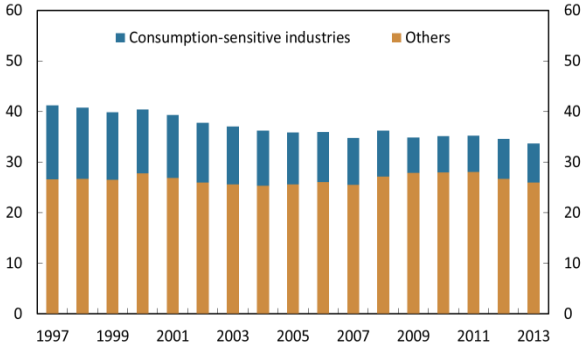
1) Adjusted for consumer goods and the furniture industry.
2) Incl. building project development.
Source: Norges Bank

Chart 5: Risk-weighted lending to non-financial enterprises. All banks except branches and subsidiaries of foreign banks in Norway. 1997–2013



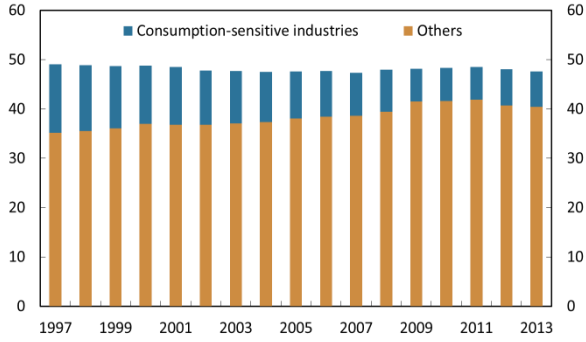
Source: Norges Bank

Chart 6: Risk-weighted lending to non-financial enterprises. All banks and mortgage companies in Norway except branches of foreign banks in Norway. 1997–2013



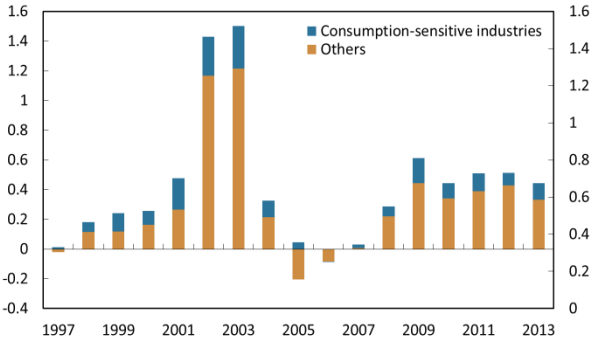
Source: Norges Bank

Chart 7: Risk-weighted lending to non-financial enterprises. Based on DNB's risk weights. Lending for all banks and mortgage companies in Norway except branches of foreign banks in Norway. 1997–2013



Sources: DNB Pillar 3 report 2012 and Norges Bank

Chart 8: Banks' annual loss ratios by industry. All banks except branches and subsidiaries of foreign banks in Norway. 1997–2013



Source: Norges Bank

Property channel

If households adjust to a shock by reducing their demand for housing, house prices may fall and banks may incur losses through what we call the property channel. The substantial shift in bank lending towards commercial property including building project development also indicates that the relative importance of the property channel may have increased.

Residential and commercial property

The residential and commercial property markets share a number of characteristics (see Zhu (2003), Whitley and Windram (2003) and ECB (2008)). Physical property is immobile; delivering new buildings is slow because of long planning and building processes; a large share of transactions are conducted through bilateral agreements; market liquidity is limited because of high transaction costs; property is often financed by substantial loan debt; property is often used as collateral; and short-selling is often impossible.

At the same time, the residential and commercial property markets often compete for the same inputs. The land on which a property stands represents a substantial share of the value of residential or commercial property and is probably one of the most important common inputs in these markets. An income shock that depresses house prices and investment appetite in the housing market will in isolation lead to lower land prices, which can have a negative impact on commercial property prices.

The consequences of a fall in commercial property prices can be considerable. First, commercial property firms may have to write down high-value assets, incurring large losses as a result. This may increase banks' losses on loans to commercial property. Second, banks may themselves own commercial property and thus be directly affected by falling prices. Third, a fall in commercial property prices may make building projects unprofitable before completion. Half-built structures have little or no value and have the potential to inflict substantial losses on banks. Property development firms are then likely to be hardest hit.

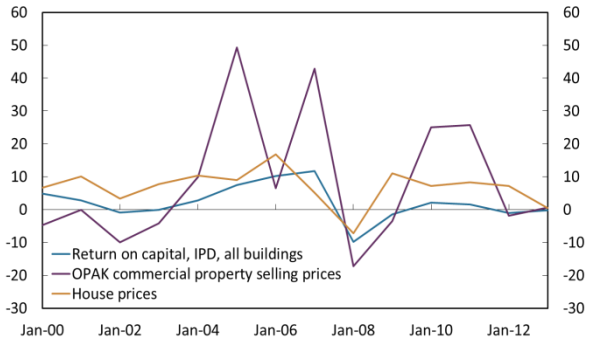
A number of studies find that residential and commercial property prices track each other fairly closely (see Gyourko (2009), Whitley and Windram (2003), Kelly (2010) and Woods (2007)). However, commercial property prices seem as a rule to be more volatile, and price falls in commercial property seem in particular to be sharper compared with the residential property market (see ECB (2008 and 2010), Woods (2007) and Whitley and Windram (2003)).

We find similar results on Norwegian data. As shown in Chart 9, there is a relatively clear correlation between residential and commercial property prices in Norway in the period 2000-2013.[13] This is confirmed by the statistical tests shown in Charts 10 and 11. In Chart 10, the correlation between house prices and the IPD series is 0.65 in the same year and the hypothesis of zero correlation can be rejected at a 5 percent significance level. The correlation is also high if the IPD series is lagged by one year. The null hypothesis of zero correlation can be rejected at a 5 percent significance level (p-value 0.05). Within reasonable confidence intervals, it cannot therefore be ruled out that house prices change at the same time as commercial property prices or that they lead commercial property prices by one year.

[13] We use two sets of commercial property prices and compare these with house prices compiled by the Norwegian Association of Real Estate Agents (NEF), Eiendom Norge, Eiendomsmeglerforetakenes forening (EFF), Finn.no and Eiendomsverdi. The series from OPAK measures the estimated market value of high-standard office premises in central Oslo. The OPAK series is estimated based on net rental prices in the Dagens Næringsliv property index and assessed direct return. The IPD series captures a relatively large section of the commercial property market. The series is based on property valuations (fair value) as recorded in the annual accounts of the firms in the sample.

Chart 11 shows the correlation between the rise in house prices and the OPAK series. The correlation for the same year is positive, but not significant. If the OPAK series is lagged by one year, the correlation is fairly similar to that of the IPD series, and the null hypothesis of zero correlation is rejected at a 5 percent significance level (p-value 0.04). Thus, on the basis of tests conducted in the period 2000-2013, the existence of substitution effects in the property market cannot be ruled out. The results also indicate that house prices may lead commercial property prices. The correlation coefficient is also important in economic terms, in line with the findings on US data reported by Gyourko (2009). It is also worth noting that the correlation has become stronger in recent years. If observations back to 1981 are included, there is no longer any significant correlation between the two series. This may be a signal that the commercial property market is vulnerable to a fall in house prices to a greater extent than previously.[14]

Chart 9: Annual percentage rise in house prices and commercial property prices. 2000-2013

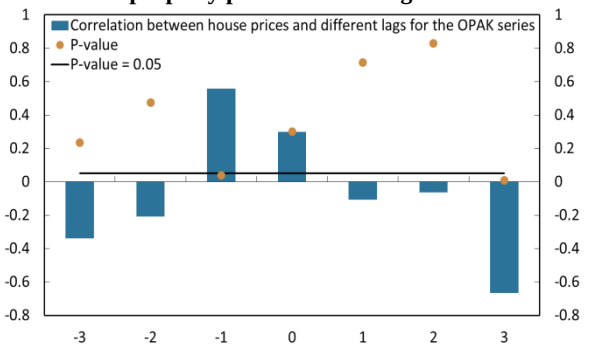


Sources: Statistics Norway, Norwegian Association of Real Estate Agents (NEF), Eiendom Norge, Eiendomsmeglerforetakenes forening (EFF), Finn.no, Eiendomsverdi, IPD and Norges Bank

Chart 10: Correlation between house and commercial property prices (IPD), annual percentage change. For negative values, house prices lead commercial property prices. Annual lags. 2000-2013

Sources: Statistics Norway, Norwegian Association of Real Estate Agents (NEF), Eiendom Norge, Eiendomsmeglerforetakenes forening (EFF), Finn.no, Eiendomsverdi, IPD and Norges Bank

Chart 11: Correlation between between house and commercial property prices (OPAK), annual percentage change. For negative values, house prices lead commercial property prices. Annual lags. 2000-2013



Sources: Statistics Norway, Norwegian Association of Real Estate Agents (NEF), Eiendom Norge, Eiendomsmeglerforetakenes forening (EFF), Finn.no, Eiendomsverdi, IPD and Norges Bank

[14] The IPD series begins in 2000, while the OPAK data go back to 1981.

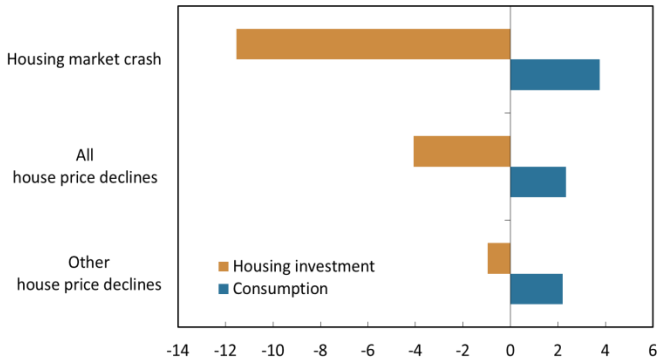
Housing investment

Housing investment can also be adversely affected if shocks to disposable income limit the possibility of purchasing a dwelling. Lower demand for housing pulls down house prices. As construction costs for new housing probably adapt more slowly than house prices, previously profitable projects can become unprofitable. This will lead to a fall in housing investment.

Empirical studies indicate that a reduction in house prices may have strong negative effects on housing investment. Roughly speaking, several studies show that a one percent fall in house prices will, all else being equal, reduce housing investment by about one percent in the long term (see Hungnes (2008), Jacobsen et al. (2006), DiPasquale and Wheaton (1994), Topell and Rosen (1988) and Tsoukis and Westaway (1994). This is far stronger than the effect of house prices on consumption (see page 4). The differences can also be substantial in the shorter term. A far greater fall in housing investment than consumption has been particularly evident in periods of sharply declining house prices (see Chart 12).

Wide swings in housing investment can increase banks' vulnerability to losses. Lending to property development firms[15] and other construction firms will be particularly vulnerable as these firms can be impacted by a reduced supply of new building projects and ongoing projects that are now making a loss. In total, these sectors accounted for about 9 percent of lending to the corporate market at end-2013 for all banks and mortgage companies in Norway except branches of foreign banks in Norway. This share has increased from around 7.5 percent in 2009.[16]

Chart 12: Percentage change in consumption and housing investment during episodes of declining house prices[1)]. Median values



1) Total of 114 episodes of declining house prices and 28 housing market crashes. Percentage change in housing investment and consumption is measured from peak to trough of house price cycle.
Sources: Claessens, Kose and Terrones (2008 and 2009)

Other channels than can affect banks

This *Staff Memo* has focused on the risk of bank losses. However, high household debt coupled with elevated house prices can also pose a risk to banks through other channels:

- Uncertainty about the value of banks' collateral may lead to demands for increased collateral for banks' own funding. Even if the actual losses banks face are small, such uncertainty can force banks to consolidate their balance sheets in a downturn. This can contribute to amplifying the economic decline.

[15] Includes development of building projects for residential and other buildings by obtaining the economic, technical and physical means to complete the building project for subsequent sale.
[16] It is not possible to provide an overview of this share for a longer period as building project development prior to 2009 was included in the industry group "property management".

- Lower demand can also reduce banks' revenue base, in the same way as for other firms. This makes banking less profitable. And if household debt is high, demand for banking services may fall more than demand for other services.

Conclusion

Vulnerabilities in the Norwegian household sector are a cause for concern. Fears have been expressed that high debt and elevated house prices may inflict losses on banks that in the worst case may trigger or amplify a downturn. In isolation, higher debt relative to income always entails an increase in vulnerabilities in the household sector, but the way in which the risk of losses on banks' lending portfolios is affected is not clear cut. In this *Staff Memo*, we have therefore established a framework to enhance understanding of the different channels from high household debt among Norwegian households to bank losses. We have in particular focused on how the *relative* importance of the various channels has changed over time.

Despite the increase in bank lending to the household sector, the risk of direct losses on lending to households is assessed to be small relative to the demand and property channels. One important explanation is that the incentives for default are considerably stronger for owners of businesses than for the average Norwegian household.

With regard to relative importance, the demand and property channels seem to have shown opposite developments. While the demand channel seems to have become relatively less important over time, the property channel seems to have gained strength. The results are driven in particular by a shift from lending to consumption-sensitive industries towards lending to commercial property including building project development, which has increased markedly. At the same time, we find that the correlation between house and commercial property prices has become stronger in recent years. This may be a signal that the property channel is vulnerable to a greater extent than previously to a fall in house prices. The results thus underscore the importance of closely monitoring developments in the property market.

Gaining a full understanding of the channels requires further work. In our view, the framework we have set up can function as a guideline for future analyses. It could be useful, for example, if subsequent analyses focus in more detail on the effect of the debt-to-income ratio on the probability of loss in the various channels. There will also be a need to increase understanding of the mechanisms in the property channel since the relative importance of the channel seems to have grown over time.

Table 2: Channels from household vulnerabilities to bank losses

	Direct channel	Demand channel	Property channel
Adjustment	Financial flows	Household demand	House purchase
Loss group	Households	Non-financial enterprises	Non-financial enterprises
Reasons for loss	Failure to pay interest and principal	1. Households tighten consumption and investment in owner-occupied housing 2. Profitability of non-financial enterprises weakens	1. Lower household demand for housing pulls down house prices 2. Decline in housing starts, reducing profits in affected industries 3. Previously profitable projects run losses 4. Commercial property prices pulled down
Industries affected		1. Consumption-sensitive industries	1. Building project development[17] and other construction 2. Commercial property
Effect of shock to income	Problems paying interest and principal	Fall in income limits household's possibilities for consumption and investment in owner-occupied housing	Fall in income limits household's possibilities of purchasing a dwelling
Effect of shock to wealth (housing)	Households can be left with negative equity (debt exceeds value of dwelling): 1. Default if fall in house prices coincides with income shock	1. Households repay debt (increase saving) to prevent value of collateral falling below loan amount 2. Ability to borrow more limited because less collateral is available	

[17] Includes development of building projects for residential and other buildings by obtaining the economic, technical and physical means to complete the building project for subsequent sale.

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