ECONOMIC COMMENTARIES

Does high debt growth in upturns lead to a more pronounced fall in consumption in downturns?

NORGES BANK

Does high debt growth in upturns lead to a more pronounced fall in consumption in downturns?[*]

Frank Hansen and Kjersti Næss Torstensen

The strong accumulation of debt in the period preceding the financial crisis has resulted in a renewed focus on the relationship between debt and household demand in an economic downturn.[1] Studies based on disaggregated data find empirical evidence that consumer demand from highly indebted households responds more strongly to changes in income and wealth compared with that of less indebted households.[2] Glick and Lansing (2010) similarly show that the countries with the largest rise in debt prior to the financial crisis also experienced the strongest rise in real estate prices, and that those same countries experienced the strongest decline in consumption when house prices began to fall. In a study involving 14 OECD countries over the past 140 years, Jorda et al. (2013) find that the fall in GDP during recessions is more pronounced when the crisis is preceded by rapid debt accumulation.

In this commentary, we analyse to what extent it is a systematic feature of recessions that strong household debt accumulation preceding a recession amplifies the decline in private consumption during the recession. Our method is similar to that of Jorda et al. (2013), using a panel of 64 recessions in 21 countries in the period between 1970 Q1 and 2014 Q4.

The results suggest that there is a robust correlation between debt accumulation during an expansion and a fall in consumption during a recession. High debt growth preceding a recession contributes to a more pronounced fall in consumption during the recession and weaker consumption growth following the recession. When we control for debt growth, strong growth in housing investment and house prices relative to disposable income during the expansion do not affect the path of consumption in the recession. This supports Irving Fisher's view that "... over-investment and over-speculation are often important; but they would have far less serious results were they not conducted with borrowed money".[3] The analyses also show that high debt growth primarily affects household consumption of durable goods and housing investment during the recession, while having little effect on

---

[1]Debt has long been linked with downturns in the real economy (see for example Fisher (1933) and King (1994))

[2]See, for example Dynan (2012) and Mian et al. (2013) for analyses of the consumption response to changes in house prices and Baker (2014) for analyses of changes in income. See also Andersen et al. (2014), Bunn and Rostom (2015) and Fagereng and Halvorsen (2016).

[3]Fisher (1933)

consumption of non-durable goods.[4].

A stronger initial fall in consumption and housing investment can amplify and prolong downturns through knock-on effects on, for example, disposable income and asset prices. If interest rates rise and income is reduced, a larger portion of household income will have to be used to service debt, leaving less income for other consumption. Since housing assets are a large component of household wealth, a marked fall in house prices may reduce household demand. With a reduction in wealth, households may give priority to deleveraging rather than consumption, and lower collateral values may reduce their capacity to increase borrowing. We find that developments in real house prices and real disposable income are weaker if debt growth was high prior to the recession, but that the difference is only statistically significant for real house prices. This suggests that there may be a strong correlation between house price developments and consumption through recessions that may amplify and prolong the decline in consumption.

Data

The analyses are based on data for 21 OECD countries in the period between 1970 Q1 and 2014 Q4.[5] For most of the countries, household consumption data are sourced from the OECD and are available for the entire period.[6] Household consumption divided into consumer durables and non-durables is available for the majority of the countries, but over a shorter period.[7]

GDP and housing investment figures are also sourced from the OECD and are available for all countries for much of the period. Data for real house prices and real disposable income are sourced from the Federal Reserve Bank of Dallas and are available for 18 of the countries in the sample from 1975 Q1.[8] Data for house prices relative to disposable income are supplemented by OECD data for countries not included in the Federal Reserve Bank of Dallas database.

Data for total household debt is sourced from the BIS and is available for all the countries in the sample for much of the period.

Classification of recessions

In order to study the path of consumption through recessions, turning points in the business cycle for all the countries in the sample must be defined. Turning points in the

---

[4]This is in line with the empirical literature, which shows that consumption of durable goods is more sensitive to changes in wealth (Mian et al. (2013)) and changes in income (Baker (2014)) than consumption of non-durable goods

[5]The countries in the sample are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Korea, the Netherlands, Norway, Portugal, Spain, Sweden, Greece, Switzerland, the UK and the US.

[6]For a complete list of data sources and availability for all variables and for each individual country, see Table A.1.

[7]Durable goods includes cars, furniture, household appliances, etc., while non-durable goods includes food, beverages, etc. The non-durable goods category in this analysis also includes services consumption.

[8]For a detailed description of the data from the Federal Reserve Bank of Dallas, see Mack and Martínez-García (2011).

reference cycle defined by Aastveit et al. (2016) are used for Norway. For the US, turning points defined by the National Bureau of Economic Research (NBER) are used. Turning points classified by the Economic Cycle Research Institute (ECRI) are used for Australia, Austria, Canada, France, Germany, Italy, Japan, Korea, Spain, Sweden, Switzerland and the UK.

For the remaining countries, recessions are identified using a version of the algorithm set out in Bry and Boschan (1971) (see Harding and Pagan (2002)).[9]

A total of 110 recessions are identified in the period between 1970 Q1 and 2014 Q4 (Table A.2). The analysis only includes recessions for which there are observations for a minimum of 16 quarters before and after the beginning of the recession. Together with varying access to data, this brings the number of recessions in the main sample down to 64.[10]

Estimating the path of a recession using local projections

In the analysis, we seek to establish whether there is a correlation between debt accumulation preceding a recession and the subsequent developments in private consumption through the recession. To achieve this, we estimate the effect of debt growth in the expansion on the path of consumption during the recession using local projection methods (see Jorda (2005) and Jorda et al. (2013)). The method estimates the effect on consumption in each period so that no correlation between debt accumulation and developments in consumption at different horizons is imposed on the estimation.

Let $\Delta_h y_{i,t(p)} = y_{i,t(p)+h} - y_{i,t(p)}$ be the percentage change in consumption from the beginning of recession p to period $t(p) + h$, where $h = 1, 2, ..., 16$ is the number of quarters from the beginning of the recession for country i. Further, let $d_{i,t(p)}$ be a measure of debt accumulation preceding the recession. The local projection for consumption through recessions is found by estimating the following equation for each horizon $h = 1, 2, ..., 16$:

$$\Delta_h y_{i,t(p)} = \sum_{i=1}^{I} \alpha_{i,h} D_{i,t(p)} + \gamma_h + \delta_h d_{i,t(p)} + \sigma_h x_{i,t(p)} + \epsilon_{i,t(p)+h} \tag{1}$$

where $x_{i,t(p)}$ is a set of control variables, $D_{i,t(p)}$ is country-specific effects and $\epsilon_{i,t(p)}$ is a stochastic error term. In equation (1), $\{\delta_h\}$ denotes how, and to what degree, the accumulation of debt preceding the recession affects consumption h periods after the cyclical peak.

We use average growth in household debt relative to GDP in the five years preceding the start of the recession as a measure of household debt accumulation. In addition to country-specific effects, we also control for the average rise in house prices relative to

---

[9]The method identifies turning points in the business cycle and divides the sample into an expansionary phase (from a local trough to a local peak) and a contractionary phase (from a local peak to a local trough). A contractionary phase is defined as a recession when GDP declines for at least two consecutive quarters. We impose the criterion that the complete business cycle (expansion plus contraction) must be a minimum of 5 quarters.
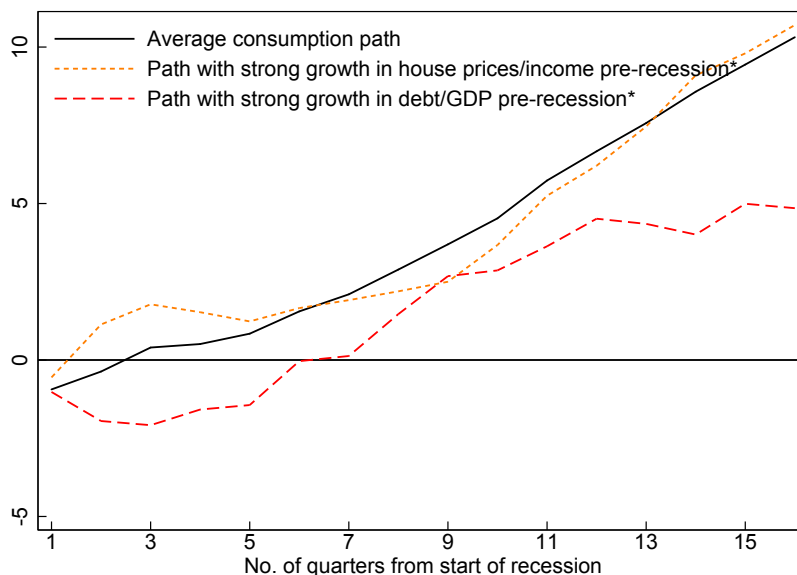
[10]The recessions included in the main sample are marked in bold in Table A.2.

disposable income, real housing investment and real GDP in the five years preceding the start of the recession.[11]

Debt growth and a fall in consumption during recessions

The analyses show that the fall in total consumption is deeper and its recovery weaker if households have accumulated substantial debt in the period preceding the recession (Chart 1).[12] The black line shows estimated average path for aggregate consumption from 1 to 16 quarters following the start of the recession. The yellow line shows estimated path for consumption if house prices relative to income were one standard deviation above the mean during the expansion, and the red line shows estimated consumption path if debt growth relative to GDP was one standard deviation above the mean.

Chart 1: *Estimated effect of stronger debt accumulation and higher house prices on consumption during recessions.*[1)]

[1)]The chart shows developments from the beginning of the recession in percent, estimated using local projections. In addition we control for country-specific effects, and average growth in real housing investment and real GDP in the five years preceding the start of the recession.
*Strong growth is defined as growth above one standard deviation from the mean. Growth is measured as average growth in the five years preceding the start of the recession.

While the average path for consumption is at the same level as at the beginning of the recession after about 3 quarters, the analysis implies that this would take about 6 quarters if debt growth was one standard deviation above the mean. The effect of debt

---

[11]Computing average growth using a shorter pre-recession period does not have a qualitative effect on the results of the analysis.

[12]The estimated effect of house prices and debt on the path for consumption in a recession is approximately the same if we use the algorithm set out in Bry and Boschan (1971) for all countries and if we exclude observations from the financial crisis. The level of significance is somewhat reduced if we use a different classification of recessions, and neither growth in house prices nor debt growth is significant if we exclude the financial crisis.

growth on consumption during recessions is statistically significant at the 3-6 quarter and 14-16 quarter horizons (Table A.3). The results support other empirical findings on the correlation between debt and the consumption response during the financial crisis and indicate that strong debt growth has also had consequences for the macroeconomy in other downturns.[13]

Controlled for developments in household debt in the period preceding the recession, pre-recession developments in house prices relative to income, housing investment and general macroeconomic developments have a limited effect on developments in total household consumption through the recession (Table A.3).

Consumption of durable and non-durable consumer goods and housing investment

Household demand consists of purchases of durable and non-durable consumer goods and housing investment. In this section, we analyse to what extent strong debt accumulation has a different effect on the three demand components. On average, the consumption of durable goods has accounted for around 9 percent of total consumption in the countries for which we have data for the period, and for many countries this share has increased over time.[14] The share of housing investment in GDP has averaged around 7 percent over time and has been more stable over time.[15] The data sample for this analysis encompasses 17 countries and 42 recessions.[16]

In line with international empirical results, we find that consumption of durable goods is markedly weaker during recessions than that of non-durable goods (Chart 2 (a) and (b)).[17] The analysis also indicates that consumption of durable goods is more sensitive to debt accumulation in the period preceding a recession than consumption of non-durable goods.[18] The effect of borrowing on consumption of durable goods is statistically significant after about 1 year (Table A.7).

Strong growth in household debt in the years preceding a recession results in a more pronounced and more persistent fall in housing investment (Chart 2 (c)). The difference is statistically significant after about 2 quarters (Table A.7). Overall, the results suggest that household demand for durable goods and housing investment is more cyclically sensitive than for non-durable goods, and that the former demand components respond more to household debt accumulation in the period preceding a recession.

---

[13]See e.g. Mian et al. (2013), Dynan (2012) and Glick and Lansing (2010)

[14]The share of durable consumption rose from about 7 percent in the mid-1990s to about 10 percent at the end of 2014 in the countries in the sample. In some countries, the share has fallen markedly since the financial crisis (particularly in Spain, Italy and Greece).

[15]The share increased from around 5 percent in the mid-1990s to just over 6 percent at the end of 2014.

[16]For housing investment, we use the entire data sample, but the results are qualitatively the same if we use the same sample of countries and recessions.

[17]See e.g. Crossley et al. (2013).

[18]See Baker (2014) for an example of similar findings using microdata.

Chart 2: *Estimated effect of stronger debt accumulation and higher house prices on consumption and housing investment in recessions.[1]*
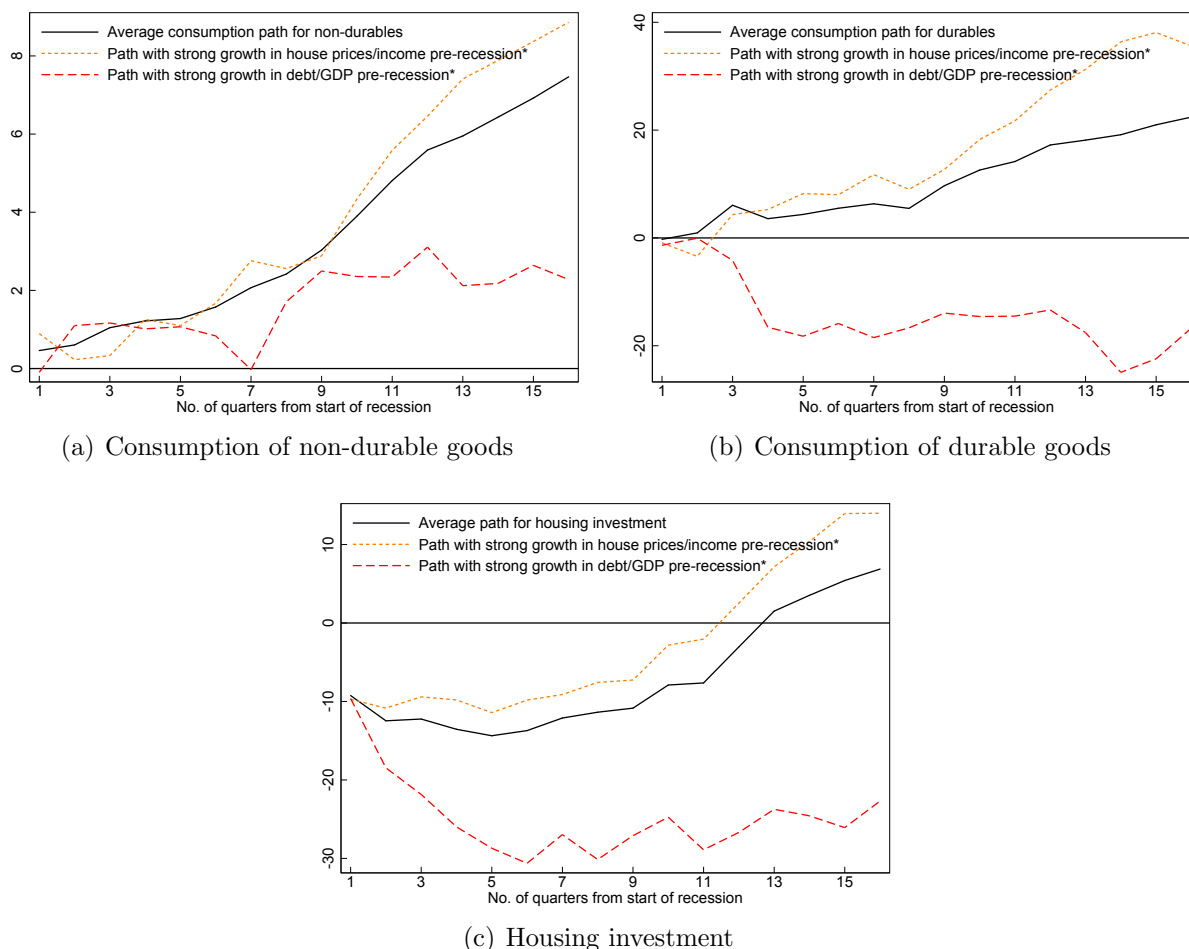
(a) Consumption of non-durable goods

(b) Consumption of durable goods

(c) Housing investment

[1]The chart shows developments from the beginning of the recession in percent, estimated using local projections. In addition we control for country-specific effects, and average growth in real housing investment and real GDP in the five years preceding the start of the recession.
*Strong growth is defined as growth above one standard deviation from the mean. Growth is measured as average growth in the five years preceding the start of the recession.

Channels from debt and house prices to consumption

The above analyses suggest that household demand falls more and its recovery is weaker if debt growth during the upturn was strong. Empirical findings from disaggregated data imply that the initial consumption response to a negative shock is stronger when debt is higher.[19] The knock-on effects on asset prices and household disposable income can in turn prolong and amplify the fall in household demand. In this section, we wish to analyse to what extent income and house prices during recessions are affected by debt accumulation during the expansionary phase.[20] Any differences in the way in which debt accumulation affects house prices and income may give an indication of which of these

---

[19]See e.g. Dynan (2012), Mian et al. (2013) and Baker (2014).
[20]We estimate equation 1 with real disposable income and real house prices respectively as the left-hand side variable.

factors influences the path of consumption during recessions.

Chart 3: *Estimated developments in real house prices and real disposable income.[1]*
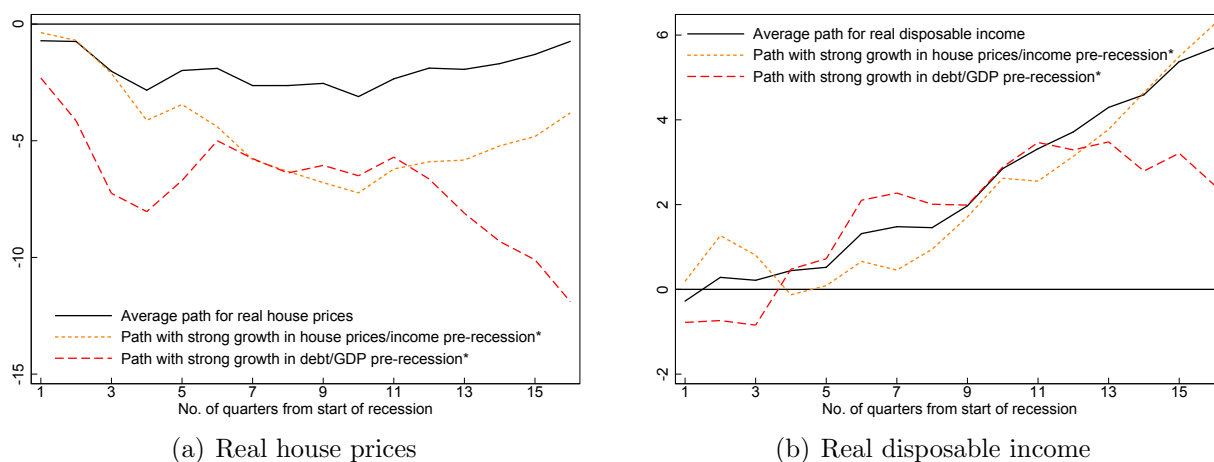
| (a) Real house prices | (b) Real disposable income |

[1]The chart shows developments from the beginning of the recession in percent, estimated using local projections. In addition we control for country-specific effects, and average growth in real housing investment and real GDP in the five years preceding the start of the recession.
*Strong growth is defined as growth above one standard deviation from the mean. Growth is measured as average growth in the five years preceding the start of the recession.

Debt growth in the period preceding a recession has a limited effect on developments in real disposable income during the recession, while the fall in house prices is stronger in recessions that follow expansionary periods featuring high debt growth (Chart 3). The effect of household debt accumulation on developments in real house prices is statistically significant in the first year after the beginning of the recession.

Real wage rigidities, increased saving, and thereby increased interest income, and differences in interest rate developments in recessions are possible factors that could explain why real disposable income does not develop differently in recessions with a more marked fall in consumption.[21]

The results suggest that even though pre-recession house price developments in themselves have a limited effect on consumption during a recession, there may be a strong correlation between house prices and consumption during recessions that can amplify the fall in consumption.

Summary

In this commentary, we have explored the relationship between household borrowing and developments in total consumption through recessions for a group of 21 OECD countries over the past four decades.

The results suggest that consumption falls more and its recovery is weaker in recessions

---

[21]The possible effects on future expected income and uncertainty about future income have not been analysed but are potentially important factors influencing household demand.

that follow expansionary periods featuring strong debt growth. The fall in aggregate consumption appears to be driven by reduced consumption of durable goods. Housing investment also falls more markedly if debt growth was high prior to the recession.

The analyses indicate that housing market developments during an expansion in themselves do not affect the path of consumption during a recession. However, the results show that the fall in house prices is markedly stronger in recessions that follow an expansionary period featuring a high level of borrowing. This may be an important factor in explaining the reduction in household demand, as housing wealth accounts for a large share of total household wealth. This suggests that it is important to understand the interaction between the housing market and household consumption in order to explain why increased debt growth in the period preceding a recession amplifies and prolongs the fall in consumption.

References

Aastveit, K. A., A. S. Jore, and F. Ravazzolo (2016). Identification and real-time forecasting of Norwegian business cycles. *International Journal of Forecasting 32*(2), 283 – 292.

Andersen, A., C. Duus, and T. Jensen (2014, 3). Household debt and consumption during the financial crisis: Evidence from Danish micro data. Working papers (online): No. 89, vol. 2014, Danmarks Nationalbank.

Baker, S. R. (2014). Debt and the consumption response to household income shocks. Mimeo.

Bry, G. and C. Boschan (1971). *Cyclical Analysis of Time Series: Selected Procedures and Computer Programs.* National Bureau of Economic Research, Inc.

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

Crossley, T. F., H. Low, and C. O'Dea (2013). Household consumption through recent recessions*. *Fiscal Studies 34*(2), 203–229.

Dynan, K. (2012). Is a Household Debt Overhang Holding Back Consumption. *Brookings Papers on Economic Activity 44*(1 (Spring), 299–362.

Fagereng, A. and E. Halvorsen (2016). Debt and household consumption responses. Staff Memo 1, Norges Bank.

Fisher, I. (1933). The debt-deflation theory of great depressions. *Econometrica 1*(4), 337–357.

Glick, R. and K. J. Lansing (2010). Global household leverage, house prices and consumption. Economic Letter 01/2010, Federal Reserve Bank of San Francisco.

Harding, D. and A. Pagan (2002, March). Dissecting the cycle: a methodological investigation. *Journal of Monetary Economics 49*(2), 365–381.

Jorda, O. (2005). Estimation and inference of impulse responses by local projections. *American Economic Review 95*(1), 161–182.

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

King, M. (1994). Debt deflation: Theory and evidence. *European Economic Review 38*(3-4), 419–445.

Mack, A. and E. Martínez-García (2011). A cross-country quarterly database of real house prices: a methodological note. Globalization and Monetary Policy Institute Working Paper 99, Federal Reserve Bank of Dallas.

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

Appendix A: Tables

Table A.1: Data sources and coverage.

	Consumption		Durables		Non-durables		Housing investments		House prices/income		Real house prices		Real disp. income		GDP		Debt	
Country	Start	Source	Start	Source	Start	Source	Start	Source	Start	Source	Start	Source	Start	Source	Start	Source	Start	Source
AUS	1970Q1	OECD	-	-	-	-	1970Q1	OECD	1975Q1	D-FED	1975Q1	D-FED	1975Q1	D-FED	1970Q1	OECD	1977Q4	BIS
AUT	1970Q1	OECD	1996Q1	OECD	1996Q1	OECD	1970Q1	OECD	2000Q1	OECD	2000Q1	OECD	-		1970Q1	OECD	1995Q4	BIS
BEL	1970Q1	OECD	-	-	-	-	1970Q1	OECD	1975Q1	D-FED	1975Q1	D-FED	1975Q1	D-FED	1970Q1	OECD	1980Q4	BIS
CAN	1970Q1	OECD	1981Q1	OECD	1981Q1	OECD	1970Q1	OECD	1975Q1	D-FED	1975Q1	D-FED	1975Q1	D-FED	1970Q1	OECD	1970Q1	BIS
CHE	1970Q1	OECD	-	-	-	-	1970Q1	OECD	1975Q1	D-FED	1975Q1	D-FED	1975Q1	D-FED	1970Q1	OECD	1999Q4	BIS
DEU	1991Q1	OECD	1991Q1	OECD	1991Q1	OECD	1991Q1	OECD	1975Q1	D-FED	1975Q1	D-FED	1975Q1	D-FED	1991Q1	OECD	1970Q4	BIS
DNQ	1970Q1	OECD	1995Q1	OECD	1995Q1	OECD	1970Q1	OECD	1975Q1	D-FED	1975Q1	D-FED	1975Q1	D-FED	1970Q1	OECD	1994Q4	BIS
ESP	1970Q1	OECD	1995Q1	OECD	1995Q1	OECD	1970Q1	OECD	1975Q1	D-FED	1975Q1	D-FED	1975Q1	D-FED	1970Q1	OECD	1980Q4	BIS
FIN	1970Q1	OECD	1990Q1	OECD	1990Q1	OECD	1970Q1	OECD	1975Q1	D-FED	1975Q1	D-FED	1975Q1	D-FED	1970Q1	OECD	1970Q4	BIS
FRA	1970Q1	OECD	1980Q1	OECD	1980Q1	OECD	1970Q1	OECD	1975Q1	D-FED	1975Q1	D-FED	1975Q1	D-FED	1970Q1	OECD	1977Q4	BIS
GBR	1970Q1	OECD	1995Q1	OECD	1995Q1	OECD	1970Q1	OECD	1975Q1	D-FED	1975Q1	D-FED	1975Q1	D-FED	1970Q1	OECD	1970Q1	BIS
GRC	1995Q1	OECD	1995Q1	OECD	1995Q1	OECD	1995Q1	OECD	1997Q1	OECD	1997Q1	OECD	-	-	1995Q1	OECD	1994Q4	BIS
IRL	1990Q1	OECD	-	OECD	-	-	1990Q1	OECD	1975Q1	D-FED	1975Q1	D-FED	1975Q1	D-FED	1990Q1	OECD	2002Q1	BIS
ITA	1970Q1	OECD	1996Q1	OECD	1996Q1	OECD	1970Q1	OECD	1975Q1	D-FED	1975Q1	D-FED	1975Q1	D-FED	1970Q1	OECD	1970Q1	BIS
JPN	1970Q1	OECD	1994Q1	OECD	1994Q1	OECD	1970Q1	OECD	1975Q1	D-FED	1975Q1	D-FED	1975Q1	D-FED	1970Q1	OECD	1970Q1	BIS
QOR	1970Q1	OECD	2000Q1	OECD	2000Q1	OECD	1970Q1	OECD	1975Q1	D-FED	1975Q1	D-FED	1975Q1	D-FED	1970Q1	OECD	1970Q1	BIS
NLD	1970Q1	OECD	1996Q1	OECD	1996Q1	OECD	1970Q1	OECD	1975Q1	D-FED	1975Q1	D-FED	1975Q1	D-FED	1970Q1	OECD	1990Q4	BIS
NOR	1978Q1	SSB	1978Q1	SSB	1978Q1	SSB	1970Q1	OECD	1975Q1	D-FED	1975Q1	D-FED	1975Q1	D-FED	1978Q1	SSB	1975Q1	SSB, NB
PRT	1970Q1	OECD	1995Q1	OECD	1995Q1	OECD	1970Q1	OECD	1995Q1	OECD	1988Q1	OECD	-	-	1970Q1	OECD	1979Q4	BIS
SWE	1970Q1	OECD	1993Q1	OECD	1993Q1	OECD	1970Q1	OECD	1975Q1	D-FED	1975Q1	D-FED	1975Q1	D-FED	1970Q1	OECD	1980Q4	BIS
USA	1970Q1	OECD	1999Q1	OECD	1999Q1	OECD	1970Q1	OECD	1975Q1	D-FED	1975Q1	D-FED	1975Q1	D-FED	1970Q1	OECD	1970Q1	BIS

Notes: OECD = Organisation for Economic Co-operation and Development, D-FED = Dallas FED, BIS = Bank for International Settlements, SSB = Statistics Norway, NB = Norges Bank.

Table A.2: Identified starting points for recessions in the period 1970Q1-2014Q4.

Country	Source	No. included	Start date for recessions
AUS	ECRI	2	1974Q3, **1982Q2**, **1990Q2**
AUT	ECRI	2	1974Q3, 1980Q1, 1992Q2, 1995Q2, **2001Q1**, **2008Q1**
BEL	BB	2	1974Q1, 1980Q2, **1992Q1**, **2007Q4**, 2011Q3
CAN	ECRI	3	**1981Q2**, **1990Q1**, **2008Q1**
CHE	ECRI	2	1974Q2, 1981Q3, 1990Q1, 1994Q4, **2001Q1**, **2008Q2**
DEU	ECRI	2	1973Q3, 1980Q1, 1991Q1, **2001Q1**, **2008Q2**
DNQ	BB	3	1973Q2, 1979Q2, 1987Q1, 1992Q1, **1997Q2**, **2006Q2**, **2007Q4**, 2011Q2
ESP	ECRI	2	1980Q1, **1991Q4**, **2008Q1**
FIN	BB	4	1975Q1, **1976Q4**, **1980Q3**, **1990Q1**, **2007Q4**, 2012Q1
FRA	ECRI	5	1974Q3, **1979Q3**, **1982Q2**, **1992Q1**, **2002Q3**, **2008Q1**, 2011Q2
GBR	ECRI	3	1974Q3, **1979Q2**, **1990Q2**, **2008Q2**, 2010Q3
GRC	BB	2	**2004Q3**, **2007Q2**
IRL	BB	1	**2007Q4**, 2011Q4
ITA	ECRI	3	1970Q3, 1974Q2, **1980Q2**, **1992Q1**, **2007Q3**, 2011Q2
JPN	ECRI	5	1973Q4, **1992Q2**, **1997Q1**, **2000Q3**, **2008Q1**, **2010Q3**, 2012Q2, 2014Q1
QOR	ECRI	4	**1979Q1**, **1997Q3**, **2002Q4**, **2008Q3**
NLD	BB	3	1973Q1, 1974Q3, 1976Q3, 1979Q4, 1982Q1, **2003Q1**, **2008Q2**, **2011Q1**
NOR	Aastveit et al. (2016)	6	**1980Q1**, **1981Q1**, **1987Q2**, **2001Q1**, **2002Q3**, **2008Q2**
PRT	BB	3	1974Q1, 1982Q4, 1992Q1, **2002Q1**, **2008Q1**, **2010Q3**
SWE	ECRI	2	1970Q4, 1975Q3, 1980Q1, **1990Q2**, **2008Q2**
USA	NBER	5	1973Q4, **1980Q1**, **1981Q3**, **1990Q3**, **2001Q1**, **2007Q4**

Notes: Dates marked in bold refer to recessions included in the sample. ECRI = Economic Cycle Research Institute, NBER = National Bureau of Economic Research, BB = Bry-Boschan algoritmen (Bry and Boschan (1971)).

Table A.3: Local projections for private consumption during recessions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Constant	-1.8**	-0.1	1.5	2.0	2.4	2.4	3.0	3.4	3.0	4.3	5.9*	6.4*	6.9*	8.0*	7.8*	8.9*
	(0.9)	(1.8)	(2.2)	(2.0)	(2.1)	(2.3)	(2.4)	(2.6)	(2.9)	(3.1)	(3.4)	(3.6)	(3.9)	(4.1)	(4.3)	(4.5)
Average growth	0.3	1.0**	0.9*	0.7	0.3	0.1	-0.1	-0.5	-0.8	-0.6	-0.3	-0.3	-0.1	0.4	0.2	0.3
in house prices/disp. income	(0.2)	(0.5)	(0.5)	(0.5)	(0.5)	(0.6)	(0.6)	(0.7)	(0.7)	(0.8)	(0.9)	(0.9)	(1.0)	(1.1)	(1.1)	(1.1)
Average growth	-0.0	-0.1	-0.1*	-0.1*	-0.1*	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.2	-0.2*	-0.2*	-0.3**
in credit/GDP	(0.0)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)
Average growth	-0.5*	-0.0	0.4	0.0	0.0	0.2	0.1	0.2	0.1	0.0	0.2	0.3	0.1	-0.2	-0.2	-0.1
in housing investment	(0.2)	(0.5)	(0.6)	(0.5)	(0.6)	(0.6)	(0.6)	(0.7)	(0.8)	(0.8)	(0.9)	(1.0)	(1.0)	(1.1)	(1.1)	(1.2)
Average GDP	1.3	0.2	-0.5	-0.9	-0.7	-0.2	0.1	0.2	1.8	1.5	1.0	1.5	2.8	3.4	4.7	5.0
growth	(0.8)	(1.7)	(2.0)	(1.9)	(2.0)	(2.1)	(2.2)	(2.4)	(2.6)	(2.8)	(3.1)	(3.4)	(3.6)	(3.8)	(4.0)	(4.1)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64

Notes: Cluster-robust standard errors in parentheses. Asterisk denote statistical significance: * = 10%, ** = 5% and *** = 1%.

Table A.4: Local projections for non-durable consumption during recessions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Constant	1.9***	1.2	2.7***	3.5**	3.7*	4.6*	5.0*	5.1*	5.7*	7.1**	9.3**	9.6**	10.0**	10.7**	10.3**	11.8***
	(0.6)	(0.9)	(0.9)	(1.6)	(2.0)	(2.2)	(2.5)	(2.8)	(2.9)	(3.3)	(3.4)	(3.4)	(3.5)	(3.9)	(4.0)	(4.1)
Average growth	0.3	-0.3	-0.5**	0.0	-0.1	0.1	0.5	0.1	-0.1	0.3	0.6	0.6	1.1	1.1	1.1	1.0
in house prices/disp. income	(0.2)	(0.2)	(0.2)	(0.5)	(0.6)	(0.8)	(1.1)	(1.1)	(1.1)	(1.3)	(1.5)	(1.6)	(1.9)	(2.1)	(2.3)	(2.5)
Average growth	-0.5	0.5	0.1	-0.2	-0.2	-0.7	-2.0	-0.7	-0.5	-1.5	-2.3	-2.3	-3.6	-4.0	-4.0	-4.9
in credit/GDP	(0.4)	(0.5)	(0.5)	(1.0)	(1.2)	(1.4)	(2.0)	(2.0)	(2.3)	(2.5)	(2.8)	(2.9)	(3.5)	(3.9)	(4.1)	(4.3)
Average GDP	-1.9**	-1.2	-2.5**	-3.6***	-3.7**	-4.6**	-3.8	-4.3*	-4.4*	-4.5	-5.9*	-5.3	-4.3	-4.2	-2.7	-3.5
growth	(0.8)	(1.0)	(1.0)	(1.3)	(1.7)	(2.0)	(2.6)	(2.4)	(2.4)	(2.9)	(3.1)	(3.6)	(4.1)	(4.4)	(4.9)	(4.9)
Average growth	0.1	0.2	0.6**	0.7*	0.8*	1.2**	1.2*	1.4**	1.5**	1.4*	1.6*	1.6	1.2	1.0	0.9	1.0
in housing investment	(0.2)	(0.2)	(0.2)	(0.3)	(0.4)	(0.5)	(0.6)	(0.6)	(0.7)	(0.8)	(0.9)	(1.0)	(1.2)	(1.3)	(1.4)	(1.5)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42

Notes: Cluster-robust standard errors in parentheses. Asterisks denote statistical significance: * = 10%, ** = 5% and *** = 1%.

Table A.5: Local projections for durable consumption during recessions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Constant	10.4**	13.2**	30.1***	34.4***	34.0***	31.5***	31.5**	30.2**	37.9**	37.5**	42.4**	48.4***	49.3***	55.7***	55.5***	56.6***
	(4.9)	(6.3)	(8.7)	(7.2)	(7.9)	(11.1)	(13.5)	(13.7)	(15.0)	(15.4)	(16.7)	(15.3)	(17.0)	(17.4)	(18.1)	(18.5)
Average growth in house prices/disp. income	-0.5	-3.2	-1.3	1.2	2.8	1.8	4.0	2.6	2.2	4.1	5.5	7.5	9.6	12.6	12.5	9.7
	(1.4)	(1.9)	(2.6)	(2.6)	(2.8)	(3.7)	(5.4)	(5.3)	(5.5)	(5.9)	(6.3)	(6.9)	(8.8)	(8.9)	(9.7)	(9.6)
Average growth in credit/GDP	-1.0	-0.9	-9.7	-19.0***	-21.3***	-20.2**	-23.5*	-20.9*	-22.3*	-25.7*	-27.1*	-28.9*	-33.7*	-41.7**	-41.0*	-37.0*
	(3.0)	(3.8)	(5.7)	(6.0)	(6.0)	(8.7)	(12.3)	(12.1)	(12.5)	(13.4)	(14.3)	(15.2)	(19.1)	(19.7)	(21.2)	(20.6)
Average GDP growth	-14.6***	-16.7**	-29.4***	-34.4***	-31.8***	-27.6**	-23.7	-24.5	-29.4	-22.2	-26.2	-30.3	-27.1	-29.5	-28.0	-28.9
	(4.6)	(7.0)	(8.0)	(7.2)	(8.2)	(11.3)	(15.0)	(15.3)	(17.2)	(18.0)	(19.9)	(19.8)	(23.7)	(24.4)	(27.0)	(26.9)
Average growth in housing investment	0.3	2.4	5.2**	7.1***	7.4**	8.5**	6.5	6.7	8.8*	7.5	6.7	7.1	6.2	5.1	6.7	6.4
	(1.3)	(1.9)	(2.1)	(2.4)	(2.9)	(3.7)	(4.6)	(4.5)	(4.7)	(5.1)	(5.4)	(5.6)	(7.0)	(7.0)	(7.5)	(7.8)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42

Notes: Cluster-robust standard errors in parentheses. Asterisks denote statistical significance: * = 10%, ** = 5% and *** = 1%.

Table A.6: Local projections for housing investments during recessions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Constant	-9.3**	-11.0**	-7.4	-6.8	-8.0	-7.9	-7.4	-5.3	-5.7	-4.2	-2.8	3.4	11.2	9.4	5.9	6.7
	(4.5)	(5.4)	(6.9)	(7.6)	(8.9)	(10.2)	(12.0)	(13.4)	(15.1)	(16.4)	(18.3)	(18.3)	(18.2)	(18.5)	(18.4)	(19.5)
Average growth in house prices/disp. income	-0.4	1.2	2.1	2.7	2.1	2.8	2.2	2.8	2.6	3.7	4.1	4.1	4.1	5.0	6.2	5.2
	(1.1)	(1.4)	(1.8)	(1.9)	(2.3)	(2.6)	(3.1)	(3.4)	(3.8)	(4.2)	(4.6)	(4.7)	(4.6)	(4.7)	(4.7)	(4.9)
Average growth in credit/GDP	-0.0	-0.3*	-0.5**	-0.6**	-0.7**	-0.9**	-0.8*	-1.0**	-0.8*	-0.9	-1.1*	-1.2**	-1.3**	-1.4**	-1.6***	-1.5**
	(0.1)	(0.2)	(0.2)	(0.2)	(0.3)	(0.3)	(0.4)	(0.4)	(0.5)	(0.5)	(0.6)	(0.6)	(0.6)	(0.6)	(0.6)	(0.6)
Average growth in housing investment	-1.3	-1.4	-2.3	-3.1	-3.4	-4.7*	-6.4*	-6.8*	-7.3*	-6.5	-6.9	-5.5	-3.7	-3.7	-2.7	-3.2
	(1.2)	(1.4)	(1.8)	(2.0)	(2.4)	(2.7)	(3.2)	(3.5)	(4.0)	(4.3)	(4.8)	(4.8)	(4.8)	(4.9)	(4.9)	(5.1)
Average GDP growth	1.3	2.3	0.5	0.1	2.3	5.1	6.6	7.4	7.4	8.6	9.9	8.4	4.1	10.3	17.9	18.4
	(4.2)	(5.0)	(6.4)	(7.0)	(8.3)	(9.4)	(11.1)	(12.4)	(14.0)	(15.1)	(16.9)	(16.9)	(16.8)	(17.1)	(17.0)	(18.0)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64

Notes: Cluster-robust standard errors in parentheses. Asterisks denote statistical significance: * = 10%, ** = 5% and *** = 1%.

Table A.7: Local projections for real house prices during recessions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Constant	-1.8**	-0.1	1.5	2.0	2.4	2.4	3.0	3.4	3.0	4.3	5.9*	6.4*	6.9*	8.0*	7.8*	8.9*
	(0.9)	(1.8)	(2.2)	(2.0)	(2.1)	(2.3)	(2.4)	(2.6)	(2.9)	(3.1)	(3.4)	(3.6)	(3.9)	(4.1)	(4.3)	(4.5)
Average growth	0.3	1.0**	0.9*	0.7	0.3	0.1	-0.1	-0.5	-0.8	-0.6	-0.3	-0.3	-0.1	0.4	0.2	0.3
in house prices/disp. income	(0.2)	(0.5)	(0.5)	(0.5)	(0.5)	(0.6)	(0.6)	(0.7)	(0.7)	(0.8)	(0.9)	(0.9)	(1.0)	(1.1)	(1.1)	(1.1)
Average growth	-0.0	-0.1	-0.1*	-0.1*	-0.1*	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.2	-0.2*	-0.2*	-0.3**
in credit/GDP	(0.0)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)
Average growth	-0.5*	-0.0	0.4	0.0	0.0	0.2	0.1	0.2	0.1	0.0	0.2	0.3	0.1	-0.2	-0.2	-0.1
in housing investment	(0.2)	(0.5)	(0.6)	(0.5)	(0.6)	(0.6)	(0.6)	(0.7)	(0.8)	(0.8)	(0.9)	(1.0)	(1.0)	(1.1)	(1.1)	(1.2)
Average GDP	1.3	0.2	-0.5	-0.9	-0.7	-0.2	0.1	0.2	1.8	1.5	1.0	1.5	2.8	3.4	4.7	5.0
growth	(0.8)	(1.7)	(2.0)	(1.9)	(2.0)	(2.1)	(2.2)	(2.4)	(2.6)	(2.8)	(3.1)	(3.4)	(3.6)	(3.8)	(4.0)	(4.1)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64

Notes: Cluster-robust standard errors in parentheses. Asterisks denote statistical significance: * = 10%, ** = 5% and *** = 1%.

Table A.8: Local projections for real disposable income during recessions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Constant	0.0	0.4	0.6	1.9	1.6	3.7	4.6	3.1	3.8	5.2	5.5*	4.9	5.3	5.2	5.6*	6.2*
	(0.6)	(1.2)	(1.3)	(2.1)	(2.6)	(2.8)	(3.0)	(2.8)	(2.9)	(3.2)	(3.2)	(3.3)	(3.4)	(3.3)	(3.2)	(3.4)
Average growth	0.3*	0.7	0.4	-0.4	-0.3	-0.5	-0.7	-0.4	-0.2	-0.2	-0.5	-0.4	-0.4	0.0	0.1	0.4
in house prices/disp. income	(0.2)	(0.5)	(0.5)	(0.6)	(0.8)	(0.9)	(0.8)	(0.8)	(0.8)	(0.9)	(0.9)	(1.0)	(1.1)	(1.1)	(1.1)	(1.3)
Average growth	-0.0	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	-0.1	-0.2
in credit/GDP	(0.0)	(0.0)	(0.0)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)
Average growth	-0.3	-0.2	-0.2	-0.3	-0.6	-0.3	-0.3	-0.7	-0.9	-0.7	-0.5	-0.7	-0.6	-0.8	-0.8	-0.8
in housing investment	(0.2)	(0.4)	(0.4)	(0.6)	(0.8)	(0.8)	(0.8)	(0.8)	(0.8)	(0.9)	(0.9)	(0.9)	(1.0)	(1.0)	(1.0)	(1.1)
Average GDP	0.0	0.3	0.0	-1.4	-0.8	-2.9	-3.8	-1.7	-1.4	-2.3	-2.1	-0.5	-0.1	0.9	1.5	1.6
growth	(0.6)	(1.1)	(1.4)	(2.4)	(3.0)	(3.3)	(3.4)	(3.2)	(3.1)	(3.5)	(3.5)	(3.4)	(3.5)	(3.4)	(3.3)	(3.6)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57

Notes: Cluster-robust standard errors in parentheses. Asterisks denote statistical significance: * = 10%, ** = 5% and *** = 1%.