

Online Appendix - Supplementary Material

Effects of LTV announcements in EU economies

Dimitris Mokas* and Massimo Giuliodori

A Data Appendix

A.1 List of Data Sources

Table B.1: Description of data sources

Timeseris	Sources
Total credit to households, nominal	ECB SDW QSAN&BIS long series on total credit
Loans to households, nominal	ECB SDW QSAN
Mortgage credit, deflated	Richter et al. (2019)
Real house price indexes	BIS selected property prices
New mortgage lending rates	MFI MIR and National Central Banks
Harmonized consumer price index	Eurostat
Real GDP growth rate	Eurostat
Final household consumption and components	Eurostat
Monetary policy rates	Refinitiv
Interbank (3-month or 90 days) interest rates	Refinitiv and Fred
10-year government bond yields	ECB IRS dataset and Refinitiv

A.2 Details and Sources for Policy Measures

Croatia

1. Announced: October 2006

- Implemented: October 2006
- Information: Guidelines directed to credit institutions and issued on 6 October 2006
- Sources: National Bank Guidelines

Cyprus

*Corresponding author. E-mail address: d.mokas@uva.nl

1. Announced: November 2003

- Implemented: November 2003
- Information: Central Bank of Cyprus: Circulars sent to Banks with immediate effect.
- Sources: non-publicly available information

2. Announced: July 2007

- Implemented: July 2007
- Information: Central Bank of Cyprus: Circulars sent to Banks with immediate effect.
- Sources: non-publicly available information

3. Announced: February 2013

- Implemented: February 2013
- Information: Central Bank of Cyprus: Circulars sent to Banks with immediate effect.
- Sources: non-publicly available information

Czech Republic

1. Announced: June 2015

- Implemented: June 2015
- Information: The Czech National Bank introduced the loan-to-value ratio measure with the Recommendation on the management of risks associated with the provision of retail loans secured by residential property. The Recommendation took immediate effect with its publication.
- Sources: Recommendation Czech National Bank

2. Announced: June 2016

- Implemented: June 2016-April 2017
- Information: On June, 14th 2016 the Czech National Bank issued the Recommendation on the management of risks associated with the provision of retail loans secured by residential property. The Recommendation replaces the Recommendation of June 16th 2015. With the Recommendation loan-to-value ratio for loans secured by residential property are tightened gradually with effective dates 14 June 2016, 1 October 2016, 1 April 2017.
- Sources: Recommendation Czech National Bank

Denmark

1. Announced: June 2003

- Implemented: January 2004
- Information: The Danish Mortgage-Credit Loans and Mortgage Credit-Bonds Act no 454 of June 10 2003 shall enter into force on 1 January 2004.
- Sources: Mortgage-Credit Loans and Mortgage Credit-Bonds Act no 454

2. Announced: June 2007

- Implemented: June 2007
- Information: Financial Business Act & Mortgage-Credit Loans and Mortgage Credit Bonds etc. Act of 6 June 2007. Since the act came into force on 1st July, the implementation month is also set to June and not July.
- Sources: Translation of Act

3. Announced: December 2014

- Implemented: January 2018
- Information: The Financial Supervisory Authority has published the final supervisory diamond for mortgage banks on December 2nd, 2014. From Annex 2 of the FSA proposal, the down payment of 5% will be carried out via an

amendment to the Executive Order on Good Business and Practices for Financial Undertakings.

- Sources: Danish FSA Annex 2 Memo on Supervisory Diamond for Mortgage Lenders and Danish FSA Press Release on Supervisory Diamond for Mortgage Lenders and ESRB.
- Information on consultation process: Proposal for Supervisory Diamond, Annex 2

Estonia

1. Announced: December 2014

- Implemented: March 2015
- Information: The Governor's Decree issued on 12 December 2014, establishes the requirements for the ratio between the amount of a housing loan and the value of the loan collateral (hereinafter the loan-to-value limit). The Decree shall enter into force on 1 March 2015.
- Sources: Decree of Governor of Eesti Pank

Finland

1. Announced: March 2010

- Implemented: March 2010
- Information: In March 2010 the FIN-FSA issues Guidelines recommending (not binding) a maximum LTV ratio of 90%.
- Sources: IMF FSAP report referring to the Finnish FSA Guidance

2. Announced: August 2014

- Implemented: July 2016
- Information: The Credit Institutions Act entered into force August 8, 2014 according to Chapter 23, section 1. Chapter 15, section 11 on Loan to Collateral requirement will enter into force 1 July 2016.

- Sources: Act on Credit Institutions

3. Announced: March 2018

- Implemented: July 2018
- Information: The Board of the Financial Supervisory Authority (FIN-FSA) at its meeting on 19 March 2018, has decided to lower the binding maximum loan-to-collateral (LTC) ratio, as referred to in chapter 15, section 11 of the Credit Institutions Act, by 5 percentage points to 85% for residential mortgage loans other than those taken for first home purchases. The decision will enter into force on 1 July 2018.
- Sources: Macroprudential decision Finish FSA

Hungary

1. Announced: December 2009

- Implemented: March 2010
- Information: With Government's Decree 361/2009 the authorities introduced maximum loan-to-value ratio limits. The limits are effective from March 2010.
- Sources: Decree 361/2009

2. Announced: August 2014

- Implemented: January 2015
- Information: Text from IMF Annual Macroprudential Dataset: As announced August 27, 2014 and effective January 1, 2015, loan-to-value (LTV) ratios for (1) real-estate-backed mortgage loans in Euros were set at 50%, in any other foreign currency set at 35%, and in HUF (Hungarian forint) set at 80%; (2) financial real estate leasing in Euros were set at 55%, in any other foreign currency set at 40%, and in HUF set a 85%; (3) vehicle financing loans in Euros were set at 45%, in any other foreign currency set at 30%, and in HUF

set at 75%; and (4) vehicle leasing in Euros were set at 50%, in any other foreign currency set at 35%, and in HUF set at 80%.

- Sources: Decree 32/2014

Ireland

1. Announced: December 2001

- Implemented: December 2001
- Information: The bill ASSET COVERED SECURITIES ACT, 2001 has been signed into law on 18 December 2001.
- Sources: Asset Covered Securities Act, 2001

2. Announced: February 2015

- Implemented: February 2015
- Information: The central bank (supervision and enforcement) Act 2013 (Section 48) (Housing Law Requirements) regulations was notified in the Iris Pifgiuil on 10th February 2015.
- Sources: Central Bank of Ireland Regulations
- Information on consultation process: CP87 Macro-prudential policy for residential mortgage lending

Latvia

1. Announced: May 2007

- Implemented: July 2007
- Information: The Saeima passed the Amendments to the Consumer Rights Protection Law on 17 May 2007. 11. Section 8, Paragraph five of this Law shall enter into force on 10 July 2007.
- Sources: Amendments to the Consumer Rights Protection Law

2. Announced: September 2014

- Implemented: September 2014
- Information: The law on the Amendments to the Consumer Rights Protection Law was passed by the Saeima on 18 September 2014. The law comes into force the day after its promulgation.
- Sources: Amendments to the Consumer Rights Protection Law

Malta

1. Announced: March 2019

- Implemented: July 2019
- Information: LTV-O ratio of an RRE for Category I Borrowers shall not exceed the 90 per cent LTV-O. The total volume of RRE loans granted to Category I Borrowers with an LTV-O beyond the 90 per cent threshold, does not exceed 10 per cent of the total volume of RRE loans granted to Category I Borrowers on a semi-annual basis. LTV-O ratio of an RRE loan for Category II Borrowers shall not exceed 85 per cent in the first year of the coming into force of this Directive and 75 per cent in the years thereafter. Provided that, the total volume of RRE loans granted to Category II Borrowers with an LTV- O beyond that set in this paragraph shall not exceed 20 per cent of the total volume of RRE loans provided on a semi-annual basis.
- Sources: Directive No 16

Lithuania

1. Announced: September 2011

- Implemented: November 2011
- Information: The Board of the Bank of Lithuania approved Regulations for Responsible Lending aimed at protecting the population against an imprudent assumption of financial burden. The regulation came into effect from 1

November 2011. The regulation was made known with the Bank of Lithuania press release on 6 September 2011.

- Sources: Responsible Lending Regulations

Netherlands

1. Announced: December 2012

- Implemented: January 2013 - January 2018
- Information: The regulation of the Minister of Finance of 12 December 2012, FM / 2012/1887 M, containing the income criteria for providing mortgage credit and rules for determining the maximum level of the mortgage credit in relation to the value of the home was published in the official government gazette on 12 December 2012.
- Sources: Ministerial Regulation
- Information on the Stability Program: Stability Program for Netherlands 2012

Poland

1. Announced: June 2013

- Implemented: June 2014 - January 2017
- Information: The Polish Financial Supervision Authority issues in June 2013 the Recommendation S regarding good practices in managing exposures mortgage-backed loans.
- Sources: Recommendation S Polish FSA

Portugal

1. Announced: February 2018

- Implemented: July 2018

- Information: The Recommendation shall apply to agreements concluded from 1 July 2018 onward. The recommendation was made known on 1st February 2018.
- Sources: Recommendation Bank of Portugal

Romania

1. Announced: December 2003

- Implemented: February 2004
- Information: text from iMaPP: The LTV ratio framework was announced December 22, 2003 in relation to consumer loans (NBR Norms No. 15/2003) and December 29, 2003 in relation to mortgage loans (Norms No. 16/2003) and became effective February 1, 2004.
- Sources: NBR FSR listing LTV measures

2. Announced: October 2011

- Implemented: October 2011
- Information: text from iMAPP: As announced October 28, 2011 and became effective October 31, 2011 explicit limits on the LTV ratio were re-introduced by the NBR regulations.
- Sources: NBR FSR listing LTV measures

Slovak Republic

1. Announced: October 2014

- Implemented: November 2014 - January 2017
- Information: Recommendation No 1/2014 in the area of macroprudential policy on risks related to market developments in retail lending was issued by Narodna banka Slovenska on 7 October 2014.
- Sources: Recommendation No 1/2014 of National Bank

2. Announced: December 2016

- Implemented: January 2017 and July 2017
- Information: The Decree laying down detailed provisions on the assessment of borrowers' ability to repay housing loans was issued by Narodna banka Slovenska on 13 December 2016
- Sources: 2016 Decree of National Bank

3. Announced: May 2018

- Implemented: July 2018 - January 2019
- Information: The Decree amending Decree No 10/2016 of Narodna banka Slovenska laying down detailed provisions on the assessment of borrowers' ability to repay housing loans was issued by Narodna banka Slovenska on 29 May 2018
- Sources: 2018 Decree of National Bank

Slovenia

1. Announced: August 2016

- Implemented: August 2016
- Information: The Governing Board of the Bank of Slovenia at its 561st meeting of 30 August 2016 approved the Macroprudential recommendation for household lending. The recommendation entered into force upon its publication on the Bank of Slovenia website (30 August 2016).
- Sources: Macroprudential Recommendation

Sweden

1. Announced: December 2003

- Implemented: July 2004

- Information: The Swedish Covered Bond Act was issued on 18 December 2003 and took effect on 1 July 2004.
- Sources: Covered Bond Issuance Act

2. Announced: July 2010

- Implemented: October 2010
- Information: Finansinspektionen's general guidelines regarding limitations to the size of loans collateralised by residential properties were published on 15 July 2010 and came into force on 1 October 2010.
- Sources: Finansinspektionen's general guidelines

A.3 LTV Actions with Consultation

Ireland

- Measure affected: The CENTRAL BANK (SUPERVISION AND ENFORCEMENT) ACT 2013 (SECTION 48) (HOUSING LOAN REQUIREMENTS) REGULATIONS 2015
- Details: On October 7th 2014, the Central Bank of Ireland launched a consultation paper (CP87) with the aim of asking feedback on the draft regulations regarding the imposition of LTV and LTI limits for mortgage lending.

Denmark

- Measure affected: LTV limits, Annex 2 of Supervisory Diamond announced in December 2014.
- Details: On September 11th 2014 the Danish FSA published its proposal for a supervisory diamond for mortgage banks. Danmarks Nationalbank recommends supplementing the Supervisory Diamond with legislation on lower loan-to-value limits for deferred amortisation loans - as a ratio of the property value at the time of granting the loan.

Netherlands

- Measure affected: LTV limits announced during December 2012.
- Details: The measures were included in earlier consolidation plans and included in the Stability Program of the Netherlands in April 2012.

Finland

- Measure affected: Decision of the FIN-FSA to lower the maximum LTV limit announced on 19th March 2018.
- Details: The FIN-FSA requested from Finance Finland and OP Financial Group on its decision proposal to lower the maximum LTV ratio. The opinions were submitted on the 6th and 8th of March by Finance Finland and OP Financial Group, respectively. The proposal appears to have been notified to these institutions in February 2018.

A.4 Details on the Dataset of Lending Rates

Lending rates for house purchase

For the construction of the lending rates dataset we combine data obtained from the ECB MFI MIR statics dataset and national central banks. For the countries for which data was available from the ECB MIR dataset, we present the timeseries codes in Table B.2. For the countries that we had to combine information from different data sources we provide a more detailed description below.

Bulgaria

- Series: Interest rates on loans other than overdraft to households for house purchase, BGN
- Source: Bulgarian National Bank
- Details: Table: INTEREST RATES AND VOLUMES OF NEW BUSINESS ON LOANS TO NON-FINANCIAL CORPORATIONS AND HOUSEHOLDS1 BY ORIGINAL MATURITY

- Accessed via: Bulgarian National Bank

Cyprus

- Series: Annualized agreed interest rate, all maturities, EUR, loans excluding overdraft, convenience and extended credit card debt
- Source: ECB SDW and Central Bank of Cyprus.
- Details: MIR.M.CY.B.A2C.A.R.A.2250.EUR.N, missing values replaced with data from the national central bank. We used interest rate for loans to households for house purchase with interest rate fixation up to 1 year from Table 8 of MFI Statistics.
- Accessed via: Central Bank of Cyprus

Czech Republic

- Series: Loans for housing purchase provided by banks and building societies to households (%p.a), CZK
- Source: Czech National Bank
- Details: Table B1.3.1
- Accessed via: Czech National Bank

Denmark

- Series: New domestic loans excl. revolving loans, etc. from MFI sector excl. Denmark National Bank, all maturities, all currencies
- Source: Danmarks Nationalbank
- Details: Table DNRNUM: NEW DOM. LOANS EXCL. REVOLVING LOANS, ETC. FROM MFI SECTOR EXCL. DANM. NAT.BANK BY PURPOSE, DATA TYPE, DOMESTIC SECTOR, CURRENCY, MATURITY

- Accessed via: Danmarks Nationalbank

Estonia

- Series: Interest rates on housing loans granted to households, all maturities, EEK and EUR
- Source: Estonian National Bank
- Details: Table: 3.7.3 Interest rates of loans granted to households by loan type and currency. Interest rates for EUR and EEK were weighted by new business volumes obtained from Table 3.3.4 Turnover of loans granted to households by type of loan, currency and collateral (EUR million)
- Accessed via: Estonian National Bank

Greece

- Series: Interest rates all housing loans
- Source: Bank of Greece
- Details: Table 1: Bank interest rates on new euro-denominated deposits and loans vis-a-vis euro area residents
- Accessed via: Bank of Greece

Croatia

- Series: Credit institutions' interest rates on kuna loans to households.
- Source: Croatian National Bank
- Details: Table G2a: Credit institutions' interest rates on kuna loans to households not indexed to foreign currency (new business); Table G2b: Credit institutions' interest rates on kuna loans to households indexed to foreign currency (new business). We obtain the interest rate series by weighting the interest rates on loans not indexed to foreign currency and loans indexed to foreign currency with new business volumes.

- Accessed via: Croatian National Bank

Hungary

- Series: Annualized agreed interest rate, all maturities, EUR, loans excluding overdraft, convenience and extended credit card debt
- Source: ECB SDW and Hungarian National Bank
- Details: MIR.M.HU.B.A2C.A.R.A.2250.HUF.N; Missing points replaced with the unweighted average of the annualised agreed rate of secured HUF loans to households from Table 2. Average consisted of rates with interest rate fixations up to 1 year, above 1 year and up to 5 years, above 5 years and up to 10 years, above 10 years.
- Accessed via: Hungarian National Bank

Luxembourg

- Series: Annualized agreed interest rate, all maturities, EUR, loans excluding overdraft, convenience and extended credit card debt.
- Source: ECB SDW and Central Bank of Luxembourg
- Details: MIR.M.LU.B.A2C.A.R.A.2250.EUR.N. After 2003 we used maturity weighted average interest rate on new loans for house purchase. This interest rate was obtained as the weighted average of interest rates with interest rate fixation up to 1 year and interest rate fixation above 1 year. These rates were sourced from Table 3.1 Luxembourg bank interest rates on euro-denominated deposits and loans by euro area residents - new business 1).
- Accessed via: Central Bank of Luxembourg

Latvia

- Series: Annualised agreed interest rate, all maturities, EUR, loans excluding overdraft, convenience and extended credit card debt

- Source: ECB SDW and Latvian National Bank
- Details: MIR.M.LV.B.A2C.A.R.A.2250.EUR.N and data from Table 2. Interest rates on loans to households (new business). We fill in the gaps in the interest rate series by obtaining a weighted average of interest rates for house purchase with different interest rate fixations (up to 1 year, over 1 and up to 5 years, over 5 years and up to 10 years, and over 10 years).
- Accessed via: Latvian National Bank

Malta

- Series: MFI interest rates on deposits and loans to residents of Malta, loans for house purchase, excluding overdrafts, convenience and extended credit card debt.
- Source: Central Bank of Malta
- Details: -
- link: Central Bank of Malta

Romania

- Series: Loans to households for house purchase
- Source: Romanian National Bank
- Details: Weighted average interest rates for new business loans to households for house purchase in EUR and RON. The interest rates for new RON and EUR loans to households for house purchase were obtained as the weighted average of interest rates for different interest rate fixation periods (up to 1 year, over 1 year and up to 5 years, over 5 years and up to 10 years, over 10 years). The calculation base of lending rates on new business does not include overdrafts, revolving credit, claims related to credit cards, non-performing loans and loans for debt restructuring granted at below market rates.

- link: Romanian National Bank

Slovenia

- Series: Loans, households, house purchase, new loans
- Source: ECB SDW and Slovenian National Bank
- Details: MIR.M.SI.B.A2C.A.R.A.2250.EUR.N and 2.4.3b MFI MIR. Numbers from the ECB MIR dataset. Gaps were filled with the interest rate on new loans for house purchase obtained from the national central bank. The interest rate was obtained as the weighted average interest rate on new loans for house purchase domestic in currency over different maturities (up to 1 year, over 1 year and up to 5 years, over 5 years and up to 10 years, over 10 years).
- link: Slovenian National Bank

Slovak Republic

- Series: Annualized agreed interest rate, all maturities, EUR, loans excluding overdraft, convenience and extended credit card debt extended with average lending rates of commercial banks for house purchase.
- Source: ECB SDW and Slovakian National Bank
- Details: MIR.M.SK.B.A2C.A.R.A.2250.EUR.N and Average Lending Rates of Commercial Banks. 2006M1-2007M12 interest rate from the national central bank. From 2008M1 rates obtained from the ECB MIR. The interest rate from the national central bank is the average lending rate of commercial banks, loans to Households and NPISHs, S.14 and S.15), loans for house purchase all maturities, new business.
- link: Slovakian National Bank

Table B.2: Data on new mortgage interest rates, MFI MIR data sourced via ECB SDW

Country	Source	Codes	Frequency
AT	ECB SDW	MIR.M.AT.B.A2C.A.R.A.2250.EUR.N;MIR.M.AT.B.A2C.F.R.A.2250.EUR.N;MIR.M.AT.B.A2C.K.R.A.2250.EUR.N	Monthly
BE	ECB SDW	MIR.M.BE.B.A2C.A.R.A.2250.EUR.N;MIR.M.BE.B.A2C.F.R.A.2250.EUR.N;MIR.M.BE.B.A2C.K.R.A.2250.EUR.N	Monthly
DE	ECB SDW	MIR.M.DE.B.A2C.A.R.A.2250.EUR.N;MIR.M.DE.B.A2C.F.R.A.2250.EUR.N;MIR.M.DE.B.A2C.K.R.A.2250.EUR.N	Monthly
ES	ECB SDW	MIR.M.ES.B.A2C.A.R.A.2250.EUR.N;MIR.M.ES.B.A2C.F.R.A.2250.EUR.N;MIR.M.ES.B.A2C.K.R.A.2250.EUR.N	Monthly
FI	ECB SDW	MIR.M.FI.B.A2C.A.R.A.2250.EUR.N;MIR.M.FI.B.A2C.F.R.A.2250.EUR.N;MIR.M.FI.B.A2C.K.R.A.2250.EUR.N	Monthly
FR	ECB SDW	MIR.M.FR.B.A2C.A.R.A.2250.EUR.N;MIR.M.FR.B.A2C.F.R.A.2250.EUR.N;MIR.M.FR.B.A2C.K.R.A.2250.EUR.N	Monthly
IE	ECB SDW	MIR.M.I2.B.A2C.A.R.A.2250.EUR.N;MIR.M.IE.B.A2C.F.R.A.2250.EUR.N;MIR.M.IE.B.A2C.K.R.A.2250.EUR.N	Monthly
IT	ECB SDW	MIR.M.IE.B.A2C.A.R.A.2250.EUR.N;MIR.M.IT.B.A2C.F.R.A.2250.EUR.N;MIR.M.IT.B.A2C.K.R.A.2250.EUR.N	Monthly
LT	ECB SDW	MIR.M.IT.B.A2C.A.R.A.2250.EUR.N;MIR.M.LT.B.A2C.F.R.A.2250.EUR.N;MIR.M.LT.B.A2C.K.R.A.2250.EUR.N	Monthly
NL	ECB SDW	MIR.M.MT.B.A2C.A.R.A.2250.EUR.N;MIR.M.NL.B.A2C.F.R.A.2250.EUR.N;MIR.M.NL.B.A2C.K.R.A.2250.EUR.N	Monthly
PL	ECB SDW	MIR.M.PL.B.A2C.A.R.A.2250.PLN.N;MIR.M.PL.B.A2C.F.R.A.2250.EUR.N;MIR.M.PL.B.A2C.(I&O&P).R.A.2250.(EUR and PLN).N	Monthly
PT	ECB SDW	MIR.M.PT.B.A2C.A.R.A.2250.EUR.N;MIR.M.PT.B.A2C.F.R.A.2250.EUR.N;MIR.M.PT.B.A2C.K.R.A.2250.EUR.N	Monthly
SE	ECB SDW	MIR.M.SE.B.A2C.A.R.A.2250.SEK.N;MIR.M.SE.B.A2C.F.R.A.2250.SEK.N;MIR.M.SE.B.A2C.(I&O&P).R.A.2250.SEK.N	Monthly
GB	ECB SDW	MIR.M.GB.B.A2C.A.R.A.2250.GBP.N;MIR.M.GB.B.A2C.F.R.A.2250.GBP.N;MIR.M.GB.B.A2C.(I&O).R.A.2250.GBP.N	Monthly

SDW codes are provided for the interest rates series on interest rate fixations followed by the codes for rates of interest rates fixation up to 1 year and over 1 year.

In case data on multiple interest rate fixations or currencies were aggregated, the keys for each maturity and currency are indicated withing brackets with the & sign.

A.5 List of tightening LTV ratio actions

Table B.3: Loan-to-value ratio tightening actions in 18 EU countries, January 2000 - June 2019

Country	Announcement	Implementation	New Limit	Binding	Speed Limit	In Package	Motivation Keywords
HR	2006M10	2006M10	75.00%	No	No	Yes	risk management;under-writing policies
CY	2003M11	2003M11	70.00%	Yes	No	No	credit growth;asset prices
CY	2007M07	2007M07	70.00%	Yes	No	No	credit growth;asset prices;borrower resilience;lender resilience
CY	2013M02	2013M02	70.00%	Yes	No	No	credit growth;asset prices;borrower resilience;lender resilience
CZ	2015M06	2015M06	91.00%	No	Yes	Yes	prevention;credit growth;borrower resilience;lenders resilience
CZ	2016M06	2016M06	91%	No	Yes	Yes	prevention
CZ	2016M06	2016M10	86.00%	No	Yes	Yes	prevention
CZ	2016M06	2017M04	81.50%	No	Yes	No	prevention
DK	2003M06	2004M01	72.50%	Yes	No	Yes	market regulation
DK	2007M07	2007M07	70.50%	Yes	No	No	market regulation
DK	2014M12	2018M01	72.50%	Yes	No	No	borrower resilience;lender resilience
EE	2014M12	2015M03	87.50%	Yes	Yes	Yes	borrower resilience;lender resilience;credit growth;asset prices
FI	2010M03	2010M03	95.00%	No	No	Yes	borrower resilience;credit growth;asset prices
FI	2014M08	2016M07	92.50%	Yes	No	No	credit growth;leverage
FI	2018M03	2018M07	90.00%	Yes	No	No	borrower resilience;systemic risk
HU	2009M12	2010M03	60.00%	Yes	No	No	consumer protection
HU	2014M08	2015M01	55.00%	Yes	No	Yes	borrower resilience;procyclicality;lenders resilience
IE	2001M12	2001M12	88.10%	Yes	No	No	market regulation

Table B.3: Loan-to-value ratio tightening actions in 18 EU countries, January 2000 - June 2019

Country	Announcement	Implementation	New Limit	Binding	Speed Limit	In Package	Motivation Keywords
IE	2015M02	2015M02	87.25%	Yes	Yes	Yes	prevention
LV	2007M05	2007M07	90.00%	Yes	No	No	consumer protection
LV	2014M09	2014M09	92.50%	Yes	No	No	consumer protection
LT	2011M09	2011M11	85.00%	Yes	Yes	Yes	borrower resilience;systemic risk
MT	2019M03	2019M07	87.50%	Yes	Yes	Yes	borrower resilience;lender resilience;prevention
NL	2012M12	2013M01	105.00%	Yes	No	Yes	borrower resilience
NL	2012M12	2014M01	104.00%	Yes	No	Yes	borrower resilience
NL	2012M12	2015M01	103.00%	Yes	No	Yes	borrower resilience
NL	2012M12	2016M01	102.00%	Yes	No	Yes	borrower resilience
NL	2012M12	2017M01	101.00%	Yes	No	Yes	borrower resilience
NL	2012M12	2018M01	100.00%	Yes	No	Yes	borrower resilience
PL	2013M06	2014M06	95.00%	No	No	Yes	credit growth;borrower resilience;credit standards
PL	2013M06	2015M01	90.00%	No	No	Yes	credit growth;borrower resilience;credit standards
PL	2013M06	2016M01	87.50%	No	No	Yes	credit growth;borrower resilience;credit standards
PL	2013M06	2017M01	85.00%	No	No	Yes	credit growth;borrower resilience;credit standards
PT	2018M02	2018M07	90.00%	No	No	Yes	borrower resilience;lenders resilience;prevention; systemic risk;c
RO	2003M12	2004M02	75.00%	Yes	No	Yes	credit growth;capital flows
RO	2011M10	2011M10	75.00%	Yes	No	Yes	credit growth;capital flows
SK	2014M10	2014M11	92.50%	No	Yes	Yes	credit growth;prevention;borrower resilience;lenders resilience
SK	2014M10	2015M07	92.00%	No	Yes	Yes	credit growth;prevention;borrower resilience;lenders resilience

Table B.3: Loan-to-value ratio tightening actions in 18 EU countries, January 2000 - June 2019

Country	Announcement	Implementation	New Limit	Binding	Speed Limit	In Package	Motivation Keywords
SK	2014M10	2016M04	91.50%	No	Yes	Yes	credit growth;prevention;borrower resilience;lenders resilience
SK	2016M12	2017M01	90.00 %	Yes	Yes	Yes	credit growth;prevention;borrower resilience;lenders resilience
SK	2016M12	2017M07	88.00%	Yes	Yes	Yes	credit growth;prevention;borrower resilience;lenders resilience
SK	2018M05	2018M07	87.00%	Yes	Yes	Yes	credit growth;prevention;borrower resilience;lenders resilience
SK	2018M05	2018M10	86.00%	Yes	Yes	Yes	credit growth;prevention;borrower resilience;lenders resilience
SK	2018M05	2019M01	85.00%	Yes	Yes	Yes	credit growth;prevention;borrower resilience;lenders resilience
SK	2018M05	2019M07	84.00%	Yes	Yes	Yes	credit growth;prevention;borrower resilience;lenders resilience
SI	2016M08	2016M08	80.00%	No	No	Yes	credit growth;prevention;borrower resilience;lenders resilience
SE	2003M12	2004M07	91.67%	Yes	No	No	market regulation
SE	2010M07	2010M10	85.00%	No	No	No	credit growth

B Results for the Quantified Measure

Our study provides empirical evidence for the response of the dependent variables to an average LTV announcement. However, policy makers might be interested in the responses after an 1% change in the maximum LTV ratio limit. Our dataset, contains information on the level of LTV limits for the instruments affected by the decision before and after the policy measures. Using this information we construct a numerical counterpart of our LTV announcements dummy.

We start by identifying the average implemented LTV ratio limit for housing loans applying during each quarter. As a starting point, we use the index of maximum LTV ratio limits provided by Alam et al. (2019) and we reconcile it with our dataset of LTV actions. When the information on the average applicable limit was not available, we calculated this limit using the information from the recovered background documents. It is possible that in a policy decision the authorities specify different LTV limits for different types of mortgage loans or types of borrowers. As in Alam et al. (2019), we take into account all LTV limits for which changes are announced, but also limits which might have been previously changed by other decisions but not mentioned in the updated decision. For the latter, we maintain the limit as amended by the last known decision.

In the next step, we proceed to construct a quantitative counterpart of our dummy of announced LTV action plans. To do so, we assign at the time of announcement the sum of all implemented changes in the maximum LTV ratio limit starting from time t and onward. The quantified measure of LTV announcements can be denoted as $qltv_{i,t}^{ann} = \sum_T^t \Delta LTV_{i,t,s}$ where $\sum_T^t \Delta LTV_{i,t,s}$ is the sum of all changes in the average applicable LTV ratio limit between the quarter of announcement t and the quarter of final implementation T . Similarly to the baseline specification, we control with $qltv_{i,t}^{ant}$ for quantified changes in the maximum LTV ratio limit in quarter t but announced in earlier quarters and with a dummy for implemented quantified changes in the maximum LTV ratio limit between time t and time $t+h$.

We identify two main caveats when constructing the quantified applicable LTV ratio

limit which could potentially introduce measurement bias in our estimates. First, when using the average of applicable LTV limits, we assume that we take into account all instrument types and financing options available to borrowers for financing their mortgage. However, it is challenging to have this specific institutional knowledge for a relatively large number of countries such as in our dataset. Introducing significant measurement error is all more likely. The second caveat has to do with the treatment of newly introduced LTV limits. In the related literature there are two different treatments. On the one hand, Richter et al. (2019) opt to disregard newly introduced actions by setting the applicable LTV limit to missing before the implementation of the new measure. On the other hand, Alam et al. (2019) assume that the *de facto* applicable LTV limit before the introduction of the official LTV limit was 100%.

The first approach (Richter et al., 2019) restricts significantly the number of actions in the sample. Most countries have limited experience with LTV policies and have introduced the most one measure. This is particularly the case for EU economies and would lead us to drop most of our LTV actions. By using this approach the sample shifts towards the countries that are the most active in the front of LTV policies. The latter might raise concerns that we evaluate policies in countries in which these policies are more likely to be effective and thus repetitively used. Therefore, to use both first-time and follow-up actions, we follow Alam et al. (2019) and we assume that the *de facto* LTV limit was 100% before the introduction of the official LTV limit. This *de facto* limit is raised to 110% for countries that introduced a first time limit in excess of 100% (e.g. Netherlands).

To measure the response to the quantified measure of announced changes, we replace the dummy index in the local projections specification, but we retain the dummy in the first stage regression. Results are presented in Figure C.1. We find qualitatively similar results for real household credit, real house prices, and lending rates with these obtained for an average action in previous sections. Additionally, the maximum responses are also comparable. A typical action is approximately 12% which means that the impact on real household credit would be around -4.5%, in-line with our findings for the effects of an

average action. However, using the quantitative measure, dynamic responses are more noisily estimated. The response of house prices becomes statistically significant at the 90% confidence level at around 9 quarters from the announcement, but turns to be not significant for most local projections horizons.

Overall, the results suggest that our identification strategy is invariant to the choice between a dummy and a quantified measure and that the announcement of the measure itself carries significant information content.

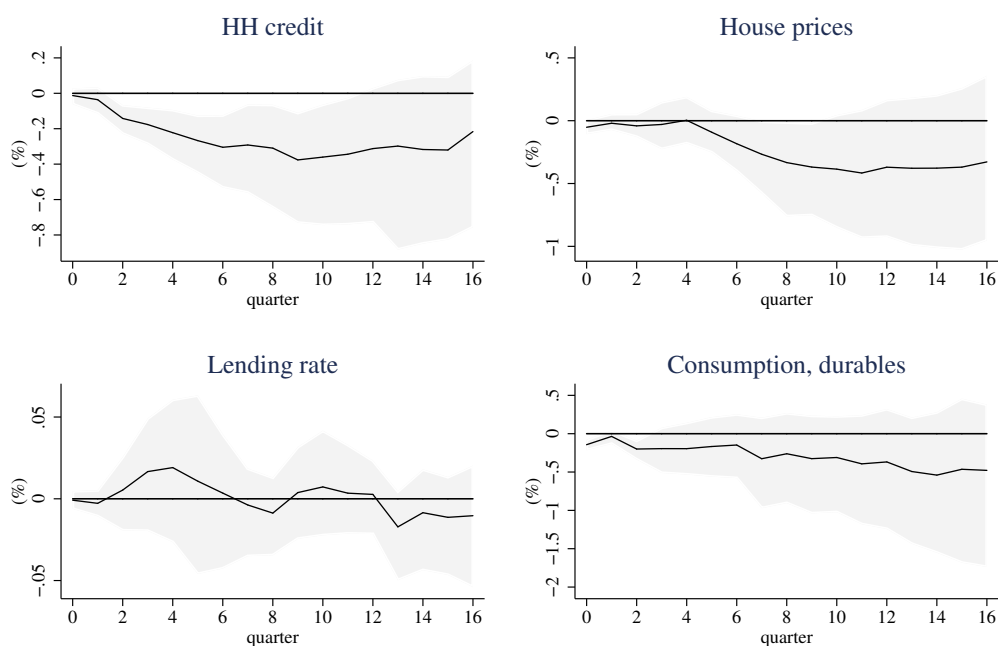


Figure C.1: Responses of main dependent variables to an announcement of 1% change in the maximum LTV ratio. *Notes:* Shaded areas correspond to the 90% confidence interval derived from inverted wild cluster bootstrap-t statistic clustered at the country level.

References

- Alam, Z., Alter, A., Eiseman, J., Gelos, R., Kang, H., Narita, M., Nier, E., and Wang, N. (2019). Digging Deeper—Evidence on the Effects of Macroprudential Policies from a New Database. IMF Working Paper 19/66, International Monetary Fund.
- Richter, B., Schularick, M., and Shim, I. (2019). The Costs of Macroprudential Policy. *Journal of International Economics*, 118:263–282.