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How Effective is Macroprudential Policy? Evidence from Lending Restriction Measures in EU Countries

by Tigran Poghosyan

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How Effective is Macroprudential Policy? Evidence from Lending Restriction Measures in EU Countries

Prepared by Tigran Poghosyan[1]

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Abstract

This paper assesses the effectiveness of lending restriction measures, such as loan-to-value and debt-service-to-income ratios, in affecting developments in house prices and credit. We use data on 99 lending standard restrictions implemented in 28 EU countries over 1990–2018. The results suggest that lending restriction measures are generally effective in curbing house prices and credit. However, the impact is delayed and reaches its peak only after three years. In addition, the impact is asymmetric, with tightening measures having weaker association with target variables compared to loosening measures. The association is stronger in countries outside of euro area and for legally-binding measures and measures involving sanctions. The results have practical implications for macroprudential authorities.

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I. INTRODUCTION

Macroprudential policies have gained importance in EU countries, especially following the global financial crisis. The authorities have used them to address externalities associated with two main dimensions of systemic risk: time-series and structural (Claessens 2014; Galati and Moessner 2018). In the *time-series dimension*, collateralized borrowing generates externalities and facilitates the emergence of boom-bust cycles. Fire sales represent a vivid example: simultaneous deleveraging in bad times by individual borrowers who do not take into account how their behavior collectively affects the entire system may lead to swings in asset prices and credit. In the *structural dimension*, externalities arise from the financial market structure, such as interconnectedness and size. Systemic risks may arise if financial institutions, especially systemically important ones, do not internalize the impact of their exposures on other financial institutions and the rest of the economy.

While containing the systemic financial risk is the ultimate objective of macroprudential policies, in practice policymakers pursue intermediate targets—such as house prices and credit (IMF 2014; IMF-FSB-BIS 2016; BIS 2018).[2] Despite the widespread use of macroprudential instruments in recent years, understanding of their effectiveness is limited. First, these policies have become popular following the crisis and relatively few measures were implemented in individual countries so far. Expanding the analysis to a cross-country sample helps expanding the number of observations but requires exercising care when drawing inferences for individual countries. Second, macroprudential policies rely on multiple instruments to tackle multiple intermediate targets (IMF 2014; 2018). This differentiates macroprudential policies from monetary and fiscal policies, where the number of instruments and targets is smaller. Measuring effectiveness of macroprudential policies is thus more complicated since assessment should be made for a multiple combination of instruments and targets.

Several recent papers have provided cross-country empirical evidence on the effectiveness of macroprudential policies. The results are mixed. One reason is that the samples typically include a large number of heterogeneous countries (EU and non-EU) to expand the number of observations and this can dilute the results. In addition, most studies focus on the short-term—usually one period ahead—effects of macroprudential policies, while in many cases the full impact of the measures takes time to materialize. It is also notable that macroprudential stance is typically measured using indices of macroprudential measures, while policymakers are typically interested in the effects of discretionary tightening and loosening actions. Finally, none of the studies explores whether the effectiveness of

[2] More general dimensions of intermediate objective were formulated by the European Systemic Risk Board (ESRB) on April 4, 2013 (ESRB/2013/1): mitigate and prevent excessive credit growth and leverage, mitigate and prevent excessive maturity mismatch and market illiquidity, limit risks related to direct and indirect exposure concentrations, limit the systemic impact of misaligned incentives, and strengthen the resilience of financial infrastructures.

macroprudential measures varies across types (e.g., legally-binding measures versus recommendations, measures with and without sanctions).

The purpose of this paper is to fill this gap and evaluate the effectiveness of macroprudential policies in 28 EU countries over the period 1990–2018. We focus on lending restriction measures, such as loan-to-value (LTV) and debt-service-to-income (DSTI) ratios, and assess their dynamic association with house prices and credit for up to 16 quarters. We also check whether the impact varies across different types of measures and country groups. The results suggest that lending restrictions have a significant association with house prices and credit, peaking at -1.5 percent after three years. However, there is asymmetry between tightening and loosening measures, with the former being weaker. There are also notable differences of effectiveness across country groups and types of measures. The results should be interpreted with caution given reverse causality between discretionary macroprudential actions and developments in target variables. Robustness check suggests that the association is stronger (-3 percent) when reverse causality is controlled for.

The remainder of the paper is structured as follows. Section II reviews cross-country empirical literature on the effectiveness of macroprudential policy. Section III discusses the dataset and describes the stylized facts. Section IV presents the estimation methodology and discusses results. The final section concludes.

II. Cross-Country Empirical Studies on the Effectiveness of Macroprudential Policy

A growing body of cross-country empirical studies attempts to provide evidence on the effectiveness of macroprudential measures. The analysis draws on several databases of macroprudential measures that were put together by various authors for a large number of countries. The databases use official publications or surveys of regulators and central bank officials as sources of information. They cover both bank-based instruments (such as capital buffers, dynamic loan-loss provisioning, concentration limits) and borrower-based instruments (such as LTV, DSTI).

Table 1 lists cross-country empirical studies on the effectiveness of macroprudential policies, including dependent variables (intermediate targets), macroprudential tools, empirical methodology, sample period, and key results. As shown in the table, most commonly used target variables are house prices and various forms of credit (including total, bank, mortgage, and household). Most commonly used macroprudential instruments are various forms of lending restrictions (LTV, DSTI), but some studies also analyze the impact of capital buffers, reserve requirements, taxes on financial institutions, and dynamic loan-loss provisioning, among others.

The review of the literature suggests that the following issues complicate the empirical assessment of the effectiveness of macroprudential policies.

- *Insufficient number of measures*. Some macroprudential measures have been implemented only recently and in a small number of countries, limiting the number of observations for the empirical analysis. Moreover, for measures implemented only recently is difficult to assess dynamic effects given the lack of sufficient observations on target variables following the implementation.

- *Intensity of measures*. The intensity of macroprudential measures is difficult to quantify. For instance, a decrease in LTV by 5 percentage points and increase in the annual amortization requirement by 1 percentage point are both tightening measures, but which of these measures is more "biting" is controversial and depends on a number of factors. Most databases use categorical variables to denote tightening and loosening measures.[3]

- *Endogeneity*. Macroprudential measures are typically implemented in reaction to developments in target variables, such as house prices and credit. This reverse causality biases the coefficient of the macroprudential variable upward.[4] As a result, the estimated coefficients are typically interpreted as lower bounds.[5] Most studies employ GMM methodology to alleviate the impact of endogeneity.

The evidence on the effectiveness of macroprudential measures is mixed. Some studies find that macroprudential policies are effective in curbing both house prices and credit, while others find that the effectiveness varies for different target variables (Jacome and Mitra 2015). There is also disagreement on the effectiveness of different types of macroprudential instruments: for instance, Fendoglu (2017) finds that borrower-based macroprudential measures are more effective in curbing credit compared to financial-institutions-based measures.

In addition to the challenges mentioned above, the mixed results could be the explained by the following reasons. First, most studies include a heterogenous sample of countries with different levels of development and financial deepening to expand the number of observations. Inclusion of various control variables may not be sufficient to address cross-country heterogeneity and restricting the sample to a more homogenous group of countries may be warranted. Second, most studies evaluate the effectiveness of macroprudential policies one period ahead and do not assess the dynamic effects.[6] Given that transmission

[3] Exceptions include Vandenbusche and others (2015), Alam and others (2018), and Richter and others (2018).

[4] For instance, tighter macroprudential stance can be deployed in periods of rising house prices, creating a positive correlation between the residual and the measure of macroprudential policy stance (Vandenbusche and others 2015).

[5] If the coefficient of the macroprudential variable is significant and has the right sign, it can be concluded that macroprudential policies are effective since the lower bound of the estimate is significant. However, if the coefficient does not have the right sign and/or is insignificant, the assessment is uncertain, since the wrong sign and/or insignificance can be resulting from the upward bias.

[6] Notable exceptions are Vandenbusche and others (2015), Jacome and Mitra (2015) and Richter and others (2018).

from changes in the macroprudential stance to target variables can take time, medium- and long-term effects may differ substantially relative to impact effects. Third, most papers use an index of macroprudential measures that is a cumulative sum of tightening (+1) and loosening (-1) measures implemented from a certain period of time (see, e.g., Cerutti and others 2017; Fendoglu 2017; Akinci and Olmstead-Rumsey 2018). While it allows to proxy the cumulative stance starting from the initial period when the data became available, it does not represent the discretionary change in the policy stance.[7] Finally, none of the studies makes a distinction between different types of measures (e.g., legally-binding versus recommended, measures with and without sanctions). Understanding how the effectiveness of macroprudential instruments varies across their types has practical importance for policymakers deciding on the appropriate mix of macroprudential measures.

Our objective is to fill these gaps and assess the effectiveness of lending restriction measures in EU-28 countries using the database of Budnik and Kleibl (2018). We use discretionary changes of lending restriction measures (tightening and loosening) and assess their dynamic effects on house prices and credit for up to 16 quarters. Finally, we assess how the effectiveness varies across different types of measures and groups of countries.

III. LENDING RESTRICTION MEASURES IN THE EU: STYLIZED FACTS

This section provides stylized facts on lending restriction measures in the EU using the Budnik and Kleibl (2018) database.[8] We restrict the sample to 1990q1–2018q2 and exclude the microprudential measures. We code macroprudential measures as a categorical variable that takes the value of: (i) 1 if a country has implemented a tightening measure in that quarter, (ii) -1 if a country has implemented a loosening measure in that quarter, and (iii) 0 if a country has not implemented any macroprudential measures or implemented measures that had a neutral impact.[9]

Table 2 presents the list of lending restriction measures implemented in 28 EU countries during 1990q1–2018q2. There are 99 lending restriction measures in total. Most frequently used measures are loan-to-value (41 measures) and debt-service-to-income (20 measures).

[7] Drawing a parallel with monetary policy: (i) the index of macroprudential policy stance is equivalent to the level of the monetary policy rate, while (ii) discretionary macroprudential measures (tightening and loosening) are equivalent to the changes in the monetary policy rate. The latter definition captures policy shocks and has been used for assessing the impact on policy targets (Romer and Romer 1989 is a seminal contribution).

[8] Lending restriction measures is only one category of measures out of eleven reported in Budnik and Kleibl (2018). We focus our analysis on this category of borrower-based measures which were employed also in the previous literature.

[9] In two cases, countries have implemented one tightening and one loosening measure in the same quarter. In these case, we coded the categorical variable as neutral (0).

Other important measures include maturity and amortization restrictions, other restrictions on lending standards, and other income requirements for loan eligibility.

Figure 1 presents the breakdown of the measures. Out of 99 measures, 82 are tightening measures and 17 are loosening measures. Most of the measures are legally-binding (54 measures) and do not include sanctions (51 measures). In the empirical analysis we will assess whether the effectiveness varies across these types of measures.

Deployment of tightening measures has picked up following the global financial crisis (Figure 2). By contrast, more loosening measures were implemented before the crisis compared to the post-crisis period. The country-specific distribution of measures (Figure 3) suggests that 18 countries have deployed tightening measures and 9 countries have deployed loosening measures. Tightening measures were particularly frequently deployed in CEEC countries, while the distribution of loosening measures is relatively flat across countries.

Figures 4 presents the dynamics of target variables: house price and credit growth.[10] The range of growth rates in both variables varies widely across countries, suggesting that country fixed effects should be used to capture country-specific unobserved heterogeneity. Also, both variables have taken a sharp dip following the global financial crisis suggesting that the dynamics of both variables is affected by common factors. The empirical analysis should include time fixed effects to control for these common factors.

IV. Empirical Analysis

In this section, we provide empirical evidence on the relationship between lending restriction measures and target variables (house prices and credit) in 28 EU countries over 1990–2018. We start by assessing the overall effectiveness of lending restriction measures, then provide evidence on the possible asymmetry between tightening and loosening measures, and finally check if the effectiveness varies across country groups and types of measures.

A. Baseline Specification: Do Lending Restrictions Affect House Prices and Credit?

In the first step, we assess the overall effectiveness of lending restriction measures using local projections methods (Jorda 2005). The baseline empirical specification takes the following form:

$$y_{i,t+h} - y_{i,t-1} = \alpha_i^h + \gamma_t^h + \beta^h M_{i,t} + \sum_{n=1}^{N} \theta_{k,n}^h X_{k,i,t-n} + \varepsilon_{i,t}^h \quad (1)$$

[10] See Table (3) for description of variables. House prices are taken from the BIS database. Credit refers to the non-financial private sector and is taken from the BIS and IFS databases. Both variables are deflated using the CPI index.

where i denotes countries, t denotes time, $h=[0,\ldots,16]$ denotes the projection horizon, N denotes the number of lags, y denotes the log of real credit or real house prices, M_{it} is the number of lending restriction measures implemented by country i in period t,[11] X is a matrix of k lagged dependent and control variables (lending restriction measure, GDP growth, change in monetary policy rate, crisis dummy), and ε is the *i.i.d.* error term. Regressions include country fixed effects (a_i) to control for country-specific unobserved heterogeneity and time fixed effects (γ_t) to control for common shocks affecting all countries simultaneously.

The coefficient of interest is β^h. It is expected to be negative consistent with the hypothesis that tightening (loosening) of macroprudential measures has been associated with a reduction (increase) in house prices and credit in quarters that followed up the measure.

Figure 5 presents the estimates of coefficient β^h for the baseline specification (see also Tables 4–5). For both house prices and credit, the coefficients are largely negative. This is consistent with the effectiveness hypothesis and suggests that target variables have tended to decline following implementation of macroprudential measures relative to a no-implementation scenario. However, coefficient estimates are imprecisely estimated in the near term and become significant only after three years (quarter 12), peaking at -1.5 percent. The weaker association and significance in the near term could be due to the upward bias mentioned above but could also indicate that the impact of the measures takes time to materialize. Another important caveat is associated with the effectiveness of the measures over time, since most of measures were implemented following the global financial crisis (Figure 2).

Lagged control variables have expected signs: (i) changes in monetary policy rates have a negative lagged association with house prices and credit, (ii) real GDP growth has a positive association with house prices and credit, and (iii) crisis dummy has a negative association (except 2 lags in credit regressions).

B. Is the Impact Symmetric Across Tightening and Loosening Measures?

After establishing association between lending restriction measures and target variables, we would like to assess whether this association is symmetric across tightening and loosening measures. We use the following empirical specification to address this question:

$$y_{i,t+h} - y_{i,t-1} = \alpha_i^h + \gamma_t^h + \beta_{MT}^h MT_{i,t} + \beta_{ML}^h ML_{i,t} + \sum_{n=1}^{N} \theta_{k,n}^h X_{k,i,t-n} + \varepsilon_{i,t}^h \qquad (2)$$

where the main difference from the baseline specification is that we introduce two dummies reflecting tightening and loosening lending restriction measures; *MT* takes the value 1 for tightening episodes and 0 otherwise, while *ML* takes the value 1 for loosening episodes and 0 otherwise.

[11] M_{it} takes a positive value for tightening measures, negative value for loosening measures, and zero for periods with no measures or neutral measures.

The coefficients of interest are β^h_{MT} and β^h_{ML}: the former is expected to be negative (tightening measures are associated with a decrease in house prices and credit), while the latter positive (loosening measures are associated with increase in house prices and credit).

Figure 6 presents the estimates of coefficients β^h_{MT} and β^h_{ML} for this specification (see also Tables 6–7). For both target variables, there is evidence of asymmetry: loosening measures tend to have a stronger association compared to tightening measures.[12] This asymmetry could be driven by leakages due to regulatory arbitrage that tend to hamper the effectiveness of tightening measures but do not affect the loosening measures (BIS 2018). The leakages in response to tightening measures could occur through a shift of customers to: (i) non-bank credit institutions that are not subject to the same level-playing field in terms of macroprudential regulation as banks (Reinhardt and Sowerbutts 2015), or (ii) foreign bank branches that are subject to macroprudential regulation of home authorities (Aiyar and others 2014).[13] Nevertheless, the results should be interpreted with caution given a relatively small number of observations for loosening measures.

C. Does the Impact Vary Across Country Groups and Types of Measures?

In the next step, we would like to assess how the association between macroprudential measures and target variables varies across country groups and types of measures. We use the following empirical specification to address this question:

$$y_{i,t+h} - y_{i,t-1} = \alpha_i^h + \gamma_t^h + \beta_1^h M_{i,t} d_{i,t} + \beta_2^h M_{i,t}(1 - d_{i,t}) + \sum_{n=1}^{N} \theta_{k,n}^h X_{k,i,t-n} + \varepsilon_{i,t}^h \qquad (3)$$

where the main difference from the baseline specification is that we differentiate the impact of lending restriction measures across country groups or types of measures by including interaction terms with respective dummy variables *d* (e.g., *d* takes the value 1 for euro area countries and 0 for other EU countries, or *d* takes the value 1 for legally-binding measures and 0 for recommendations).

The coefficients of interest are β^h_1 and β^h_2. Both are expected to be negative consistent with the hypothesis that tightening (loosening) of macroprudential measures has been associated with a reduction (increase) in house prices and credit in quarters that followed up the measure. Differences in magnitudes of these coefficients will reflect the relative importance of lending restriction measures across respective country groups or types of measures.

Figure 7 presents the estimates of coefficients across two country groups: euro area countries versus other EU countries (see also Tables 8–9). For both target variables, the results suggest

[12] Kuttner and Shim (2016) also find asymmetric effects for tightening and loosening LTV and DSTI measures, but the association is not always significant. By contrast, IMF (2012) finds little evidence of asymmetric effects.

[13] These types of leakages can be alleviated through reciprocation agreements across home and host supervisory authorities. Reciprocation is common in Nordic countries.

a negative and largely significant association for other EU countries, with the impact peaking at around -2 percent. By contrast, that the association has a wrong sign and is largely insignificant for euro area countries. The latter result could be explained by the inability to use monetary policy instruments and exchange rate to cushion the impact of external shocks on house prices and credit in these countries. This is consistent with Bruno and others (2017), who find that macroprudential measures are more effective when complemented by monetary policy actions. In addition, the endogeneity issue is likely to be more severe for euro area countries, since the accommodative ECB policies following the crisis had a differential effect on house prices and credit in different euro area and those that chose to implement macroprudential instruments are likely to be the ones that were affected the most by the monetary expansion. However, these results should be interpreted with caution given that some countries in the other EU members sample have limited room to use monetary policy for cushioning external shocks (e.g., Denmark is pegging its currency to Euro and euro area countries had to comply with ERM 2 before joining the currency area).

There is also evidence that the effectiveness of macroprudential measures varies across different types of measures:

- Legally-binding measures have a stronger association with house prices and credit compared to recommendations (Figures 8, Tables 10–11). The impact peaks at -3 percent for house prices and -2.2 percent for credit. This suggests that legally-binding measures are more "biting" and more effective in curbing house prices and credit.

- Measures that include non-compliance sanctions (such as fines, penalties, or various forms of non-monetary sanctions) have a stronger association with house prices and credit compared to measures without sanctions (Figures 9, Tables 12–13). The impact peaks at -4 percent for house prices and -3 percent for credit. This may be because sanctions help enforce compliance and better compliance helps curbing house prices and credit.

D. Robustness Checks

Inverse Probability Weighted Estimator

As discussed above, the reverse causality between developments in target variables and activation of macroprudential measures introduces upward bias in the coefficient estimate of the macroprudential variable. Following Richter and others (2018), we use the inverse probability weighted (IPW) estimator to alleviate the issue of endogeneity. Unlike the standard local projections methodology used in the baseline specification, the IPW estimator gives more weight to those macroprudential measures that are difficult to predict based on observables and less weight to those measures that are endogenous to developments in observables.

The estimation proceeds in two steps. In the first step, we estimate an ordered logit model to estimate the probability (p_{it}) that lending restriction measures are implemented by country *i*

in period *t* using lagged values of lending restriction measures, target variables, changes in monetary policy rates, real GDP growth, and crisis dummies as independent variables. In the second step, we estimate the baseline local projections model using regression weights given by the inverse of p_{it}.[14] Weighting by the inverse of the propensity score puts more weight on those measures that were difficult to predict using the macro-financial observables and puts less weights on those measures that could be predicted.

The IPW estimates confirm the negative association between macroprudential measures and target variables (Figure 10). Moreover, the impact is stronger than in the baseline specification, peaking at -3 percent after three years. The stronger association confirms the presence of an upward bias in the baseline specification, since the IPW estimator alleviates the endogeneity issue. Richter and others (2018) find a stronger response of house prices (peaking at -7 percent in quarter 16) and household credit (peaking at 6 percent in quarter 16) to changes in LTV ratios in a cross-country panel of 56 countries over 1990–2012.

Event Study Analysis

As mentioned above, the asymmetric effect of tightening and loosening measures should be interpreted with caution given the relatively low number of observations on loosening measures. To shed further light on the asymmetric association, we adopt the event study methodology of Gourinchas and Obstfeld (2012). The empirical specification takes the following form:

$$y_{i,t} = \alpha_i + \gamma_t + \sum_{j=-12}^{12} \beta_j M_{i,t+j} + \varepsilon_{i,t} \quad (4)$$

where *i* denotes countries, *t* denotes time, *y* denotes the log of real credit or real house prices, *j* denotes the number of forward and backward lags around a lending restriction measure, M_{it} is a dummy variable taking the value of 1 if country *i* implemented a lending restriction measure in period *t*. We run separate regressions for tightening and loosening measures. Coefficients β_j allow us to examine the behavior of credit and house prices around periods when respective lending restriction measures were implemented. In particular, they measure the deviation of respective variables in window *j* around lending restriction measures from their "tranquil values" outside of the window (purged from country-specific and time-specific unobserved heterogeneity).

Figure 11 presents the results of the event study analysis across tightening measures, while Figure 12 presents the results across loosening measures. The figures confirm the presence of endogenety issues, as tightening measures tend to be implemented in periods when house prices and credit are on the rise, while loosening measures tend to be implemented in periods when house prices and credit are on the decline.

[14] The weights are defined by $w_{it} = M_{it}/p_{it} + (1-M_{it})/(1-p_{it})$.

Moreover, the figures provide further support to the notion of asymmetry between tightening and loosening measures. After implementation of tightening measures, house prices stay relatively flat in the short-term while credit continues growing before flattening in the medium term. By contrast, after implementation of loosening measures, both house prices and credit start rising fast.

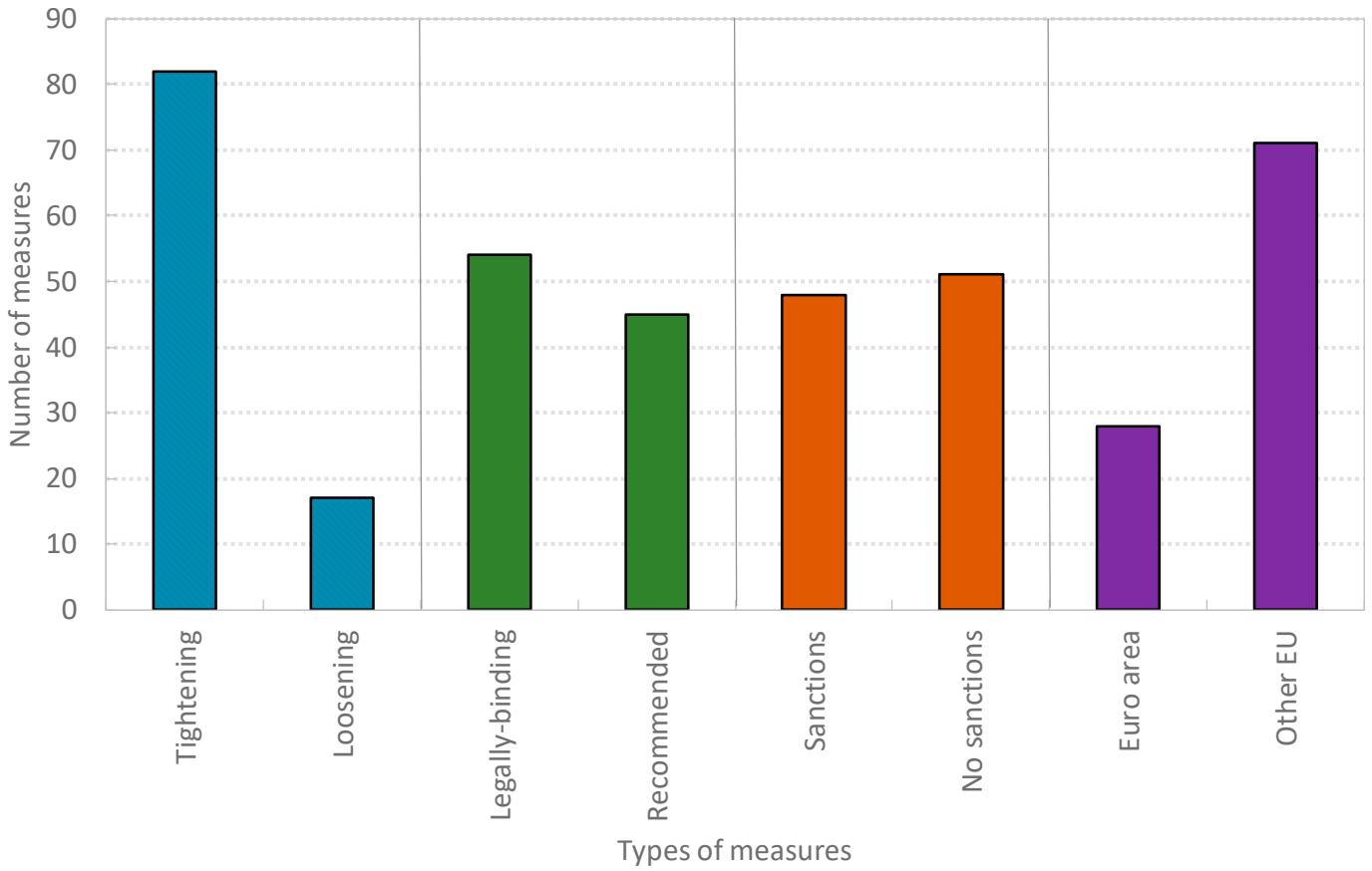
V. CONCLUSIONS

This paper provides evidence on the effectiveness of lending restriction measures (such as LTV and DSTI) in affecting developments in house prices and credit in a sample of 28 EU countries. Using data on 99 lending restriction measures implemented over 1990–2018, we find that the measures are generally effective in curbing house prices and credit. However, the impact is delayed and reaches its peak of -1.5 percent only after three years. Correcting for endogeneity, the impact is even stronger and reaches -3 percent after three years. In addition, the impact is asymmetric: tightening measures have weaker association with target variables compared to loosening measures. The latter maybe driven by leakages from tightening measures widely documented in the literature.

We also find that the impact can vary across country groups and types of measures. The association between lending restrictions and target variables is stronger in EU countries outside of the euro area, which could be driven by the fact that macroprudential measures can be more effective if they are supported by monetary policy actions. Across types of measures, we find a stronger association for legally-binding measures (versus recommendations) and measures involving sanctions (versus measures without sanctions).

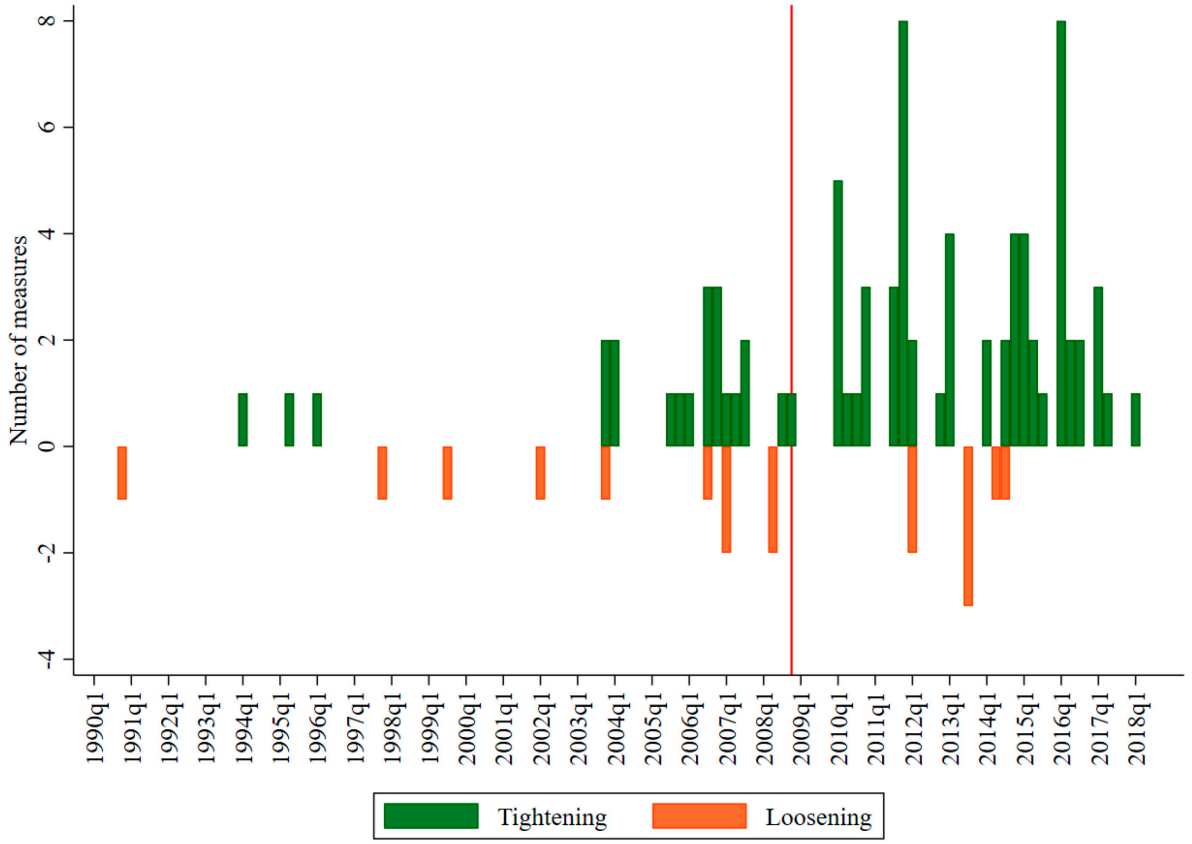
The results have policy implications. They suggest that lending measures implemented in the EU countries so far have been broadly effective, especially given that the estimates provide the lower bound of the effectiveness given the endogeneity bias. However, time is needed for the full impact of the measures to materialize. This lag between implementation and ultimate effect on target variables, the asymmetry between tightening and loosening measures, and differences in the effectiveness across country groups and types of measures should be factored in by policymakers. Future work could assess the effectiveness of other macroprudential measures—such as bank-based restrictions (capital buffers, loan-loss provisioning, concentration limits, etc.)—in addressing financial stability risks.

Figure 1. Number of Lending Restriction Measures by Types and Across Country Groups



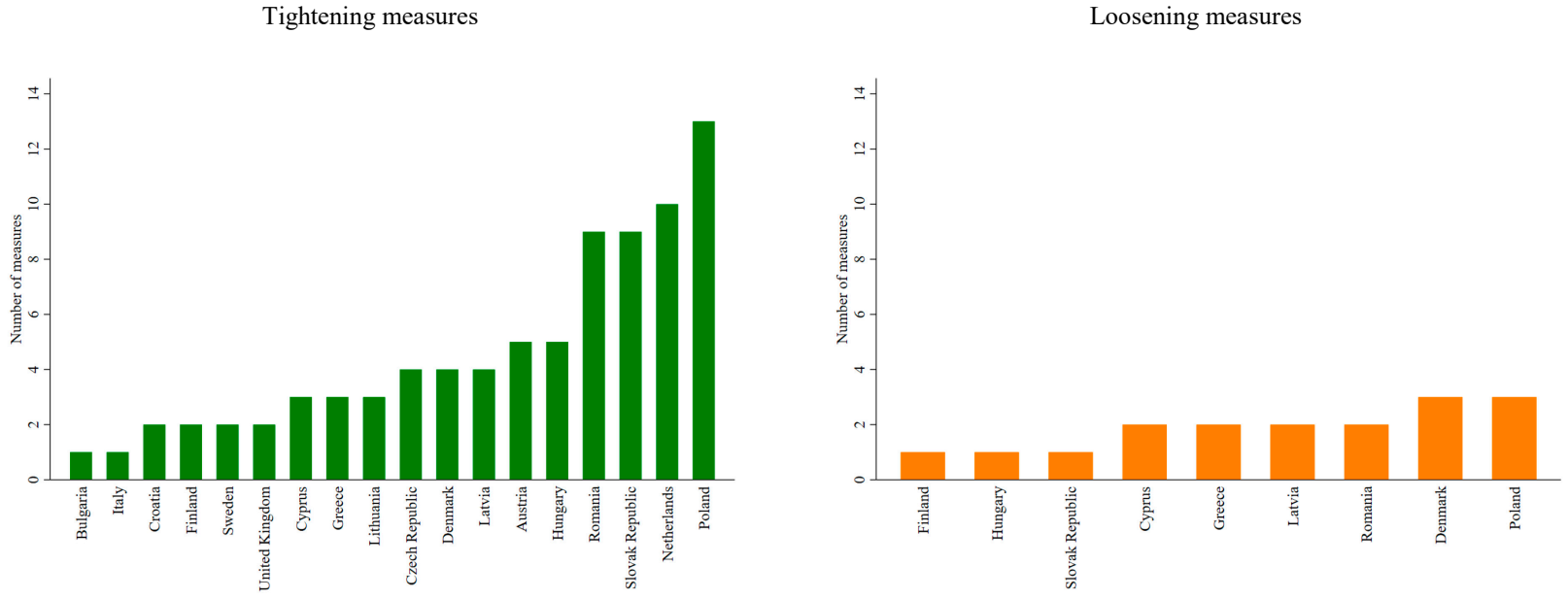
Source: Budnik and Kleibl (2018), IMF staff calculations.
Note: Reported are macroprudential lending restriction measures (microprudential measures are not included).

Figure 2. Number of Tightening and Loosening Lending Restriction Measures: Over Time



Source: Budnik and Kleibl (2018), IMF staff calculations.
Note: The vertical red line indicates the start of the global financial crisis (2008q4).

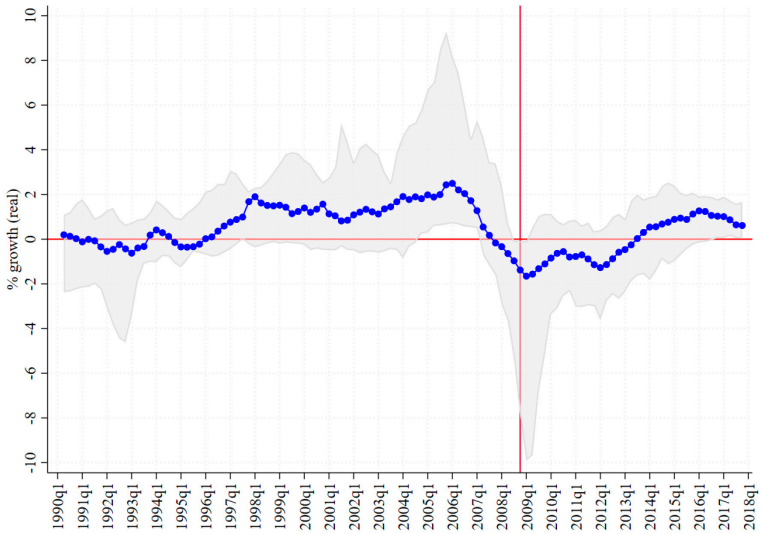
Figure 3. Number of Tightening and Loosening Lending Restriction Measures: Across Countries



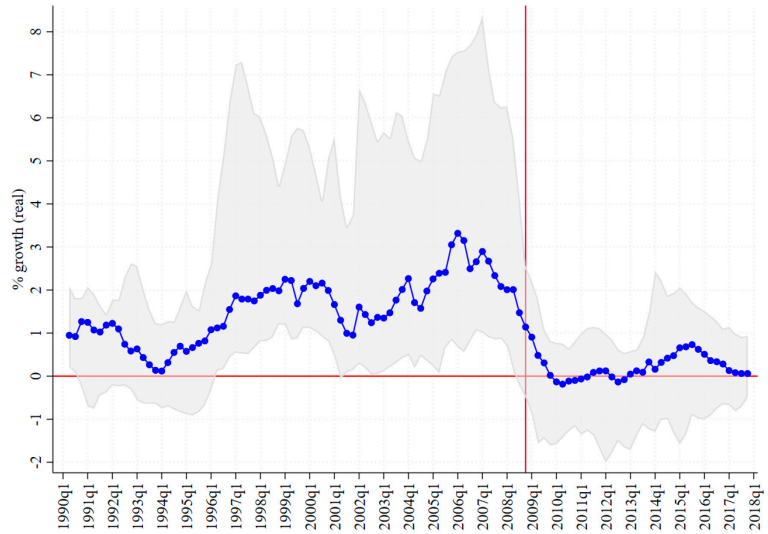
Source: Budnik and Kleibl (2018), IMF staff calculations.

Figure 4. Dynamics of House Price and Credit Growth

House prices



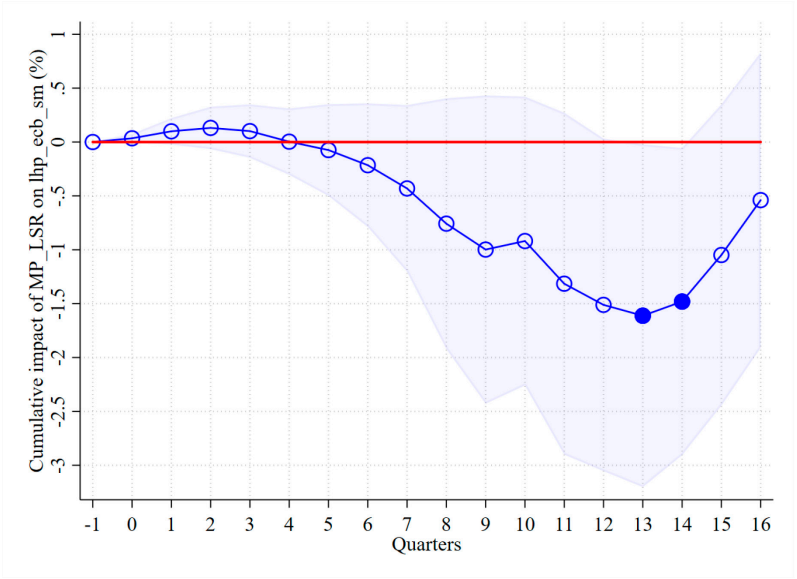
Ccredit



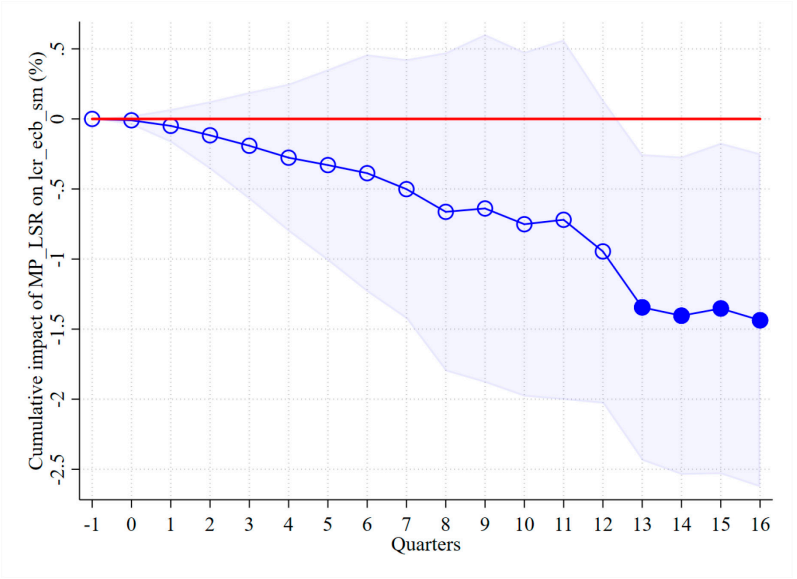
Source: Bank for International Settlements, International Financial Statistics, and IMF staff calculations.
Note: The sample includes 28 EU countries. Reported are the median (blue line) and 10-90 percentile interval (grey area). The vertical red line indicates the start of the global financial crisis (2008q4).

Figure 5. Results: Response of Target Variables to Lending Restriction Measures

House prices

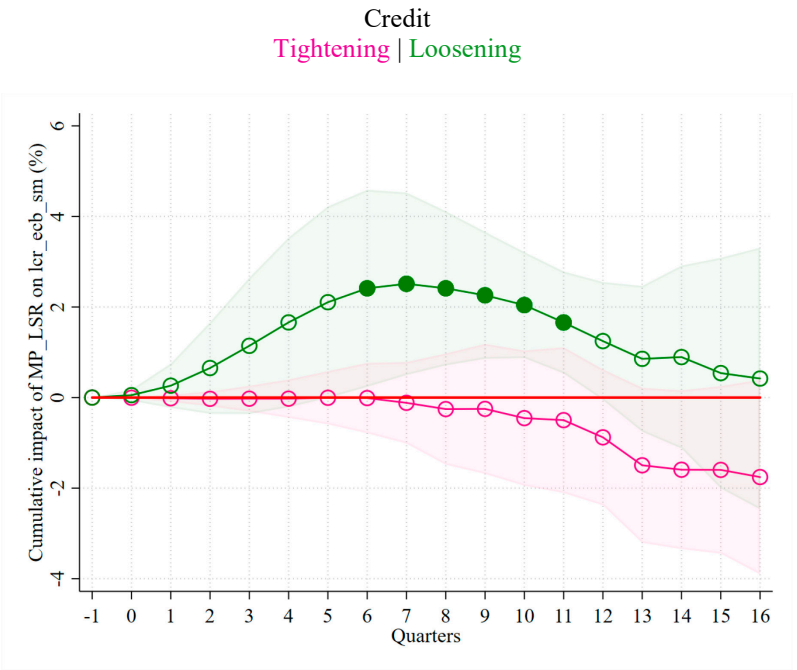


Credit



Source: Bank for International Settlements, International Financial Statistics, Budnik and Kleibl (2018), and IMF staff calculations.
Note: Reported are β^h coefficients from baseline specification ([1]). Filled circles indicate significance at 10 percent confidence level (robust standard errors). Measures are implemented in period 0.

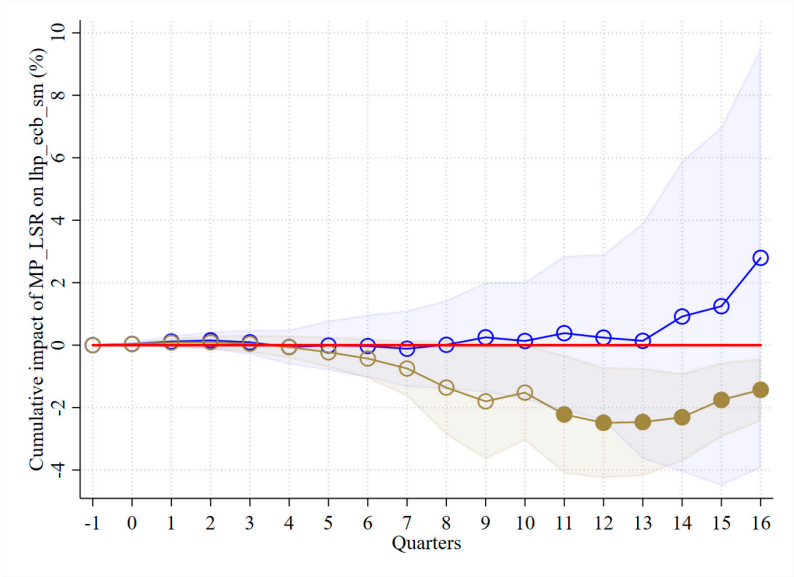
Figure 6. Results: Asymmetric Response of Target Variables with Respect to Tightening and Loosening Measures



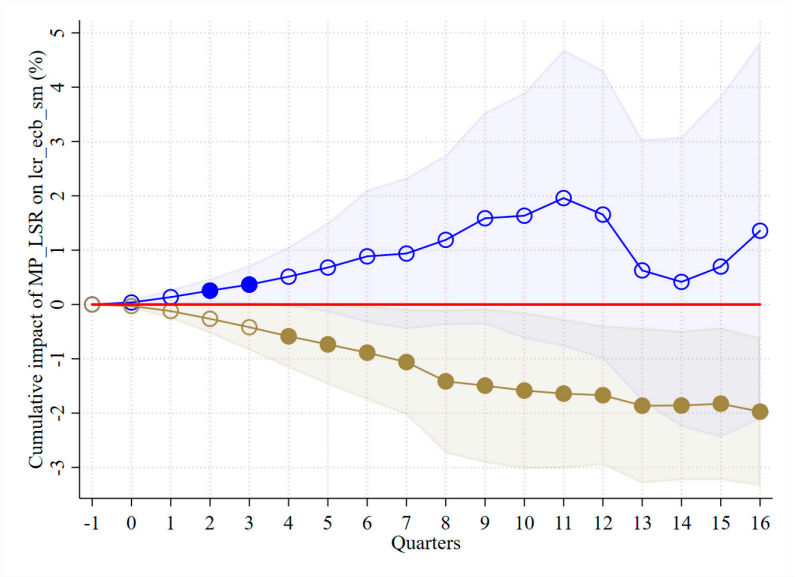
Source: Bank for International Settlements, International Financial Statistics, Budnik and Kleibl (2018), and IMF staff calculations.
Note: Reported are β^{h}_{MT} and β^{h}_{ML} coefficients from specification ([2]). Filled circles indicate significance at 10 percent confidence level (robust standard errors). Measures are implemented in period 0.

Figure 7. Results: Differential Effects Across Euro Area and Other EU Countries

House prices
Euro area | Other EU countries



Credit
Euro area | Other EU countries

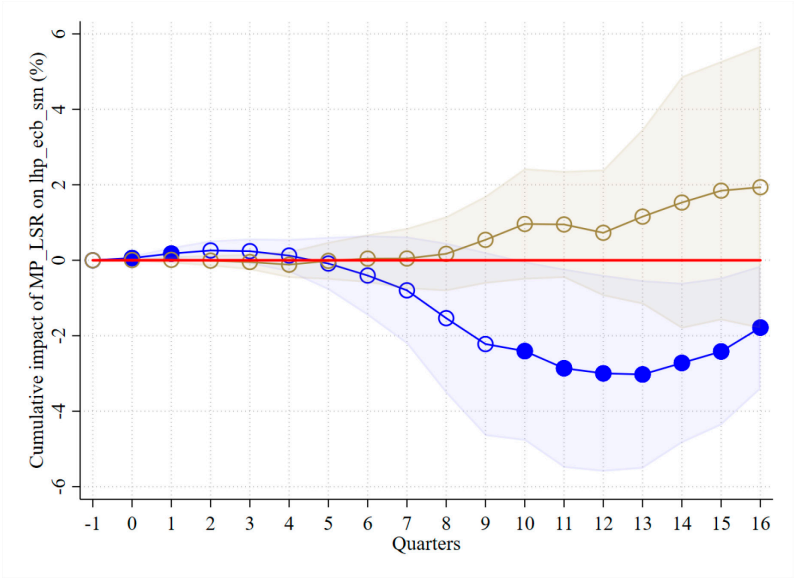


Source: Bank for International Settlements, International Financial Statistics, Budnik and Kleibl (2018), and IMF staff calculations.
Note: Reported are β^h_1 and β^h_2 coefficients from specification ([3]). Filled circles indicate significance at 10 percent confidence level (robust standard errors). Measures are implemented in period 0.

Figure 8. Results: Differential Effects Across Legally–Binding Measures and Recommendations

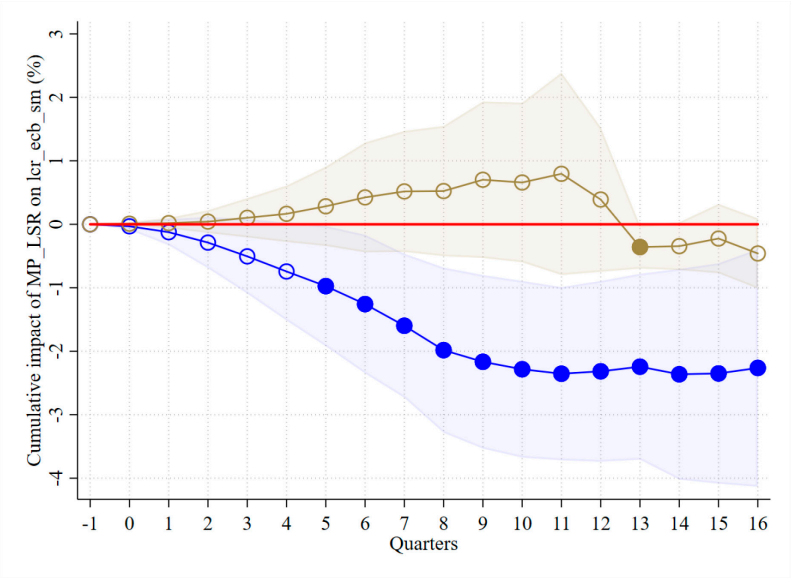
House prices

Legally-binding measures | Recommendations



Credit

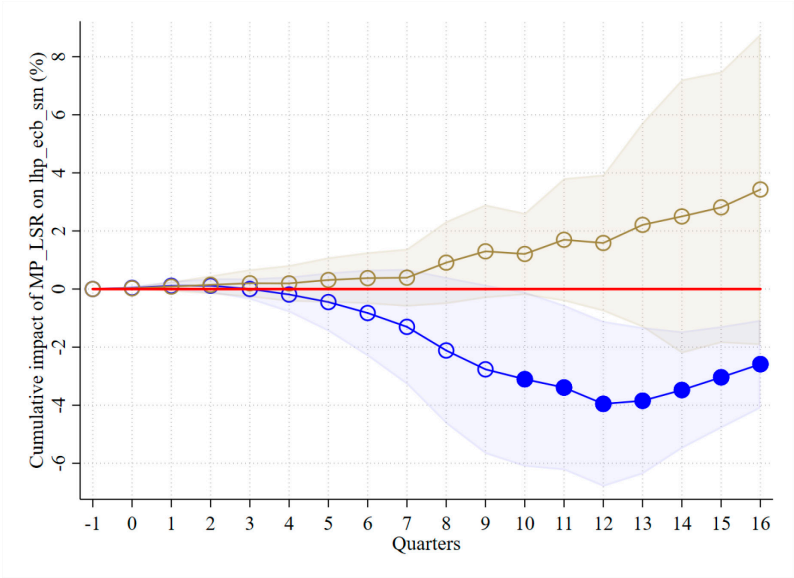
Legally-binding measures | Recommendations



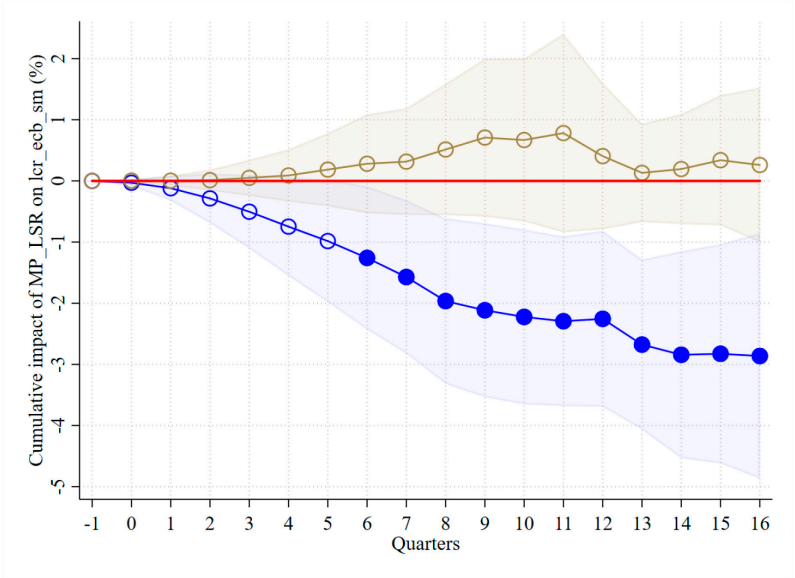
Source: Bank for International Settlements, International Financial Statistics, Budnik and Kleibl (2018), and IMF staff calculations.
Note: Reported are β^h_1 and β^h_2 coefficients from specification ([3]). Filled circles indicate significance at 10 percent confidence level (robust standard errors). Measures are implemented in period 0.

Figure 9. Results: Differential Effects Across Measures with and Without Sanctions

House prices
With sanctions | Without sanctions



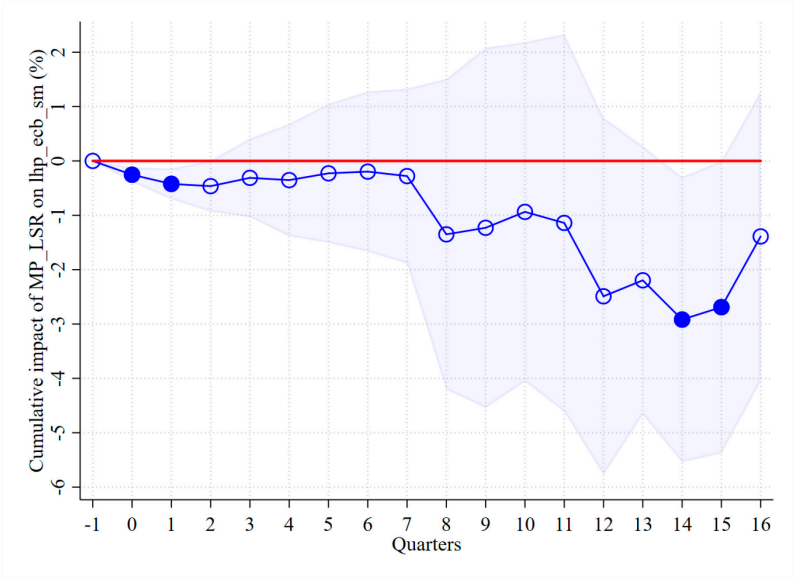
Credit
With sanctions | Without sanctions



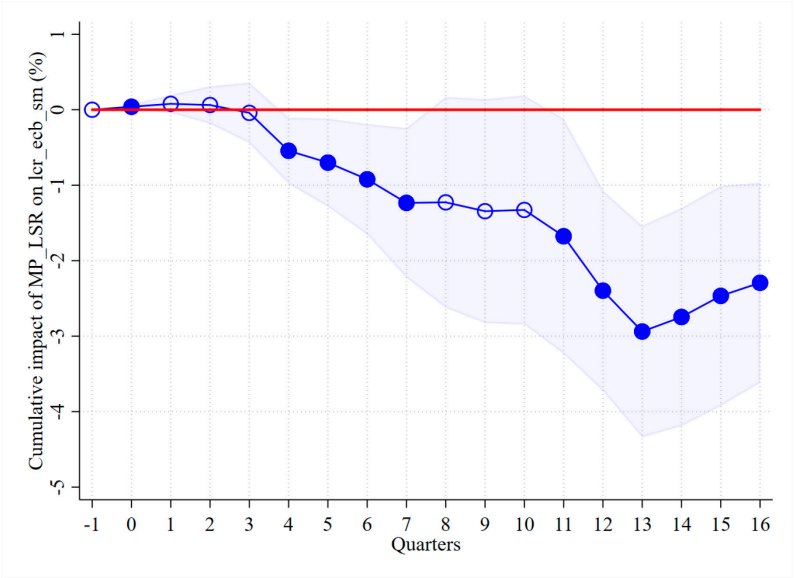
Source: Bank for International Settlements, International Financial Statistics, Budnik and Kleibl (2018), and IMF staff calculations.
Note: Reported are β^h_1 and β^h_2 coefficients from specification ([3]). Filled circles indicate significance at 10 percent confidence level (robust standard errors). Measures are implemented in period 0.

Figure 10. Robustness Check: Inverse Probability Weighted Estimator

House prices



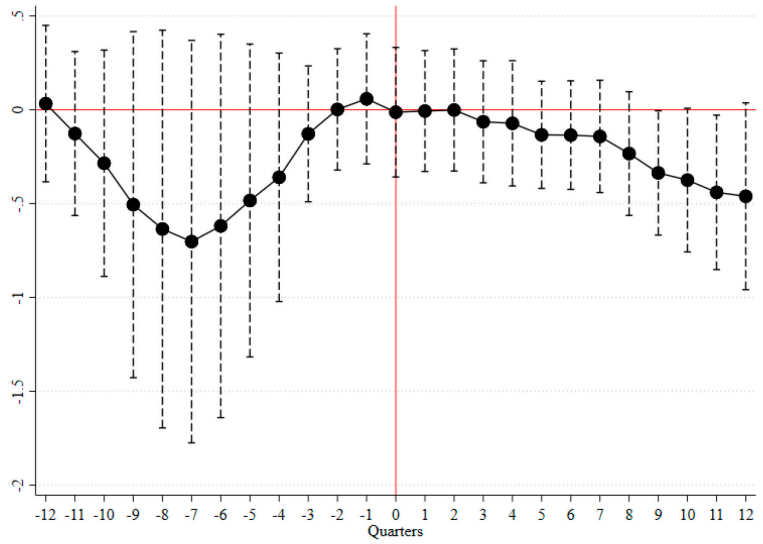
Credit



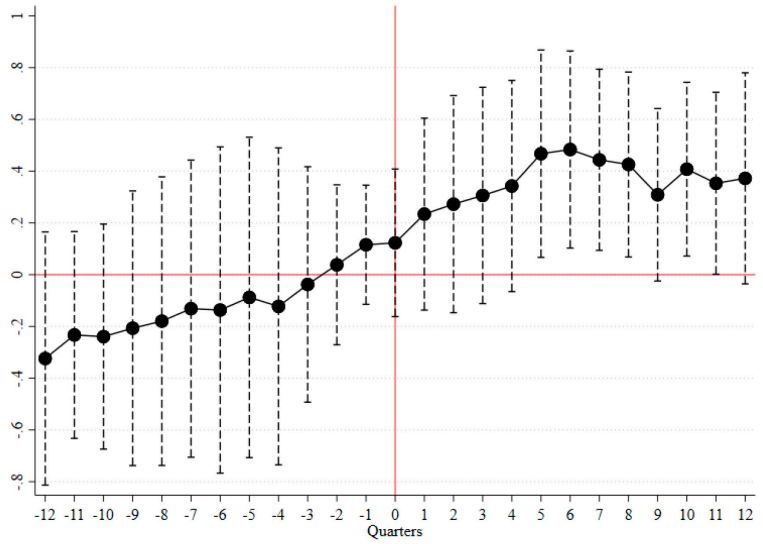
Source: Bank for International Settlements, International Financial Statistics, Budnik and Kleibl (2018), and IMF staff calculations.
Note: Reported are β^h coefficients from baseline specification ([1]) using the inverse probability weighted estimator. Filled circles indicate significance at 10 percent confidence level (robust standard errors). Measures are implemented in period 0.

Figure 11. Robustness Check: Event Study Analysis for Tightening Measures

House prices



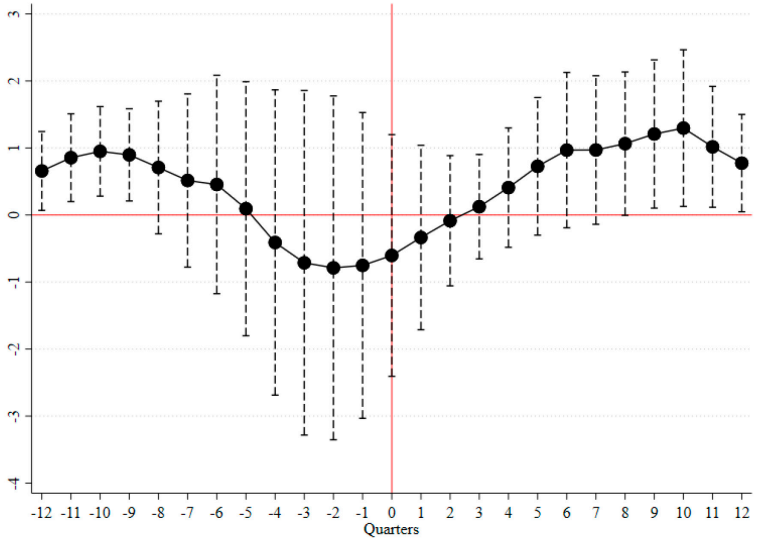
Credit



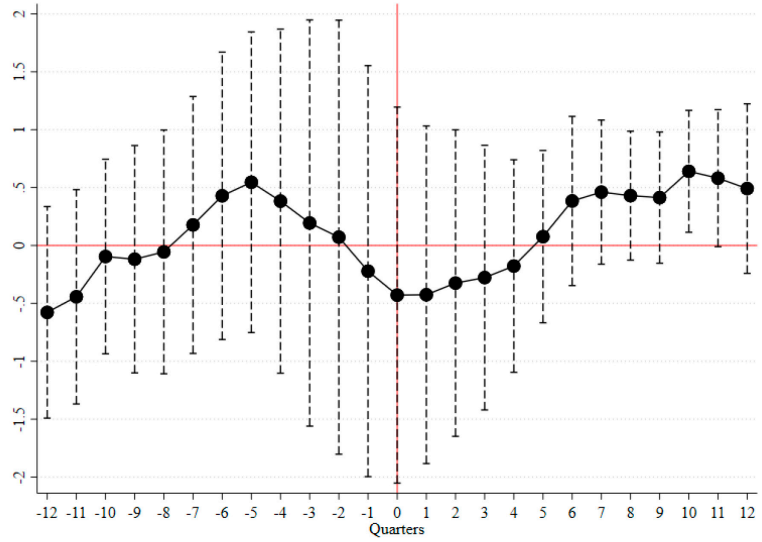
Source: Bank for International Settlements, International Financial Statistics, Budnik and Kleibl (2018), and IMF staff calculations.
Note: Estimations are performed using the Gourinchas and Obstfeld (2012) event study methodology: $y_{i,t} = \alpha_i + \lambda_t + \sum_{j=-12}^{12} \beta_j M_{i,t+j} + \varepsilon_{i,t}$. Reported are β_j coefficients and their 90 percent confidence intervals. t=0 is the period when the lending restriction measures (M) were implemented.

Figure 12. Robustness Check: Event Study Analysis for Loosening Measures

House prices



Credit



Source: Bank for International Settlements, International Financial Statistics, Budnik and Kleibl (2018), and IMF staff calculations.
Note: Estimations are performed using the Gourinchas and Obstfeld (2012) event study methodology: $y_{i,t} = \alpha_i + \lambda_t + \sum_{j=-12}^{12} \beta_j M_{i,t+j} + \varepsilon_{i,t}$. Reported are β_j coefficients and their 90 percent confidence intervals. t=0 is the period when the lending restriction measures (M) were implemented.

Table 1. Cross–Country Empirical Studies on the Effectiveness of Macroprudential Policies

Study	Dependent variables	Macrorpudential variables	Methodology	Sample	Key result
Alam and others (2018)	Real household credit and real house price growth.	LTV, DSTI, CG, CCG, DP, LIQ, FC, CR, LEV, TAX, and indices of macroprudential measures.	Panel OLS with fixed effects, propensity score matching.	34 advanced and 29 emerging market economies, 1990q1-2016q4.	One percentage point LTV tightening cumulatively reduces household credit and house prices by about one percent after one year.
Ahuja and Nabar (2011)	Property price growth, lending to property sector, bank capital/assets, bank return on assets.	LTV and DTI.	Dynamic GMM panel, controls include prime lending rate, credit/GDP.	49 emerging and advanced economies, 2000q1-2010q4.	LTV tends to have a decelerating effect on property price growth. Both LTV and DTI slow the growth of lending to the property sector.
Akinci and Olmstead-Rumsey (2018)	Bank credit, housing credit and house price growth.	Index of domestic MP policies.	Dynamic GMM panel, controls include VIX, GDP growth, policy rate.	57 countries, 2000-2013.	MP are effective in curbing asset prices and credit growth, especially targeted policies on housing, and capital inflow limits in EMs.
Bruno and others (2017)	Banking and bond inflows, bank credit, total credit.	MP measures and capital flow measures.	Panel OLS and Dynamic GMM panel.	12 Asia-Pacific countries, 2004-2013.	Capital flow policies slow inflows, MP policies most effective alongside monetary policy.
Carreras and others (2018)	House prices, household credit.	MP indices and measures from IMF and BIS datasets.	Panel vector error correction, fully modified OLS, panel seemingly unrelated regression.	19 OECD countries, 2000q1-2014q4.	TAX, CR, LTV and DTI are more effective than others in containing house price and household credit growth.
Cerutti, Claessens, Laeven (2017)	Real credit and house price growth.	Indices of MP policy overall, for borrowers and financial firms and for specific instruments.	Dynamic GMM panel, controls include GDP growth, policy rate, banking crises and country fixed effects.	119 countries, 2000–2013.	Policies are effective but especially in the upturn; policies are weaker in more open and financially deeper economies.
Cerutti, Dagher, Dell'Ariccia (2017)	Credit booms and busts (dummy).	MP measures.	Cross section probit.	77 observations.	Deployment of MP measures reduces the probability of a bad boom and a bust.
Fendoglu (2017)	Credit-to-GDP gap.	MP indices.	Dynamic GMM panel, controls include monetary policy stance, real GDP growth, changes in real effective exchange rate, portfolio flows.	18 emerging countries, 2000q1-2013q2.	Borrower-based MP tools, measures with a domestic focus, and domestic reserve requirements are particularly effective. Weaker results emerge for financial-institutions-based or foreign-currency related macroprudential tools.
Jacome and Mitra (2015)	Mortgage credit growth.	LTV and DTI.	Panel OLS with country fixed effects.	Brazil, Hong Kong SAR, Korea, Malaysia, Poland, and Romania; July 2002–December 2013.	In most cases, LTVs and DTIs were effective in reducing loan-growth and improving debt-servicing performances of borrowers, but not always in curbing house price growth.
Kuttner and Shim (2016)	Growth in house prices and housing credit.	DTI, LTV, and TAX.	Panel regression, controls are interest rate and growth in GNI per capita.	57 countries, 1980-2012.	DTI and TAX affect housing credit but only TAX affects house price growth.
Lim and others (2011)	Private sector credit and leverage.	RR, DP, LTV, DTI, CCG, and FC.	Panel GMM regression.	49 countries, 2000–2010.	MP Policies can affect credit growth and leverage, especially LTV, DTI, CCG, RR, DP.
Reinhardt and Sowerbutts (2016)	Cross-border lending growth.	RR, CR, LTV, DTI, and LTI.	Panel OLS with destination country and origin country-time fixed effects.	37 countries, 2005q1-2014q3.	Foreign banks lending to domestic non-bank sectors increases after domestic authorities take a macroprudential capital action.
Richter and others (2018)	Household credit, mortgage loans, house prices.	LTV.	Local projections.	56 countries, 1990q1-2012q2.	LTV tightening has a significant downward causal impact on credit and house prices.
Vandenbussche and others (2015)	House price growth.	CR and RR.	Panel regression, error correction framework.	16 CEE countries, 2002-2011.	CR and RR help slow house prices.
Zhang and Zoli (2014)	House prices, credit, equity prices and bank leverage.	Index of MP and CFM measures.	Event study, cross country macro panel, bank level micro panel.	46 countries, 2000-2013.	LTV, TAX and FC are most effective MP tools.

Source: IMF staff literature review.

Note: Abbreviations used in the table: CCG – ceilings on credit growth, CEE – Central and Eastern Europe, CFM – capital flow measures, CG – limits on domestic currency loans, CR – capital ratio limits, DP – time varying/dynamic loan-loss provisioning, DTI – debt-to-income limits, DSTI - debt-service-to-income limits, FC – limits on foreign currency loans, GMM – Generalised Method of Moments, LEV - leverage limits, LIQ - liquidity requirements, LTV – loan-to-value limits, MP – macroprudential, OLS – Ordinary Least Squares, RR – reserve requirements, TAX – levy/tax on financial institutions, VIX – a measure of the implied volatility of S&P 500 index options.

Table 2. List of Lending Restriction Measures Implemented in 28 EU Countries Over 1990–2018

Measure	Description	# measures
Loan-to-value (LTV) limits	LTV limits restrict the size of loans relative to the value of the underlying collateral. The LTV cap generally applies at the time of the loan origination and includes also down-payment requirements. The calibration of LTVs can also take into account factors other than the value of the collateral.	41
Loan-to-income (LTI) limits	LTI limits restrict the size of a loan to a fixed multiple of income.	1
Debt-to-income (DTI) limits	DTI limits restrict the size of total household debt to a fixed multiple of the borrowers' income (or to similar income measures such as income less the average national wage).	1
Debt-service-to-income (DSTI) limits (incl. interest rate stress testing)	DSTI limits restrict the size of total debt service payments (including interest rate payments) to a fixed multiple of household income or, in some cases, to a fixed multiple of household income less household expenditure. The subcategory includes also criteria based on stress-testing factors such as interest rate risk and foreign exchange risks which impact maximum household indebtedness level.	20
Maturity and amortisation restrictions	Maximum maturity restrictions (e.g. maximum maturity of mortgages set to 30 years) or regulations concerning loan amortisation periods.	12
Other income requirements for loan eligibility	Income based criteria of creditworthiness such as minimum disposable income, permanent source of income in the currency of a loan.	5
Limits on the volume of personal loans		2
Other restrictions on lending standards		17
Total		**99**

Source: Budnik and Kleibl (2018), IMF staff calculations.

Table 3. Variables and Their Sources

Variable	Description	Source
House prices	House price index, deflated with CPI and seasonally adjusted. Exact definitions vary across countries and time (https://www.bis.org/statistics/pp_detailed.htm).	BIS
Credit	Total credit to non-financial private sector, deflated with CPI and seasonally adjusted.	BIS, IFS
Lending restriction measures	Restrictions on LTV, LTI, DTI, DSTI, maturity, amortization, volumes, income eligibility, and other lending standards.	Budnik and Kleibl (2018)
Monetary policy rate	Interest rate on central bank's main policy instrument.	BIS
Real GDP	Value added of all industries (constant prices).	Eurostat
Crisis dummy	Systemic crises (currency, sovereign, banking, significant asset price correction, transition to a market economy).	Lo Duca and others (2017)

Table 4. Estimation Results: Baseline Specification (House Prices)

	House prices																
	h=0	h=1	h=2	h=3	h=4	h=5	h=6	h=7	h=8	h=9	h=10	h=11	h=12	h=13	h=14	h=15	h=16
Measures	0.03	0.10	0.13	0.10	0.00	-0.07	-0.22	-0.43	-0.76	-1.00	-0.92	-1.31	-1.51	-1.61*	-1.48*	-1.05	-0.54
	[0.02]	[0.07]	[0.12]	[0.15]	[0.18]	[0.25]	[0.34]	[0.45]	[0.68]	[0.84]	[0.79]	[0.93]	[0.90]	[0.93]	[0.84]	[0.82]	[0.80]
Measures (lag 1)	-0.01	-0.06	-0.17**	-0.31**	-0.48*	-0.67*	-0.87	-1.26	-1.45	-1.26	-1.65*	-1.77*	-1.82*	-1.71**	-1.28	-0.66	-0.20
	[0.01]	[0.04]	[0.08]	[0.15]	[0.26]	[0.39]	[0.52]	[0.76]	[0.89]	[0.84]	[0.96]	[0.91]	[0.91]	[0.80]	[0.78]	[0.68]	[0.63]
Measures (lag 2)	-0.04*	-0.14*	-0.27*	-0.44	-0.61	-0.81	-1.21	-1.39	-1.19	-1.57	-1.73*	-1.80*	-1.76*	-1.39	-0.79	-0.38	-0.23
	[0.02]	[0.07]	[0.15]	[0.26]	[0.40]	[0.55]	[0.78]	[0.92]	[0.86]	[1.00]	[0.97]	[1.01]	[0.90]	[0.87]	[0.77]	[0.73]	[0.78]
Measures (lag 3)	0.00	-0.02	-0.09	-0.18	-0.31	-0.53	-0.68	-0.63	-0.93	-1.11	-1.13	-1.20	-1.05	-0.59	-0.27	-0.12	0.03
	[0.01]	[0.06]	[0.15]	[0.27]	[0.39]	[0.61]	[0.74]	[0.69]	[0.86]	[0.88]	[0.92]	[0.89]	[0.92]	[0.84]	[0.81]	[0.84]	[0.87]
Measures (lag 4)	0.00	-0.03	-0.11	-0.22	-0.38	-0.52	-0.52	-0.80	-1.04	-1.06	-1.11	-1.03	-0.74	-0.56	-0.29	-0.07	0.19
	[0.03]	[0.09]	[0.19]	[0.29]	[0.45]	[0.57]	[0.55]	[0.71]	[0.74]	[0.79]	[0.76]	[0.81]	[0.73]	[0.70]	[0.75]	[0.75]	[0.66]
Dependent variable (lag 1)	2.07***	4.54***	7.06***	9.54***	11.73***	13.20***	14.01***	14.23***	13.92***	13.27***	12.44***	11.26***	9.83***	8.67***	7.66***	6.29***	4.58**
	[0.07]	[0.32]	[0.66]	[0.92]	[1.08]	[1.21]	[1.31]	[1.38]	[1.49]	[1.63]	[1.77]	[1.94]	[2.04]	[2.13]	[2.18]	[2.21]	[2.20]
Dependent variable (lag 2)	-3.63***	-8.39***	-13.49***	-18.95***	-24.18***	-27.95***	-30.33***	-31.41***	-31.28***	-30.36***	-29.08***	-26.87***	-23.87***	-21.63***	-19.85***	-17.00***	-12.98***
	[0.19]	[0.87]	[1.89]	[2.74]	[3.28]	[3.70]	[3.96]	[4.00]	[3.97]	[3.93]	[3.95]	[4.14]	[4.26]	[4.36]	[4.43]	[4.53]	[4.61]
Dependent variable (lag 3)	1.99***	4.87***	8.12***	12.00***	16.12***	19.28***	21.48***	22.72***	23.04***	22.74***	22.19***	20.79***	18.56***	17.07***	16.08***	14.01***	10.61**
	[0.15]	[0.79]	[1.80]	[2.70]	[3.32]	[3.83]	[4.17]	[4.24]	[4.16]	[3.97]	[3.75]	[3.73]	[3.72]	[3.65]	[3.59]	[3.71]	[3.94]
Dependent variable (lag 4)	-0.43***	-1.04***	-1.73***	-2.67***	-3.80***	-4.72***	-5.42***	-5.88***	-6.09***	-6.13***	-6.11***	-5.81***	-5.22***	-4.87***	-4.71***	-4.20***	-3.17*
	[0.04]	[0.23]	[0.57]	[0.89]	[1.12]	[1.33]	[1.48]	[1.55]	[1.55]	[1.50]	[1.43]	[1.41]	[1.41]	[1.38]	[1.34]	[1.41]	[1.55]
Change in monetary policy rate (lag 1)	-0.02***	-0.08***	-0.17***	-0.29***	-0.41***	-0.52**	-0.59**	-0.62**	-0.61*	-0.56*	-0.48	-0.43	-0.40	-0.39	-0.35	-0.37	-0.33
	[0.01]	[0.03]	[0.06]	[0.10]	[0.14]	[0.19]	[0.23]	[0.27]	[0.30]	[0.32]	[0.34]	[0.36]	[0.38]	[0.39]	[0.37]	[0.35]	[0.33]
Change in monetary policy rate (lag 2)	-0.01*	-0.04**	-0.10**	-0.17**	-0.24**	-0.29**	-0.32**	-0.30*	-0.25	-0.17	-0.10	-0.06	-0.07	-0.06	-0.07	-0.08	-0.07
	[0.01]	[0.02]	[0.04]	[0.07]	[0.09]	[0.12]	[0.15]	[0.17]	[0.19]	[0.21]	[0.23]	[0.26]	[0.29]	[0.29]	[0.26]	[0.26]	[0.25]
Change in monetary policy rate (lag 3)	-0.01*	-0.04**	-0.09**	-0.14**	-0.18**	-0.21**	-0.20*	-0.17	-0.10	-0.04	0.00	0.00	0.00	-0.03	-0.03	-0.02	-0.04
	[0.00]	[0.02]	[0.03]	[0.05]	[0.07]	[0.09]	[0.12]	[0.14]	[0.15]	[0.17]	[0.20]	[0.24]	[0.25]	[0.23]	[0.23]	[0.22]	[0.22]
Change in monetary policy rate (lag 4)	-0.01**	-0.05**	-0.10**	-0.15**	-0.20**	-0.22*	-0.22	-0.17	-0.13	-0.11	-0.11	-0.12	-0.16	-0.17	-0.15	-0.15	-0.11
	[0.01]	[0.02]	[0.04]	[0.06]	[0.09]	[0.12]	[0.16]	[0.18]	[0.20]	[0.24]	[0.27]	[0.28]	[0.29]	[0.29]	[0.27]	[0.26]	[0.25]
Real GDP growth (lag 1)	0.00	0.01	0.03	0.05	0.07	0.08	0.09	0.10	0.15	0.18	0.23	0.30	0.36	0.47	0.56	0.56	0.60
	[0.01]	[0.04]	[0.09]	[0.14]	[0.19]	[0.23]	[0.27]	[0.31]	[0.35]	[0.45]	[0.45]	[0.46]	[0.42]	[0.42]	[0.42]	[0.42]	[0.43]
Real GDP growth (lag 2)	0.00	0.02	0.04	0.07	0.10	0.12	0.15	0.22	0.29	0.36	0.46	0.55	0.70*	0.81*	0.82*	0.87	0.98
	[0.01]	[0.03]	[0.06]	[0.09]	[0.11]	[0.14]	[0.18]	[0.23]	[0.29]	[0.32]	[0.36]	[0.35]	[0.39]	[0.43]	[0.48]	[0.52]	[0.58]
Real GDP growth (lag 3)	0.01	0.02	0.04	0.06	0.07	0.10	0.15	0.19	0.27	0.37	0.45	0.61	0.74*	0.80*	0.89*	1.00*	1.04
	[0.01]	[0.03]	[0.04]	[0.07]	[0.10]	[0.13]	[0.18]	[0.25]	[0.28]	[0.32]	[0.33]	[0.37]	[0.42]	[0.46]	[0.51]	[0.56]	[0.62]
Real GDP growth (lag 4)	-0.01	-0.01	-0.01	-0.01	-0.01	0.02	0.02	0.07	0.14	0.20	0.31	0.43	0.52	0.61	0.71	0.78	0.84*
	[0.01]	[0.02]	[0.05]	[0.08]	[0.11]	[0.15]	[0.20]	[0.25]	[0.29]	[0.31]	[0.35]	[0.38]	[0.41]	[0.44]	[0.44]	[0.49]	[0.47]
Crisis dummy (lag 1)	0.04	0.09	0.10	0.02	0.01	-0.07	-0.50	-0.87	-1.31	-2.06	-2.46	-3.11	-3.56	-4.08*	-3.97*	-5.21**	-5.22**
	[0.04]	[0.14]	[0.31]	[0.52]	[0.72]	[0.97]	[1.21]	[1.41]	[1.58]	[1.78]	[1.86]	[2.02]	[2.10]	[2.15]	[2.16]	[2.46]	[2.45]
Crisis dummy (lag 2)	-0.08**	-0.23*	-0.40*	-0.42	-0.63	-1.00*	-0.91	-0.95	-1.24**	-0.90	-1.07*	-0.82	-1.01*	-0.44	-1.67**	-0.59	0.21
	[0.04]	[0.13]	[0.23]	[0.31]	[0.38]	[0.49]	[0.55]	[0.58]	[0.59]	[0.64]	[0.61]	[0.55]	[0.59]	[0.44]	[0.77]	[0.37]	[0.69]
Crisis dummy (lag 3)	0.02	0.08	0.23	0.25	0.20	0.36	0.33	0.09	0.35	0.12	0.23	0.01	0.47	-0.76	0.25	0.92	-0.59
	[0.04]	[0.11]	[0.19]	[0.25]	[0.34]	[0.44]	[0.48]	[0.49]	[0.54]	[0.51]	[0.48]	[0.49]	[0.47]	[0.84]	[0.50]	[0.62]	[0.92]
Crisis dummy (lag 4)	-0.01	-0.12	-0.37	-0.68*	-0.96**	-1.29**	-1.61**	-1.66	-1.93*	-2.00	-2.08	-1.97	-2.30	-1.23	-1.00	-1.60	-0.61
	[0.04]	[0.14]	[0.24]	[0.35]	[0.46]	[0.61]	[0.78]	[0.97]	[1.11]	[1.25]	[1.36]	[1.47]	[1.54]	[1.67]	[1.69]	[1.65]	[1.72]
Constant	0.23***	0.91***	2.15***	4.12***	8.90***	12.02***	9.84***	15.14***	18.94***	19.09***	20.63***	24.18***	25.90***	26.31***	27.35***	29.43***	29.83***
	[0.03]	[0.15]	[0.42]	[0.87]	[1.71]	[2.37]	[2.13]	[3.49]	[4.41]	[4.43]	[4.56]	[5.08]	[5.85]	[5.72]	[6.14]	[6.75]	[7.13]
# observations	1,587	1,586	1,585	1,583	1,568	1,541	1,523	1,496	1,469	1,442	1,415	1,388	1,361	1,334	1,307	1,280	1,253
Log-likelihood	53	-1,866	-2,965	-3,701	-4,212	-4,561	-4,828	-4,989	-5,086	-5,133	-5,141	-5,122	-5,081	-5,021	-4,948	-4,866	-4,776
# countries	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
R^2	0.99	0.97	0.94	0.91	0.88	0.86	0.83	0.81	0.79	0.79	0.78	0.78	0.79	0.79	0.80	0.81	0.82

Source: Bank for International Settlements, International Financial Statistics, Budnik and Kleibl (2018), Lo Duca and others (2017), and IMF staff calculations.
Note: Estimations are performed using the local projections methodology. Robust standard errors are in brackets. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table 5. Estimation Results: Baseline Specification (Credit)

	Credit																
	h=0	h=1	h=2	h=3	h=4	h=5	h=6	h=7	h=8	h=9	h=10	h=11	h=12	h=13	h=14	h=15	h=16
Measures	-0.01	-0.05	-0.12	-0.19	-0.28	-0.33	-0.39	-0.50	-0.66	-0.64	-0.75	-0.72	-0.95	-1.34**	-1.40**	-1.35*	-1.44**
	[0.02]	[0.07]	[0.14]	[0.22]	[0.31]	[0.40]	[0.50]	[0.54]	[0.67]	[0.73]	[0.72]	[0.75]	[0.64]	[0.64]	[0.67]	[0.69]	[0.70]
Measures (lag 1)	-0.02	-0.08	-0.14	-0.20	-0.24	-0.25	-0.30	-0.40	-0.33	-0.39	-0.32	-0.49	-0.80	-0.76	-0.68	-0.69	-0.68
	[0.01]	[0.06]	[0.12]	[0.19]	[0.26]	[0.34]	[0.39]	[0.52]	[0.59]	[0.59]	[0.62]	[0.52]	[0.52]	[0.55]	[0.62]	[0.71]	[0.75]
Measures (lag 2)	-0.01	-0.02	-0.04	-0.04	0.00	0.01	-0.02	0.05	0.01	0.06	-0.10	-0.42	-0.41	-0.37	-0.37	-0.40	-0.57
	[0.02]	[0.05]	[0.11]	[0.16]	[0.23]	[0.30]	[0.41]	[0.48]	[0.50]	[0.54]	[0.47]	[0.51]	[0.55]	[0.62]	[0.70]	[0.73]	[0.86]
Measures (lag 3)	0.01	0.02	0.05	0.09	0.13	0.18	0.26	0.22	0.25	0.11	-0.16	-0.19	-0.17	-0.16	-0.22	-0.40	-0.50
	[0.01]	[0.05]	[0.10]	[0.15]	[0.21]	[0.30]	[0.38]	[0.41]	[0.47]	[0.43]	[0.45]	[0.50]	[0.57]	[0.65]	[0.68]	[0.80]	[0.84]
Measures (lag 4)	-0.02	-0.03	-0.03	0.01	0.02	0.09	0.05	0.09	-0.05	-0.21	-0.22	-0.18	-0.19	-0.27	-0.40	-0.51	-0.38
	[0.01]	[0.04]	[0.09]	[0.15]	[0.25]	[0.34]	[0.39]	[0.47]	[0.46]	[0.48]	[0.55]	[0.63]	[0.72]	[0.76]	[0.87]	[0.89]	[1.05]
Dependent variable (lag 1)	1.91***	3.88***	5.62***	7.39***	9.04***	10.12***	10.71***	11.13***	11.31***	11.10***	10.61***	10.05***	9.64***	9.08***	8.44***	7.66***	6.74***
	[0.07]	[0.28]	[0.56]	[0.84]	[1.10]	[1.32]	[1.49]	[1.57]	[1.59]	[1.55]	[1.48]	[1.36]	[1.27]	[1.24]	[1.18]	[1.06]	[0.95]
Dependent variable (lag 2)	-3.28***	-6.77***	-9.80***	-13.19***	-16.73***	-19.16***	-20.53***	-21.71***	-22.55***	-22.52***	-21.81***	-20.86***	-20.20***	-19.26***	-18.26***	-16.91***	-15.20***
	[0.14]	[0.61]	[1.30]	[1.98]	[2.61]	[3.20]	[3.66]	[3.92]	[4.04]	[3.96]	[3.79]	[3.49]	[3.22]	[3.05]	[2.83]	[2.45]	[2.02]
Dependent variable (lag 3)	1.76***	3.62***	5.03***	6.96***	9.40***	11.14***	12.14***	13.16***	14.17***	14.55***	14.36***	13.89***	13.58***	13.12***	12.73***	12.05***	11.03***
	[0.08]	[0.42]	[0.98]	[1.56]	[2.11]	[2.64]	[3.12]	[3.44]	[3.64]	[3.66]	[3.51]	[3.26]	[2.99]	[2.86]	[2.68]	[2.39]	[2.06]
Dependent variable (lag 4)	-0.39***	-0.74***	-0.89***	-1.21***	-1.78***	-2.21***	-2.47**	-2.78**	-3.17**	-3.42**	-3.50**	-3.47***	-3.46***	-3.42***	-3.43***	-3.37***	-3.19***
	[0.02]	[0.10]	[0.26]	[0.43]	[0.61]	[0.79]	[0.98]	[1.13]	[1.26]	[1.33]	[1.30]	[1.24]	[1.14]	[1.11]	[1.07]	[1.00]	[0.93]
Change in monetary policy rate (lag 1)	-0.03*	-0.10*	-0.19	-0.25	-0.32	-0.39	-0.47	-0.54	-0.63	-0.71	-0.80	-0.85	-0.91	-0.92	-0.89	-0.84	-0.75
	[0.01]	[0.06]	[0.12]	[0.19]	[0.27]	[0.37]	[0.47]	[0.58]	[0.69]	[0.78]	[0.85]	[0.90]	[0.91]	[0.89]	[0.85]	[0.81]	[0.76]
Change in monetary policy rate (lag 2)	-0.01	-0.01	-0.01	0.01	0.01	-0.01	-0.04	-0.07	-0.12	-0.20	-0.25	-0.34	-0.37	-0.36	-0.33	-0.27	-0.23
	[0.01]	[0.04]	[0.08]	[0.14]	[0.20]	[0.28]	[0.37]	[0.45]	[0.52]	[0.58]	[0.60]	[0.60]	[0.56]	[0.51]	[0.46]	[0.41]	[0.38]
Change in monetary policy rate (lag 3)	0.01	0.03	0.06	0.08	0.08	0.06	0.03	0.00	-0.06	-0.12	-0.19	-0.22	-0.21	-0.15	-0.09	-0.05	-0.01
	[0.01]	[0.04]	[0.08]	[0.13]	[0.20]	[0.28]	[0.36]	[0.42]	[0.45]	[0.47]	[0.46]	[0.42]	[0.36]	[0.30]	[0.25]	[0.22]	[0.21]
Change in monetary policy rate (lag 4)	-0.01	-0.04	-0.07	-0.10	-0.16	-0.22	-0.28	-0.34	-0.42	-0.50	-0.54	-0.53	-0.48	-0.40	-0.33	-0.25	-0.17
	[0.01]	[0.04]	[0.08]	[0.14]	[0.23]	[0.33]	[0.42]	[0.49]	[0.55]	[0.58]	[0.57]	[0.52]	[0.45]	[0.40]	[0.36]	[0.33]	[0.30]
Real GDP growth (lag 1)	-0.01	-0.03	-0.05	-0.06	-0.07	-0.06	-0.05	-0.03	-0.01	0.01	0.04	0.32	0.32	0.36	0.42	0.39	0.52
	[0.01]	[0.02]	[0.04]	[0.06]	[0.09]	[0.12]	[0.15]	[0.17]	[0.19]	[0.21]	[0.23]	[0.31]	[0.31]	[0.30]	[0.31]	[0.30]	[0.32]
Real GDP growth (lag 2)	0.01*	0.02	0.04	0.07	0.11	0.15	0.18	0.22	0.25	0.29	0.43	0.45	0.49*	0.57*	0.54*	0.65**	0.68**
	[0.00]	[0.02]	[0.04]	[0.06]	[0.08]	[0.10]	[0.12]	[0.14]	[0.16]	[0.18]	[0.26]	[0.27]	[0.28]	[0.30]	[0.28]	[0.29]	[0.29]
Real GDP growth (lag 3)	0.01	0.03	0.06	0.10*	0.13*	0.18*	0.22*	0.26	0.29	0.43**	0.47**	0.48*	0.56**	0.55***	0.64***	0.69***	0.68***
	[0.01]	[0.02]	[0.04]	[0.05]	[0.07]	[0.09]	[0.12]	[0.15]	[0.19]	[0.20]	[0.22]	[0.24]	[0.22]	[0.20]	[0.21]	[0.22]	[0.23]
Real GDP growth (lag 4)	0.00	0.00	0.02	0.05	0.07	0.10	0.13	0.17	0.27*	0.31*	0.35*	0.39**	0.46***	0.53***	0.58***	0.61***	0.64***
	[0.00]	[0.01]	[0.02]	[0.04]	[0.06]	[0.09]	[0.12]	[0.15]	[0.14]	[0.15]	[0.17]	[0.18]	[0.15]	[0.17]	[0.17]	[0.18]	[0.18]
Crisis dummy (lag 1)	-0.06	-0.20	-0.36	-0.45	-0.45	-0.37	-0.36	-0.33	-0.28	-0.24	-0.25	-0.26	-0.23	-0.14	0.00	-0.10	0.05
	[0.04]	[0.14]	[0.28]	[0.44]	[0.57]	[0.72]	[0.87]	[1.01]	[1.11]	[1.20]	[1.28]	[1.44]	[1.53]	[1.59]	[1.65]	[2.00]	[2.02]
Crisis dummy (lag 2)	0.04	0.14**	0.30**	0.48*	0.63*	0.65	0.66	0.69	0.69	0.62	0.42	0.44	0.46	0.50	0.00	0.22	0.23
	[0.03]	[0.06]	[0.13]	[0.24]	[0.34]	[0.43]	[0.49]	[0.52]	[0.52]	[0.48]	[0.55]	[0.41]	[0.40]	[0.41]	[0.57]	[0.37]	[0.44]
Crisis dummy (lag 3)	0.04	0.15	0.30	0.39	0.41	0.42	0.46	0.46	0.40	0.27	0.44	0.45	0.50	-0.16	0.32	0.36	0.20
	[0.04]	[0.11]	[0.20]	[0.29]	[0.37]	[0.41]	[0.44]	[0.44]	[0.43]	[0.53]	[0.44]	[0.43]	[0.44]	[0.54]	[0.44]	[0.44]	[0.47]
Crisis dummy (lag 4)	-0.03	-0.11	-0.29	-0.50*	-0.71*	-0.90**	-1.10**	-1.29**	-1.41*	-1.38	-1.47	-1.61	-1.86	-1.35	-1.51	-1.78	-1.92
	[0.03]	[0.10]	[0.17]	[0.25]	[0.35]	[0.44]	[0.51]	[0.60]	[0.71]	[0.81]	[0.96]	[1.12]	[1.25]	[1.56]	[1.72]	[1.86]	[1.96]
Constant	3.07***	11.99***	27.07***	47.78***	75.06***	108.88***	147.32***	188.87***	232.23***	278.80***	325.31***	368.54***	413.11***	459.55***	507.38***	554.98***	600.18***
	[0.37]	[1.40]	[3.22]	[5.83]	[9.24]	[13.59]	[18.89]	[24.90]	[31.43]	[38.62]	[46.70]	[56.53]	[66.38]	[75.22]	[82.66]	[89.07]	[93.85]
# observations	1,759	1,759	1,759	1,759	1,737	1,715	1,688	1,661	1,634	1,607	1,580	1,553	1,526	1,499	1,472	1,445	1,418
Log-likelihood	113	-1,952	-3,087	-3,834	-4,355	-4,748	-5,018	-5,200	-5,321	-5,397	-5,434	-5,438	-5,419	-5,384	-5,334	-5,270	-5,194
# countries	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
R^2	0.99	0.96	0.93	0.91	0.88	0.86	0.84	0.82	0.81	0.81	0.80	0.81	0.81	0.81	0.82	0.83	0.83

Source: Bank for International Settlements, International Financial Statistics, Budnik and Kleibl (2018), Lo Duca and others (2017), and IMF staff calculations.

Note: Estimations are performed using the local projections methodology. Robust standard errors are in brackets. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table 6. Estimation Results: Asymmetric Effects of Tightening and Loosening Measures (House Prices)

	House prices																
	h=0	h=1	h=2	h=3	h=4	h=5	h=6	h=7	h=8	h=9	h=10	h=11	h=12	h=13	h=14	h=15	h=16
Tightening measures	0.02	0.06	0.06	-0.01	-0.13	-0.22	-0.37	-0.59	-0.95	-1.17	-0.98	-1.44	-1.64	-1.70	-1.38	-0.68	0.12
	[0.02]	[0.07]	[0.12]	[0.17]	[0.25]	[0.39]	[0.54]	[0.70]	[1.07]	[1.23]	[1.10]	[1.28]	[1.23]	[1.24]	[1.20]	[1.17]	[1.18]
Loosening measures	-0.06	-0.18	-0.32	-0.43	-0.40	-0.21	0.01	0.25	0.65	1.12	1.51	1.82	2.22	2.54	2.69	2.46	2.58
	[0.07]	[0.28]	[0.58]	[0.93]	[1.23]	[1.48]	[1.71]	[1.90]	[2.05]	[2.18]	[2.25]	[2.23]	[2.22]	[2.15]	[2.15]	[2.06]	[1.91]
Tightening measures (lag 1)	0.00	-0.05	-0.17	-0.31	-0.44	-0.60	-0.79	-1.14	-1.27	-0.99	-1.32	-1.38	-1.29	-1.06	-0.63	0.19	0.76
	[0.02]	[0.05]	[0.10]	[0.20]	[0.32]	[0.48]	[0.65]	[0.94]	[1.09]	[1.01]	[1.14]	[1.08]	[1.09]	[1.08]	[1.09]	[1.07]	[1.15]
Tightening measures (lag 2)	-0.05*	-0.16*	-0.30*	-0.45	-0.61	-0.80	-1.22	-1.35	-1.04	-1.39	-1.51	-1.49	-1.32	-0.93	-0.12	0.41	0.35
	[0.02]	[0.08]	[0.17]	[0.30]	[0.44]	[0.60]	[0.88]	[1.03]	[0.96]	[1.09]	[1.05]	[1.11]	[1.09]	[1.11]	[1.08]	[1.15]	[1.14]
Tightening measures (lag 3)	-0.01	-0.01	-0.04	-0.10	-0.21	-0.37	-0.45	-0.35	-0.57	-0.67	-0.55	-0.53	-0.27	0.41	0.85	0.78	1.25
	[0.02]	[0.07]	[0.16]	[0.28]	[0.43]	[0.68]	[0.83]	[0.80]	[0.98]	[1.01]	[1.12]	[1.20]	[1.22]	[1.21]	[1.28]	[1.28]	[1.27]
Tightening measures (lag 4)	0.02	0.04	0.00	-0.07	-0.15	-0.20	-0.16	-0.33	-0.47	-0.35	-0.27	-0.11	0.40	0.68	0.73	1.16	1.56
	[0.02]	[0.09]	[0.19]	[0.32]	[0.50]	[0.64]	[0.63]	[0.81]	[0.85]	[0.93]	[1.04]	[1.06]	[1.06]	[1.09]	[1.16]	[1.19]	[1.13]
Loosening measures (lag 1)	0.03	0.07	0.12	0.27	0.58	0.90	1.14	1.50	1.95	2.32	2.60	2.85	3.10	3.28	3.14	3.22	3.04
	[0.10]	[0.30]	[0.52]	[0.74]	[1.01]	[1.31]	[1.59]	[1.86]	[2.14]	[2.31]	[2.41]	[2.47]	[2.48]	[2.49]	[2.43]	[2.28]	[2.13]
Loosening measures (lag 2)	0.00	0.01	0.10	0.31	0.55	0.78	1.04	1.41	1.79	2.12	2.41	2.63	2.87	2.75	3.00	2.99	1.94
	[0.02]	[0.04]	[0.13]	[0.30]	[0.49]	[0.69]	[0.95]	[1.27]	[1.57]	[1.81]	[2.02]	[2.18]	[2.26]	[2.19]	[2.22]	[2.19]	[2.47]
Loosening measures (lag 3)	-0.02	0.07	0.32	0.62	0.91	1.27	1.70	2.13	2.54	2.97	3.24	3.56	3.98	4.26	4.32	3.33	8.86*
	[0.05]	[0.15]	[0.32]	[0.55]	[0.78]	[1.07]	[1.44]	[1.78]	[2.06]	[2.31]	[2.51]	[2.73]	[3.08]	[3.10]	[3.13]	[3.42]	[4.56]
Loosening measures (lag 4)	0.10	0.37	0.72	1.06	1.50	2.00	2.46	2.93	3.48	3.88	4.14	4.61	4.98	5.08	4.02	8.91*	8.73*
	[0.08]	[0.29]	[0.58]	[0.88]	[1.20]	[1.57]	[1.90]	[2.15]	[2.35]	[2.53]	[2.79]	[3.09]	[3.06]	[3.03]	[3.33]	[4.35]	[4.60]
Dependent variable (lag 1)	2.07***	4.54***	7.06***	9.54***	11.73***	13.22***	14.03***	14.25***	13.95***	13.32***	12.51***	11.35***	9.94***	8.79***	7.79***	6.43***	4.77**
	[0.07]	[0.32]	[0.65]	[0.91]	[1.07]	[1.20]	[1.30]	[1.38]	[1.49]	[1.63]	[1.77]	[1.94]	[2.03]	[2.11]	[2.16]	[2.19]	[2.16]
Dependent variable (lag 2)	-3.63***	-8.39***	-13.49***	-18.95***	-24.19***	-27.99***	-30.38***	-31.46***	-31.35***	-30.48***	-29.25***	-27.08***	-24.16***	-21.96***	-20.21***	-17.36***	-13.45***
	[0.19]	[0.86]	[1.87]	[2.70]	[3.23]	[3.64]	[3.89]	[3.94]	[3.93]	[3.89]	[3.93]	[4.15]	[4.25]	[4.35]	[4.43]	[4.54]	[4.57]
Dependent variable (lag 3)	1.99***	4.87***	8.13***	12.01***	16.13***	19.31***	21.52***	22.77***	23.10***	22.85***	22.35***	20.97***	18.82***	17.37***	16.41***	14.35***	11.04***
	[0.15]	[0.78]	[1.77]	[2.66]	[3.27]	[3.77]	[4.10]	[4.17]	[4.09]	[3.89]	[3.70]	[3.71]	[3.69]	[3.63]	[3.60]	[3.74]	[3.93]
Dependent variable (lag 4)	-0.43***	-1.04***	-1.74***	-2.67***	-3.80***	-4.73***	-5.43***	-5.90***	-6.11***	-6.17***	-6.17***	-5.87***	-5.30***	-4.97***	-4.83***	-4.31***	-3.31**
	[0.04]	[0.23]	[0.56]	[0.87]	[1.10]	[1.30]	[1.46]	[1.52]	[1.53]	[1.47]	[1.40]	[1.40]	[1.40]	[1.37]	[1.34]	[1.41]	[1.54]
Change in monetary policy rate (lag 1)	-0.02***	-0.08***	-0.17***	-0.29***	-0.41***	-0.51**	-0.59**	-0.62**	-0.60*	-0.56	-0.47	-0.41	-0.38	-0.36	-0.33	-0.32	-0.26
	[0.01]	[0.03]	[0.06]	[0.10]	[0.14]	[0.19]	[0.23]	[0.27]	[0.30]	[0.33]	[0.34]	[0.36]	[0.38]	[0.39]	[0.37]	[0.34]	[0.32]
Change in monetary policy rate (lag 2)	-0.01*	-0.05**	-0.11**	-0.17**	-0.24**	-0.29**	-0.32**	-0.30*	-0.25	-0.16	-0.09	-0.05	-0.05	-0.04	-0.05	-0.02	0.00
	[0.01]	[0.02]	[0.04]	[0.06]	[0.09]	[0.12]	[0.15]	[0.18]	[0.20]	[0.21]	[0.23]	[0.26]	[0.29]	[0.29]	[0.26]	[0.24]	[0.23]
Change in monetary policy rate (lag 3)	-0.01**	-0.04**	-0.09***	-0.14***	-0.18**	-0.21**	-0.20*	-0.17	-0.09	-0.02	0.02	0.02	0.03	0.01	0.01	0.03	0.01
	[0.00]	[0.01]	[0.03]	[0.05]	[0.07]	[0.09]	[0.11]	[0.13]	[0.15]	[0.17]	[0.20]	[0.23]	[0.24]	[0.22]	[0.21]	[0.20]	[0.20]
Change in monetary policy rate (lag 4)	-0.01**	-0.05**	-0.10**	-0.15**	-0.19**	-0.21*	-0.21	-0.16	-0.11	-0.09	-0.09	-0.09	-0.12	-0.12	-0.10	-0.10	-0.08
	[0.01]	[0.02]	[0.04]	[0.06]	[0.09]	[0.12]	[0.16]	[0.18]	[0.20]	[0.23]	[0.26]	[0.27]	[0.27]	[0.27]	[0.25]	[0.24]	[0.24]
Real GDP growth (lag 1)	0.00	0.01	0.03	0.05	0.06	0.08	0.09	0.10	0.15	0.17	0.21	0.29	0.34	0.46	0.54	0.53	0.56
	[0.01]	[0.04]	[0.08]	[0.14]	[0.19]	[0.23]	[0.27]	[0.31]	[0.35]	[0.45]	[0.45]	[0.46]	[0.42]	[0.42]	[0.42]	[0.42]	[0.44]
Real GDP growth (lag 2)	0.00	0.02	0.04	0.07	0.10	0.12	0.15	0.22	0.29	0.36	0.46	0.54	0.70*	0.81*	0.82*	0.85	0.96
	[0.01]	[0.03]	[0.06]	[0.08]	[0.11]	[0.14]	[0.18]	[0.23]	[0.29]	[0.32]	[0.36]	[0.35]	[0.39]	[0.43]	[0.47]	[0.52]	[0.57]
Real GDP growth (lag 3)	0.01	0.02	0.04	0.06	0.08	0.10	0.16	0.20	0.28	0.39	0.47	0.62	0.76*	0.82*	0.91*	1.02*	1.07*
	[0.01]	[0.03]	[0.04]	[0.07]	[0.10]	[0.13]	[0.18]	[0.25]	[0.28]	[0.32]	[0.33]	[0.37]	[0.42]	[0.46]	[0.51]	[0.55]	[0.61]
Real GDP growth (lag 4)	-0.01	-0.01	-0.01	-0.01	-0.01	0.03	0.03	0.08	0.15	0.21	0.31	0.43	0.53	0.61	0.70	0.79	0.84*
	[0.01]	[0.02]	[0.05]	[0.08]	[0.11]	[0.15]	[0.20]	[0.24]	[0.28]	[0.30]	[0.35]	[0.37]	[0.41]	[0.43]	[0.44]	[0.48]	[0.46]
Crisis dummy (lag 1)	0.04	0.10	0.10	0.02	0.02	-0.05	-0.47	-0.85	-1.26	-2.00	-2.37	-3.00	-3.44	-3.94*	-3.85*	-5.00*	-5.11**
	[0.04]	[0.14]	[0.30]	[0.51]	[0.71]	[0.96]	[1.19]	[1.39]	[1.56]	[1.76]	[1.84]	[1.99]	[2.08]	[2.12]	[2.13]	[2.44]	[2.41]
Crisis dummy (lag 2)	-0.09**	-0.24*	-0.42*	-0.43	-0.65	-1.03**	-0.95*	-0.98	-1.28**	-0.95	-1.12*	-0.90	-1.09*	-0.52	-1.69**	-0.79*	0.14
	[0.04]	[0.13]	[0.23]	[0.30]	[0.38]	[0.49]	[0.55]	[0.58]	[0.59]	[0.65]	[0.61]	[0.55]	[0.58]	[0.44]	[0.75]	[0.42]	[0.72]
Crisis dummy (lag 3)	0.02	0.09	0.25	0.27	0.24	0.41	0.39	0.15	0.42	0.21	0.32	0.12	0.60	-0.64	0.31	1.10*	-0.48
	[0.04]	[0.11]	[0.19]	[0.25]	[0.33]	[0.44]	[0.48]	[0.49]	[0.55]	[0.52]	[0.49]	[0.50]	[0.49]	[0.85]	[0.52]	[0.64]	[0.98]
Crisis dummy (lag 4)	-0.01	-0.12	-0.37	-0.69*	-0.97**	-1.31**	-1.63**	-1.69*	-1.98*	-2.07	-2.17	-2.06	-2.43	-1.37	-1.15	-1.76	-0.70
	[0.04]	[0.14]	[0.24]	[0.35]	[0.46]	[0.61]	[0.78]	[0.97]	[1.11]	[1.25]	[1.35]	[1.46]	[1.52]	[1.66]	[1.67]	[1.61]	[1.69]
Constant	0.22***	0.90***	2.12***	4.08***	8.86***	12.01***	9.66***	14.99***	18.82***	18.91***	20.57***	24.09***	25.80***	26.20***	27.12***	29.28***	29.65***
	[0.04]	[0.16]	[0.43]	[0.89]	[1.73]	[2.37]	[2.16]	[3.55]	[4.46]	[4.50]	[4.66]	[5.12]	[5.88]	[5.75]	[6.22]	[6.81]	[7.18]
# observations	1,587	1,586	1,585	1,583	1,568	1,541	1,523	1,496	1,469	1,442	1,415	1,388	1,361	1,334	1,307	1,280	1,253
Log-likelihood	56	-1,864	-2,963	-3,699	-4,211	-4,560	-4,826	-4,988	-5,085	-5,131	-5,139	-5,120	-5,079	-5,019	-4,945	-4,862	-4,771
# countries	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
R^2	0.99	0.97	0.94	0.91	0.88	0.86	0.83	0.81	0.80	0.79	0.78	0.78	0.79	0.79	0.80	0.81	0.82

Source: Bank for International Settlements, International Financial Statistics, Budnik and Kleibl (2018), Lo Duca and others (2017), and IMF staff calculations.

Note: Estimations are performed using the local projections methodology. Robust standard errors are in brackets. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table 7. Estimation Results: Asymmetric Effects of Tightening and Loosening Measures (Credit)

	Credit																	
	h=0	h=1	h=2	h=3	h=4	h=5	h=6	h=7	h=8	h=9	h=10	h=11	h=12	h=13	h=14	h=15	h=16
Tightening measures	0.00	-0.02	-0.03	-0.02	-0.02	0.00	-0.01	-0.12	-0.25	-0.25	-0.45	-0.50	-0.88	-1.49	-1.59	-1.60	-1.75
	[0.01]	[0.05]	[0.10]	[0.17]	[0.25]	[0.34]	[0.45]	[0.53]	[0.72]	[0.84]	[0.87]	[0.94]	[0.88]	[1.00]	[1.03]	[1.08]	[1.26]
Loosening measures	0.05	0.26	0.65	1.14	1.66	2.11	2.41*	2.51**	2.41**	2.26**	2.04***	1.66**	1.25	0.85	0.89	0.54	0.42
	[0.07]	[0.29]	[0.59]	[0.88]	[1.10]	[1.24]	[1.28]	[1.18]	[1.00]	[0.82]	[0.69]	[0.66]	[0.76]	[0.94]	[1.18]	[1.49]	[1.69]
Tightening measures (lag 1)	-0.01	-0.02	-0.02	-0.02	0.01	0.03	-0.02	-0.11	-0.08	-0.21	-0.20	-0.50	-0.98	-0.98	-0.91	-0.92	-0.90
	[0.01]	[0.05]	[0.11]	[0.19]	[0.27]	[0.36]	[0.44]	[0.62]	[0.73]	[0.76]	[0.81]	[0.73]	[0.83]	[0.84]	[0.92]	[1.03]	[1.15]
Tightening measures (lag 2)	0.00	0.01	0.03	0.06	0.12	0.12	0.07	0.11	0.01	-0.01	-0.28	-0.79	-0.83	-0.82	-0.82	-0.80	-0.80
	[0.02]	[0.06]	[0.12]	[0.18]	[0.26]	[0.34]	[0.49]	[0.61]	[0.65]	[0.73]	[0.68]	[0.77]	[0.76]	[0.82]	[0.90]	[1.00]	[1.13]
Tightening measures (lag 3)	0.01	0.02	0.06	0.11	0.14	0.17	0.22	0.13	0.12	-0.14	-0.57	-0.64	-0.66	-0.68	-0.70	-0.70	-0.80
	[0.02]	[0.05]	[0.10]	[0.16]	[0.23]	[0.35]	[0.47]	[0.53]	[0.62]	[0.59]	[0.64]	[0.65]	[0.70]	[0.78]	[0.87]	[0.99]	[1.14]
Tightening measures (lag 4)	-0.01	0.00	0.03	0.07	0.07	0.12	0.05	0.06	-0.15	-0.43	-0.46	-0.49	-0.52	-0.58	-0.58	-0.64	-0.81
	[0.01]	[0.05]	[0.10]	[0.17]	[0.29]	[0.41]	[0.48]	[0.58]	[0.58]	[0.65]	[0.70]	[0.77]	[0.87]	[0.95]	[1.04]	[1.16]	[1.40]
Loosening measures (lag 1)	0.12	0.42	0.83*	1.27**	1.65**	1.93**	2.00***	1.90***	1.72**	1.51	1.16	0.85	0.45	0.30	0.03	-0.02	0.09
	[0.07]	[0.25]	[0.44]	[0.58]	[0.67]	[0.72]	[0.70]	[0.68]	[0.75]	[0.90]	[1.04]	[1.15]	[1.33]	[1.62]	[1.85]	[1.98]	[2.03]
Loosening measures (lag 2)	0.05	0.20	0.43	0.62	0.72	0.68	0.53	0.32	0.08	-0.23	-0.54	-0.85	-1.08	-1.35	-1.32	-1.12	-0.17
	[0.04]	[0.13]	[0.25]	[0.43]	[0.65]	[0.89]	[1.16]	[1.43]	[1.68]	[1.86]	[1.98]	[2.10]	[2.42]	[2.67]	[2.73]	[2.70]	[2.83]
Loosening measures (lag 3)	-0.03	-0.02	0.06	0.10	0.01	-0.18	-0.35	-0.55	-0.82	-1.08	-1.35	-1.54	-1.79	-1.85	-1.64	-0.84	-0.56
	[0.06]	[0.18]	[0.35]	[0.56]	[0.82]	[1.10]	[1.37]	[1.61]	[1.79]	[1.91]	[2.05]	[2.34]	[2.59]	[2.67]	[2.66]	[2.73]	[2.67]
Loosening measures (lag 4)	0.07	0.21	0.34	0.33	0.23	0.09	-0.05	-0.26	-0.49	-0.75	-0.81	-1.13	-1.13	-0.86	-0.22	0.06	-2.31
	[0.04]	[0.15]	[0.28]	[0.44]	[0.61]	[0.81]	[1.02]	[1.21]	[1.37]	[1.53]	[1.84]	[2.12]	[2.28]	[2.38]	[2.51]	[2.50]	[3.54]
Dependent variable (lag 1)	1.91***	3.87***	5.61***	7.38***	9.03***	10.11***	10.71***	11.14***	11.33***	11.12***	10.65***	10.10***	9.69***	9.12***	8.48***	7.69***	6.73***
	[0.07]	[0.28]	[0.57]	[0.84]	[1.10]	[1.33]	[1.50]	[1.58]	[1.61]	[1.56]	[1.50]	[1.37]	[1.29]	[1.26]	[1.20]	[1.08]	[0.95]
Dependent variable (lag 2)	-3.28***	-6.77***	-9.78***	-13.18***	-16.72***	-19.16***	-20.55***	-21.74***	-22.60***	-22.58***	-21.89***	-20.96***	-20.30***	-19.34***	-18.34***	-16.97***	-15.12***
	[0.14]	[0.61]	[1.30]	[1.99]	[2.63]	[3.22]	[3.69]	[3.96]	[4.08]	[4.00]	[3.84]	[3.55]	[3.28]	[3.11]	[2.89]	[2.50]	[2.01]
Dependent variable (lag 3)	1.76***	3.62***	5.02***	6.95***	9.38***	11.14***	12.16***	13.19***	14.21***	14.59***	14.42***	13.97***	13.66***	13.18***	12.79***	12.09***	10.93***
	[0.08]	[0.42]	[0.98]	[1.57]	[2.12]	[2.66]	[3.15]	[3.47]	[3.69]	[3.71]	[3.56]	[3.32]	[3.05]	[2.92]	[2.74]	[2.45]	[2.04]
Dependent variable (lag 4)	-0.39***	-0.74***	-0.88***	-1.20**	-1.77***	-2.21**	-2.47**	-2.78**	-3.18**	-3.43**	-3.51**	-3.49**	-3.48***	-3.43***	-3.45***	-3.38***	-3.15***
	[0.02]	[0.10]	[0.26]	[0.44]	[0.61]	[0.80]	[0.99]	[1.15]	[1.28]	[1.35]	[1.32]	[1.26]	[1.17]	[1.13]	[1.09]	[1.02]	[0.92]
Change in monetary policy rate (lag 1)	-0.03*	-0.10*	-0.18	-0.24	-0.30	-0.37	-0.45	-0.52	-0.61	-0.70	-0.80	-0.85	-0.92	-0.93	-0.90	-0.85	-0.76
	[0.01]	[0.06]	[0.12]	[0.18]	[0.26]	[0.36]	[0.46]	[0.58]	[0.68]	[0.78]	[0.85]	[0.91]	[0.92]	[0.91]	[0.87]	[0.82]	[0.77]
Change in monetary policy rate (lag 2)	-0.01	-0.01	0.00	0.02	0.03	0.01	-0.01	-0.05	-0.11	-0.18	-0.25	-0.34	-0.38	-0.38	-0.35	-0.29	-0.25
	[0.01]	[0.04]	[0.08]	[0.13]	[0.20]	[0.28]	[0.37]	[0.46]	[0.53]	[0.59]	[0.62]	[0.62]	[0.58]	[0.53]	[0.48]	[0.43]	[0.40]
Change in monetary policy rate (lag 3)	0.01	0.04	0.07	0.09	0.09	0.07	0.04	0.00	-0.06	-0.12	-0.20	-0.24	-0.23	-0.18	-0.11	-0.06	-0.03
	[0.01]	[0.04]	[0.08]	[0.14]	[0.21]	[0.29]	[0.37]	[0.43]	[0.47]	[0.49]	[0.48]	[0.44]	[0.38]	[0.31]	[0.26]	[0.23]	[0.22]
Change in monetary policy rate (lag 4)	-0.01	-0.04	-0.06	-0.10	-0.16	-0.22	-0.28	-0.35	-0.43	-0.52	-0.56	-0.56	-0.50	-0.43	-0.35	-0.27	-0.19
	[0.01]	[0.04]	[0.09]	[0.15]	[0.24]	[0.34]	[0.44]	[0.51]	[0.58]	[0.60]	[0.59]	[0.54]	[0.48]	[0.42]	[0.38]	[0.34]	[0.31]
Real GDP growth (lag 1)	-0.01	-0.03	-0.05	-0.06	-0.06	-0.05	-0.04	-0.02	-0.01	0.02	0.05	0.32	0.33	0.37	0.42	0.39	0.54*
	[0.01]	[0.02]	[0.04]	[0.06]	[0.09]	[0.12]	[0.14]	[0.17]	[0.19]	[0.21]	[0.23]	[0.31]	[0.31]	[0.30]	[0.31]	[0.30]	[0.31]
Real GDP growth (lag 2)	0.01*	0.03	0.05	0.08	0.12	0.15	0.19	0.23	0.26	0.29	0.43	0.45	0.49	0.56*	0.53*	0.64**	0.68**
	[0.00]	[0.02]	[0.03]	[0.06]	[0.08]	[0.10]	[0.12]	[0.14]	[0.16]	[0.19]	[0.26]	[0.28]	[0.29]	[0.30]	[0.29]	[0.29]	[0.29]
Real GDP growth (lag 3)	0.01	0.03	0.06	0.10*	0.14**	0.18*	0.23*	0.26	0.29	0.43**	0.46**	0.47*	0.55**	0.55**	0.63***	0.68***	0.67**
	[0.01]	[0.02]	[0.04]	[0.05]	[0.07]	[0.09]	[0.12]	[0.16]	[0.19]	[0.20]	[0.22]	[0.24]	[0.23]	[0.21]	[0.22]	[0.23]	[0.24]
Real GDP growth (lag 4)	0.00	0.01	0.03	0.05	0.08	0.10	0.13	0.16	0.27*	0.30*	0.34*	0.38*	0.45***	0.53***	0.59***	0.61***	0.63***
	[0.00]	[0.01]	[0.02]	[0.04]	[0.06]	[0.09]	[0.12]	[0.15]	[0.14]	[0.16]	[0.17]	[0.19]	[0.15]	[0.17]	[0.17]	[0.19]	[0.18]
Crisis dummy (lag 1)	-0.06	-0.20	-0.36	-0.45	-0.44	-0.35	-0.33	-0.29	-0.24	-0.19	-0.20	-0.22	-0.21	-0.13	0.00	-0.12	0.14
	[0.04]	[0.14]	[0.28]	[0.44]	[0.57]	[0.72]	[0.86]	[1.01]	[1.11]	[1.20]	[1.29]	[1.45]	[1.53]	[1.60]	[1.66]	[2.01]	[2.04]
Crisis dummy (lag 2)	0.04	0.15**	0.30**	0.49**	0.63*	0.65	0.65	0.67	0.66	0.58	0.36	0.38	0.40	0.45	-0.05	0.21	0.13
	[0.03]	[0.07]	[0.13]	[0.24]	[0.34]	[0.42]	[0.48]	[0.51]	[0.50]	[0.47]	[0.55]	[0.41]	[0.40]	[0.40]	[0.55]	[0.35]	[0.47]
Crisis dummy (lag 3)	0.05	0.15	0.31	0.40	0.42	0.42	0.46	0.46	0.39	0.24	0.42	0.42	0.48	-0.17	0.33	0.36	0.19
	[0.04]	[0.11]	[0.20]	[0.29]	[0.36]	[0.41]	[0.43]	[0.44]	[0.43]	[0.53]	[0.44]	[0.42]	[0.43]	[0.54]	[0.44]	[0.42]	[0.46]
Crisis dummy (lag 4)	-0.03	-0.11	-0.28	-0.50*	-0.70*	-0.89*	-1.08**	-1.28**	-1.40*	-1.35	-1.45	-1.59	-1.83	-1.33	-1.49	-1.76	-1.92
	[0.03]	[0.10]	[0.17]	[0.26]	[0.35]	[0.44]	[0.51]	[0.60]	[0.71]	[0.81]	[0.97]	[1.13]	[1.27]	[1.59]	[1.75]	[1.89]	[1.97]
Constant	3.10***	12.13***	27.38***	48.26***	75.72***	109.60***	148.03***	189.40***	232.61***	278.91***	325.09***	367.88***	412.03***	458.14***	505.98***	554.02***	599.55***
	[0.37]	[1.41]	[3.22]	[5.77]	[9.09]	[13.31]	[18.50]	[24.37]	[30.87]	[38.12]	[46.31]	[56.22]	[66.24]	[75.30]	[82.96]	[89.25]	[94.14]
# observations	1,759	1,759	1,759	1,759	1,737	1,715	1,688	1,661	1,634	1,607	1,580	1,553	1,526	1,499	1,472	1,445	1,418
Log-likelihood	117	-1,947	-3,081	-3,829	-4,349	-4,743	-5,014	-5,197	-5,320	-5,396	-5,433	-5,437	-5,418	-5,383	-5,333	-5,269	-5,193
# countries	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
R^2	0.99	0.96	0.93	0.91	0.89	0.86	0.84	0.82	0.81	0.81	0.80	0.81	0.81	0.81	0.82	0.83	0.83

Source: Bank for International Settlements, International Financial Statistics, Budnik and Kleibl (2018), Lo Duca and others (2017), and IMF staff calculations.
Note: Estimations are performed using the local projections methodology. Robust standard errors are in brackets. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table 8. Estimation Results: Differential Effects Across Euro Area and Other EU Countries (House Prices)

	House prices																
	h=0	h=1	h=2	h=3	h=4	h=5	h=6	h=7	h=8	h=9	h=10	h=11	h=12	h=13	h=14	h=15	h=16
Measures 1 (euro area)	0.04	0.12	0.15	0.09	-0.06	-0.01	-0.03	-0.12	0.01	0.25	0.13	0.38	0.24	0.14	0.92	1.25	2.80
	[0.04]	[0.11]	[0.17]	[0.23]	[0.33]	[0.46]	[0.59]	[0.72]	[0.84]	[1.03]	[1.10]	[1.45]	[1.57]	[2.22]	[2.92]	[3.37]	[3.94]
Measures 1 (other EU countries)	0.03	0.08	0.09	0.04	-0.06	-0.23	-0.43	-0.75	-1.36	-1.80	-1.52	-2.22*	-2.49**	-2.46**	-2.31***	-1.76**	-1.43**
	[0.03]	[0.08]	[0.13]	[0.16]	[0.21]	[0.29]	[0.37]	[0.52]	[0.89]	[1.09]	[0.90]	[1.11]	[1.04]	[1.01]	[0.82]	[0.70]	[0.59]
Measures 1 (lag 1)	0.00	-0.05	-0.19	-0.37	-0.52	-0.64	-0.73	-0.70	-0.48	-0.53	-0.21	-0.35	-0.53	0.08	0.61	2.17	3.04
	[0.02]	[0.09]	[0.19]	[0.30]	[0.43]	[0.53]	[0.61]	[0.68]	[0.81]	[0.85]	[1.09]	[1.14]	[1.73]	[2.60]	[3.15]	[3.47]	[3.84]
Measures 1 (lag 2)	-0.07	-0.23*	-0.43*	-0.62*	-0.71	-0.84	-0.77	-0.58	-0.65	-0.41	-0.58	-0.58	-0.21	0.35	1.95	2.63	1.19
	[0.04]	[0.13]	[0.23]	[0.35]	[0.46]	[0.53]	[0.62]	[0.78]	[0.83]	[1.04]	[1.11]	[1.82]	[2.62]	[3.19]	[3.54]	[4.05]	[3.88]
Measures 1 (lag 3)	-0.03	-0.07	-0.08	-0.01	0.02	0.22	0.42	0.36	0.59	0.44	0.62	1.12	1.21	2.67	3.18	1.80	2.79
	[0.04]	[0.13]	[0.24]	[0.34]	[0.47]	[0.64]	[0.80]	[0.92]	[1.06]	[1.24]	[1.82]	[2.79]	[3.28]	[3.65]	[4.23]	[4.06]	[4.24]
Measures 1 (lag 4)	0.02	0.10	0.24*	0.41*	0.54	0.75	0.77	0.96	0.67	0.83	1.46	1.42	2.57	2.76	1.68	2.50	3.94
	[0.02]	[0.06]	[0.13]	[0.22]	[0.34]	[0.45]	[0.58]	[0.68]	[0.96]	[1.24]	[1.99]	[2.45]	[2.77]	[3.25]	[3.22]	[3.52]	[3.59]
Measures 2 (lag 1)	-0.01	-0.06	-0.17*	-0.31*	-0.50*	-0.74	-0.99	-1.58	-1.93	-1.61	-2.23*	-2.39**	-2.30**	-2.12**	-1.66**	-1.26*	-0.89*
	[0.01]	[0.04]	[0.08]	[0.15]	[0.27]	[0.43]	[0.60]	[0.95]	[1.14]	[0.98]	[1.20]	[1.13]	[1.10]	[0.88]	[0.78]	[0.63]	[0.52]
Measures 2 (lag 2)	-0.03	-0.11	-0.22	-0.39	-0.60	-0.84	-1.44	-1.77	-1.44	-2.05	-2.26*	-2.20*	-2.08**	-1.74*	-1.36*	-1.01	-0.46
	[0.02]	[0.08]	[0.16]	[0.29]	[0.46]	[0.64]	[0.99]	[1.18]	[1.03]	[1.27]	[1.23]	[1.22]	[1.00]	[0.91]	[0.76]	[0.64]	[0.64]
Measures 2 (lag 3)	0.00	-0.01	-0.09	-0.25	-0.45	-0.86	-1.15	-1.02	-1.59	-1.82	-1.73	-1.72	-1.53	-1.28	-0.96	-0.47	-0.61
	[0.02]	[0.08]	[0.20]	[0.37]	[0.55]	[0.90]	[1.09]	[0.96]	[1.25]	[1.26]	[1.22]	[1.09]	[1.03]	[0.91]	[0.80]	[0.78]	[0.77]
Measures 2 (lag 4)	0.00	-0.07	-0.22	-0.44	-0.75	-1.05	-1.00	-1.56	-1.87	-1.92	-1.88*	-1.83*	-1.69*	-1.42*	-0.86	-0.81	-0.54
	[0.03]	[0.13]	[0.27]	[0.43]	[0.70]	[0.89]	[0.82]	[1.10]	[1.15]	[1.16]	[1.03]	[1.01]	[0.89]	[0.77]	[0.71]	[0.66]	[0.62]
Dependent variable (lag 1)	2.07***	4.54***	7.06***	9.55***	11.74***	13.21***	14.02***	14.24***	13.92***	13.26***	12.45***	11.28***	9.82***	8.63***	7.64***	6.26***	4.53**
	[0.07]	[0.32]	[0.66]	[0.92]	[1.08]	[1.22]	[1.32]	[1.39]	[1.50]	[1.63]	[1.77]	[1.94]	[2.04]	[2.12]	[2.17]	[2.18]	[2.16]
Dependent variable (lag 2)	-3.63***	-8.39***	-13.50***	-18.97***	-24.20***	-27.97***	-30.34***	-31.41***	-31.24***	-30.31***	-29.09***	-26.89***	-23.83***	-21.50***	-19.75***	-16.87***	-12.80***
	[0.19]	[0.88]	[1.89]	[2.74]	[3.29]	[3.71]	[3.97]	[4.00]	[3.99]	[3.95]	[3.94]	[4.14]	[4.25]	[4.34]	[4.39]	[4.44]	[4.49]
Dependent variable (lag 3)	1.99***	4.87***	8.13***	12.02***	16.13***	19.29***	21.47***	22.70***	22.98***	22.66***	22.16***	20.77***	18.48***	16.91***	15.93***	13.84***	10.38**
	[0.15]	[0.79]	[1.80]	[2.70]	[3.33]	[3.83]	[4.18]	[4.24]	[4.17]	[3.97]	[3.74]	[3.71]	[3.68]	[3.61]	[3.53]	[3.61]	[3.82]
Dependent variable (lag 4)	-0.43***	-1.04***	-1.74***	-2.68***	-3.80***	-4.71***	-5.41***	-5.86***	-6.05***	-6.08***	-6.08***	-5.78***	-5.17***	-4.80***	-4.64***	-4.12***	-3.06*
	[0.04]	[0.23]	[0.57]	[0.89]	[1.12]	[1.33]	[1.49]	[1.55]	[1.56]	[1.50]	[1.42]	[1.40]	[1.39]	[1.36]	[1.32]	[1.37]	[1.51]
Change in monetary policy rate (lag 1)	-0.02***	-0.08***	-0.17***	-0.29***	-0.41***	-0.51**	-0.59**	-0.63**	-0.61*	-0.57	-0.49	-0.44	-0.42	-0.41	-0.37	-0.39	-0.36
	[0.01]	[0.03]	[0.06]	[0.10]	[0.14]	[0.19]	[0.23]	[0.27]	[0.31]	[0.34]	[0.35]	[0.38]	[0.40]	[0.41]	[0.39]	[0.37]	[0.36]
Change in monetary policy rate (lag 2)	-0.01*	-0.04**	-0.10**	-0.17**	-0.24**	-0.29**	-0.32**	-0.30	-0.25	-0.17	-0.10	-0.06	-0.07	-0.06	-0.08	-0.09	-0.09
	[0.01]	[0.02]	[0.04]	[0.07]	[0.10]	[0.12]	[0.15]	[0.18]	[0.21]	[0.23]	[0.25]	[0.28]	[0.30]	[0.30]	[0.28]	[0.28]	[0.27]
Change in monetary policy rate (lag 3)	-0.01*	-0.04**	-0.09**	-0.14**	-0.18**	-0.21**	-0.20	-0.18	-0.10	-0.04	0.00	0.00	0.00	-0.03	-0.04	-0.04	-0.06
	[0.00]	[0.02]	[0.03]	[0.05]	[0.07]	[0.10]	[0.12]	[0.15]	[0.16]	[0.19]	[0.22]	[0.25]	[0.26]	[0.25]	[0.24]	[0.23]	[0.23]
Change in monetary policy rate (lag 4)	-0.01**	-0.05**	-0.10**	-0.15**	-0.20*	-0.22	-0.22	-0.17	-0.14	-0.12	-0.13	-0.13	-0.17	-0.19	-0.17	-0.17	-0.14
	[0.01]	[0.02]	[0.04]	[0.06]	[0.10]	[0.13]	[0.17]	[0.19]	[0.22]	[0.26]	[0.29]	[0.30]	[0.31]	[0.32]	[0.29]	[0.28]	[0.27]
Real GDP growth (lag 1)	0.00	0.01	0.03	0.05	0.07	0.08	0.10	0.11	0.16	0.19	0.24	0.31	0.36	0.48	0.57	0.57	0.62
	[0.01]	[0.04]	[0.09]	[0.14]	[0.19]	[0.23]	[0.28]	[0.31]	[0.35]	[0.45]	[0.45]	[0.47]	[0.42]	[0.42]	[0.43]	[0.42]	[0.44]
Real GDP growth (lag 2)	0.00	0.02	0.04	0.07	0.11	0.13	0.16	0.24	0.31	0.39	0.49	0.57	0.72*	0.83*	0.83*	0.89*	1.01*
	[0.01]	[0.03]	[0.06]	[0.09]	[0.11]	[0.15]	[0.19]	[0.23]	[0.30]	[0.32]	[0.36]	[0.35]	[0.39]	[0.44]	[0.48]	[0.52]	[0.59]
Real GDP growth (lag 3)	0.01	0.02	0.04	0.06	0.08	0.11	0.17	0.21	0.29	0.39	0.47	0.62	0.75*	0.81*	0.90*	1.02*	1.04
	[0.01]	[0.03]	[0.05]	[0.07]	[0.10]	[0.14]	[0.18]	[0.25]	[0.28]	[0.32]	[0.33]	[0.37]	[0.42]	[0.47]	[0.51]	[0.56]	[0.63]
Real GDP growth (lag 4)	-0.01	-0.01	-0.01	-0.01	0.00	0.03	0.04	0.09	0.17	0.23	0.33	0.45	0.55	0.64	0.73	0.80	0.87*
	[0.01]	[0.02]	[0.05]	[0.08]	[0.11]	[0.15]	[0.20]	[0.25]	[0.29]	[0.31]	[0.35]	[0.38]	[0.42]	[0.44]	[0.46]	[0.50]	[0.49]
Crisis dummy (lag 1)	0.04	0.09	0.08	-0.02	-0.05	-0.15	-0.57	-0.94	-1.42	-2.15	-2.53	-3.18	-3.65*	-4.15*	-3.96*	-5.21**	-5.34**
	[0.04]	[0.14]	[0.30]	[0.52]	[0.71]	[0.96]	[1.20]	[1.40]	[1.58]	[1.77]	[1.85]	[2.01]	[2.10]	[2.15]	[2.15]	[2.44]	[2.46]
Crisis dummy (lag 2)	-0.08**	-0.23*	-0.40	-0.40	-0.60	-0.94*	-0.84	-0.90	-1.14*	-0.82	-0.98	-0.72	-0.92	-0.31	-1.60**	-0.62	0.34
	[0.04]	[0.13]	[0.23]	[0.31]	[0.39]	[0.49]	[0.56]	[0.59]	[0.59]	[0.66]	[0.62]	[0.56]	[0.60]	[0.48]	[0.77]	[0.40]	[0.73]
Crisis dummy (lag 3)	0.02	0.09	0.26	0.29	0.26	0.44	0.38	0.18	0.42	0.20	0.32	0.08	0.59	-0.73	0.19	0.98	-0.82
	[0.04]	[0.11]	[0.19]	[0.25]	[0.32]	[0.44]	[0.48]	[0.49]	[0.55]	[0.52]	[0.51]	[0.52]	[0.46]	[0.83]	[0.48]	[0.65]	[0.84]
Crisis dummy (lag 4)	-0.01	-0.12	-0.38	-0.71*	-1.01**	-1.37**	-1.71**	-1.78*	-2.07*	-2.17*	-2.30*	-2.20	-2.60	-1.53	-1.21	-1.88	-0.64
	[0.04]	[0.14]	[0.24]	[0.35]	[0.47]	[0.62]	[0.78]	[0.97]	[1.11]	[1.25]	[1.34]	[1.45]	[1.53]	[1.67]	[1.69]	[1.58]	[1.72]
Constant	0.23***	0.91***	2.15***	4.10***	8.82***	11.91***	9.98***	15.23***	18.96***	19.13***	20.78***	24.09***	25.80***	26.23***	27.01***	29.23***	29.66***
	[0.04]	[0.16]	[0.43]	[0.87]	[1.71]	[2.34]	[2.17]	[3.50]	[4.38]	[4.41]	[4.52]	[5.07]	[5.85]	[5.71]	[6.35]	[6.92]	[7.28]
# observations	1,587	1,586	1,585	1,583	1,568	1,541	1,523	1,496	1,469	1,442	1,415	1,388	1,361	1,334	1,307	1,280	1,253
Log-likelihood	54	-1,865	-2,964	-3,699	-4,210	-4,559	-4,826	-4,986	-5,083	-5,130	-5,138	-5,119	-5,079	-5,019	-4,945	-4,863	-4,774
# countries	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
R^2	0.99	0.97	0.94	0.91	0.88	0.86	0.83	0.81	0.80	0.79	0.78	0.78	0.79	0.79	0.80	0.81	0.82

Source: Bank for International Settlements, International Financial Statistics, Budnik and Kleibl (2018), Lo Duca and others (2017), and IMF staff calculations.
Note: Estimations are performed using the local projections methodology. Robust standard errors are in brackets. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table 9. Estimation Results: Differential Effects Across Euro Area and Other EU Countries (Credit)

	Credit																
	h=0	h=1	h=2	h=3	h=4	h=5	h=6	h=7	h=8	h=9	h=10	h=11	h=12	h=13	h=14	h=15	h=16
Measures 1 (euro area)	0.04	0.14	0.25*	0.37*	0.51	0.68	0.89	0.94	1.19	1.59	1.63	1.96	1.66	0.63	0.42	0.70	1.36
	[0.03]	[0.08]	[0.13]	[0.21]	[0.32]	[0.48]	[0.72]	[0.82]	[0.92]	[1.14]	[1.33]	[1.60]	[1.56]	[1.41]	[1.56]	[1.84]	[2.04]
Measures 1 (other EU countries)	-0.03	-0.12	-0.26	-0.42	-0.59*	-0.73*	-0.89*	-1.06*	-1.41*	-1.49*	-1.58*	-1.64*	-1.67**	-1.86**	-1.86**	-1.83**	-1.97**
	[0.02]	[0.08]	[0.16]	[0.25]	[0.34]	[0.43]	[0.51]	[0.57]	[0.77]	[0.83]	[0.84]	[0.81]	[0.75]	[0.84]	[0.81]	[0.82]	[0.80]
Measures 1 (lag 1)	0.02	0.05	0.09	0.16	0.25	0.40	0.47	0.60	0.95	1.04	1.33	0.92	0.11	-0.02	0.17	0.75	0.85
	[0.02]	[0.07]	[0.17]	[0.30]	[0.43]	[0.64]	[0.72]	[0.81]	[1.00]	[1.11]	[1.31]	[1.20]	[1.41]	[1.57]	[1.81]	[1.92]	[1.98]
Measures 1 (lag 2)	-0.04	-0.09	-0.09	-0.03	0.09	0.17	0.33	0.71	0.78	1.08	0.91	0.00	-0.06	0.01	0.62	0.72	0.76
	[0.04]	[0.14]	[0.26]	[0.39]	[0.53]	[0.61]	[0.69]	[0.88]	[0.93]	[1.10]	[1.19]	[1.24]	[1.41]	[1.66]	[1.79]	[1.86]	[1.90]
Measures 1 (lag 3)	0.01	0.07	0.20	0.41	0.66*	0.95**	1.36**	1.46**	1.78**	1.73*	1.20	1.11	1.16	1.67	1.64	1.60	1.56
	[0.03]	[0.10]	[0.19]	[0.28]	[0.39]	[0.45]	[0.64]	[0.67]	[0.85]	[0.96]	[1.17]	[1.35]	[1.61]	[1.82]	[1.91]	[2.00]	[2.08]
Measures 1 (lag 4)	0.04	0.14	0.31	0.56*	0.92*	1.29*	1.39*	1.67*	1.53	1.12	0.97	0.85	1.45	1.40	1.34	1.25	1.73
	[0.03]	[0.10]	[0.20]	[0.33]	[0.48]	[0.64]	[0.70]	[0.86]	[0.91]	[1.16]	[1.32]	[1.54]	[1.80]	[1.86]	[1.89]	[1.94]	[2.36]
Measures 2 (lag 1)	-0.04**	-0.12*	-0.23*	-0.34*	-0.42	-0.50	-0.59	-0.81	-0.85	-0.89	-0.90	-0.91	-0.96	-0.89	-0.81	-0.93	-0.92
	[0.01]	[0.06]	[0.13]	[0.20]	[0.27]	[0.34]	[0.41]	[0.58]	[0.63]	[0.65]	[0.63]	[0.60]	[0.66]	[0.66]	[0.73]	[0.82]	[0.85]
Measures 2 (lag 2)	0.00	-0.01	-0.04	-0.06	-0.07	-0.09	-0.21	-0.25	-0.29	-0.33	-0.35	-0.45	-0.43	-0.39	-0.51	-0.55	-0.76
	[0.01]	[0.05]	[0.10]	[0.16]	[0.23]	[0.31]	[0.45]	[0.52]	[0.55]	[0.54]	[0.54]	[0.62]	[0.65]	[0.72]	[0.81]	[0.84]	[1.00]
Measures 2 (lag 3)	0.01	0.00	-0.01	-0.03	-0.06	-0.11	-0.16	-0.23	-0.29	-0.33	-0.41	-0.42	-0.38	-0.45	-0.51	-0.72	-0.82
	[0.02]	[0.05]	[0.09]	[0.15]	[0.21]	[0.33]	[0.40]	[0.44]	[0.46]	[0.48]	[0.55]	[0.60]	[0.67]	[0.74]	[0.78]	[0.93]	[0.97]
Measures 2 (lag 4)	-0.04**	-0.10**	-0.15	-0.20	-0.33	-0.39	-0.48	-0.54	-0.60	-0.61	-0.59	-0.52	-0.58	-0.64	-0.79	-0.89	-0.69
	[0.01]	[0.04]	[0.09]	[0.16]	[0.28]	[0.37]	[0.43]	[0.48]	[0.53]	[0.62]	[0.70]	[0.79]	[0.88]	[0.92]	[1.07]	[1.10]	[1.21]
Dependent variable (lag 1)	1.91***	3.88***	5.62***	7.39***	9.04***	10.12***	10.71***	11.12***	11.30***	11.09***	10.60***	10.08***	9.69***	9.12***	8.46***	7.67***	6.75***
	[0.07]	[0.28]	[0.56]	[0.84]	[1.10]	[1.33]	[1.49]	[1.57]	[1.59]	[1.55]	[1.48]	[1.35]	[1.28]	[1.25]	[1.19]	[1.07]	[0.95]
Dependent variable (lag 2)	-3.28***	-6.77***	-9.79***	-13.18***	-16.72***	-19.14***	-20.51***	-21.66***	-22.48***	-22.43***	-21.73***	-20.87***	-20.28***	-19.35***	-18.30***	-16.91***	-15.18***
	[0.14]	[0.61]	[1.30]	[1.99]	[2.63]	[3.22]	[3.69]	[3.94]	[4.06]	[3.97]	[3.79]	[3.50]	[3.24]	[3.08]	[2.87]	[2.48]	[2.05]
Dependent variable (lag 3)	1.76***	3.61***	5.02***	6.93***	9.36***	11.10***	12.08***	13.06***	14.03***	14.39***	14.19***	13.81***	13.61***	13.17***	12.73***	12.01***	10.97***
	[0.08]	[0.42]	[0.99]	[1.57]	[2.12]	[2.66]	[3.15]	[3.47]	[3.69]	[3.70]	[3.54]	[3.29]	[3.04]	[2.91]	[2.74]	[2.45]	[2.11]
Dependent variable (lag 4)	-0.39***	-0.73***	-0.87***	-1.19**	-1.75***	-2.18**	-2.43**	-2.72**	-3.09**	-3.33**	-3.40**	-3.40**	-3.44***	-3.42***	-3.42***	-3.34***	-3.15***
	[0.02]	[0.10]	[0.26]	[0.44]	[0.62]	[0.81]	[1.00]	[1.16]	[1.29]	[1.35]	[1.32]	[1.26]	[1.17]	[1.14]	[1.10]	[1.03]	[0.95]
Change in monetary policy rate (lag 1)	-0.03*	-0.11*	-0.19	-0.26	-0.32	-0.39	-0.47	-0.55	-0.64	-0.73	-0.82	-0.87	-0.92	-0.93	-0.90	-0.85	-0.76
	[0.01]	[0.06]	[0.12]	[0.19]	[0.28]	[0.37]	[0.48]	[0.59]	[0.69]	[0.78]	[0.86]	[0.91]	[0.92]	[0.90]	[0.86]	[0.82]	[0.77]
Change in monetary policy rate (lag 2)	-0.01	-0.01	-0.01	0.01	0.01	-0.01	-0.03	-0.07	-0.12	-0.19	-0.25	-0.34	-0.36	-0.36	-0.33	-0.27	-0.24
	[0.01]	[0.04]	[0.08]	[0.14]	[0.20]	[0.28]	[0.37]	[0.45]	[0.52]	[0.57]	[0.60]	[0.60]	[0.56]	[0.51]	[0.46]	[0.42]	[0.38]
Change in monetary policy rate (lag 3)	0.01	0.03	0.06	0.08	0.08	0.06	0.03	-0.01	-0.07	-0.12	-0.19	-0.23	-0.21	-0.16	-0.10	-0.06	-0.02
	[0.01]	[0.04]	[0.08]	[0.13]	[0.20]	[0.28]	[0.35]	[0.41]	[0.44]	[0.46]	[0.45]	[0.41]	[0.35]	[0.29]	[0.25]	[0.22]	[0.20]
Change in monetary policy rate (lag 4)	-0.01	-0.04	-0.07	-0.11	-0.17	-0.23	-0.29	-0.36	-0.43	-0.51	-0.56	-0.55	-0.49	-0.42	-0.34	-0.27	-0.19
	[0.01]	[0.04]	[0.08]	[0.15]	[0.23]	[0.33]	[0.42]	[0.49]	[0.56]	[0.59]	[0.57]	[0.53]	[0.46]	[0.41]	[0.37]	[0.33]	[0.31]
Real GDP growth (lag 1)	-0.01	-0.03	-0.05	-0.06	-0.07	-0.06	-0.05	-0.03	0.00	0.02	0.05	0.33	0.33	0.37	0.42	0.40	0.54
	[0.01]	[0.02]	[0.04]	[0.06]	[0.09]	[0.12]	[0.15]	[0.17]	[0.19]	[0.21]	[0.23]	[0.31]	[0.31]	[0.30]	[0.32]	[0.30]	[0.32]
Real GDP growth (lag 2)	0.01*	0.03	0.05	0.07	0.12	0.16	0.20	0.24*	0.27*	0.31	0.45*	0.47*	0.50*	0.58*	0.55*	0.66**	0.70**
	[0.00]	[0.02]	[0.03]	[0.06]	[0.08]	[0.10]	[0.12]	[0.14]	[0.15]	[0.18]	[0.25]	[0.27]	[0.28]	[0.30]	[0.29]	[0.29]	[0.30]
Real GDP growth (lag 3)	0.01	0.03	0.06	0.10*	0.14**	0.19**	0.23*	0.28*	0.31	0.45**	0.48**	0.49**	0.56**	0.56**	0.64***	0.69***	0.67***
	[0.01]	[0.02]	[0.04]	[0.05]	[0.07]	[0.09]	[0.12]	[0.15]	[0.19]	[0.20]	[0.22]	[0.24]	[0.23]	[0.20]	[0.22]	[0.23]	[0.24]
Real GDP growth (lag 4)	0.00	0.01	0.03	0.06	0.09	0.12	0.15	0.19	0.30**	0.34**	0.37**	0.41**	0.48***	0.55***	0.60***	0.62***	0.65***
	[0.00]	[0.01]	[0.02]	[0.04]	[0.06]	[0.09]	[0.12]	[0.15]	[0.14]	[0.15]	[0.17]	[0.19]	[0.15]	[0.17]	[0.18]	[0.19]	[0.19]
Crisis dummy (lag 1)	-0.06*	-0.22	-0.39	-0.50	-0.52	-0.46	-0.46	-0.43	-0.38	-0.30	-0.28	-0.31	-0.31	-0.22	-0.06	-0.19	-0.02
	[0.04]	[0.14]	[0.28]	[0.44]	[0.57]	[0.72]	[0.86]	[1.01]	[1.11]	[1.20]	[1.28]	[1.44]	[1.53]	[1.59]	[1.64]	[2.02]	[2.04]
Crisis dummy (lag 2)	0.04	0.15**	0.31**	0.50**	0.67*	0.70	0.73	0.77	0.77	0.68	0.46	0.48	0.51	0.59	0.06	0.30	0.29
	[0.03]	[0.06]	[0.13]	[0.23]	[0.34]	[0.42]	[0.49]	[0.52]	[0.51]	[0.48]	[0.55]	[0.42]	[0.41]	[0.41]	[0.58]	[0.39]	[0.48]
Crisis dummy (lag 3)	0.05	0.16	0.32	0.42	0.45	0.48	0.52	0.53	0.46	0.30	0.45	0.47	0.55	-0.14	0.35	0.38	0.06
	[0.04]	[0.11]	[0.20]	[0.29]	[0.36]	[0.41]	[0.44]	[0.44]	[0.43]	[0.53]	[0.44]	[0.42]	[0.44]	[0.54]	[0.43]	[0.44]	[0.42]
Crisis dummy (lag 4)	-0.03	-0.13	-0.31*	-0.54**	-0.78**	-0.99**	-1.21**	-1.43**	-1.57**	-1.54*	-1.62	-1.75	-2.02	-1.51	-1.68	-1.97	-1.95
	[0.03]	[0.10]	[0.17]	[0.25]	[0.34]	[0.43]	[0.51]	[0.60]	[0.72]	[0.83]	[0.99]	[1.15]	[1.29]	[1.61]	[1.77]	[1.91]	[1.98]
Constant	3.03***	11.85***	26.77***	47.30***	74.36***	107.89***	145.90***	187.07***	230.08***	276.32***	322.42***	365.84***	410.70***	457.13***	504.77***	551.82***	596.67***
	[0.37]	[1.41]	[3.26]	[5.93]	[9.45]	[13.93]	[19.42]	[25.64]	[32.26]	[39.56]	[47.77]	[57.52]	[67.31]	[76.23]	[83.79]	[90.41]	[95.11]
# observations	1,759	1,759	1,759	1,759	1,737	1,715	1,688	1,661	1,634	1,607	1,580	1,553	1,526	1,499	1,472	1,445	1,418
Log-likelihood	117	-1,947	-3,082	-3,829	-4,349	-4,742	-5,012	-5,194	-5,316	-5,392	-5,430	-5,435	-5,417	-5,383	-5,333	-5,269	-5,192
# countries	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
R^2	0.99	0.96	0.93	0.91	0.89	0.86	0.84	0.83	0.81	0.81	0.81	0.81	0.81	0.81	0.82	0.83	0.83

Source: Bank for International Settlements, International Financial Statistics, Budnik and Kleibl (2018), Lo Duca and others (2017), and IMF staff calculations.
Note: Estimations are performed using the local projections methodology. Robust standard errors are in brackets. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table 10. Differential Effects Across Legally-Binding Measures and Recommendations (House Prices)

	House prices																	
	h=0	h=1	h=2	h=3	h=4	h=5	h=6	h=7	h=8	h=9	h=10	h=11	h=12	h=13	h=14	h=15	h=16
Measures 1 (legally-binding measures)	0.06*	0.18*	0.26	0.24	0.12	-0.09	-0.40	-0.80	-1.53	-2.22	-2.41*	-2.86*	-3.00*	-3.03**	-2.72**	-2.42**	-1.78*
	[0.03]	[0.10]	[0.15]	[0.20]	[0.26]	[0.41]	[0.62]	[0.84]	[1.17]	[1.43]	[1.39]	[1.54]	[1.53]	[1.46]	[1.24]	[1.15]	[0.96]
Measures 1 (recommendations)	0.01	0.01	-0.01	-0.05	-0.12	-0.01	0.04	0.05	0.17	0.54	0.96	0.95	0.73	1.16	1.53	1.85	1.94
	[0.02]	[0.05]	[0.09]	[0.12]	[0.20]	[0.29]	[0.37]	[0.47]	[0.58]	[0.68]	[0.86]	[0.83]	[0.98]	[1.36]	[1.96]	[2.01]	[2.20]
Measures 1 (lag 1)	-0.01	-0.09	-0.28*	-0.56*	-0.92*	-1.32	-1.74*	-2.50*	-3.14*	-3.12**	-3.63**	-3.65**	-3.57**	-3.23**	-2.82**	-1.94**	-1.27*
	[0.02]	[0.07]	[0.16]	[0.31]	[0.53]	[0.78]	[1.01]	[1.33]	[1.55]	[1.49]	[1.60]	[1.55]	[1.45]	[1.23]	[1.13]	[0.92]	[0.67]
Measures 1 (lag 2)	-0.07*	-0.25*	-0.51*	-0.86*	-1.23*	-1.65*	-2.39*	-2.96*	-2.93*	-3.49**	-3.56**	-3.58**	-3.27**	-2.87**	-2.03**	-1.48**	-1.60*
	[0.04]	[0.12]	[0.26]	[0.47]	[0.71]	[0.95]	[1.27]	[1.49]	[1.44]	[1.57]	[1.51]	[1.45]	[1.23]	[1.08]	[0.89]	[0.71]	[0.78]
Measures 1 (lag 3)	-0.02	-0.10	-0.27	-0.50	-0.80	-1.29	-1.78	-1.92	-2.44	-2.64*	-2.71*	-2.59*	-2.48*	-1.86*	-1.45	-1.60	-1.03
	[0.03]	[0.12]	[0.29]	[0.51]	[0.72]	[1.05]	[1.28]	[1.26]	[1.47]	[1.48]	[1.44]	[1.29]	[1.25]	[1.08]	[0.94]	[0.96]	[0.76]
Measures 1 (lag 4)	-0.02	-0.11	-0.31	-0.56	-0.88	-1.29	-1.48	-1.94*	-2.18*	-2.28**	-2.24**	-2.16**	-1.74*	-1.49*	-1.45*	-0.92	-0.41
	[0.05]	[0.17]	[0.33]	[0.50]	[0.72]	[0.90]	[0.91]	[1.08]	[1.12]	[1.10]	[1.00]	[1.00]	[0.88]	[0.74]	[0.82]	[0.65]	[0.60]
Measures 2 (lag 1)	-0.01	-0.04	-0.07	-0.08	-0.05	-0.05	-0.02	-0.05	0.19	0.58	0.45	0.30	0.50	0.79	1.36	1.57	1.75
	[0.01]	[0.04]	[0.08]	[0.14]	[0.21]	[0.28]	[0.36]	[0.40]	[0.48]	[0.66]	[0.52]	[0.55]	[0.72]	[1.22]	[1.46]	[1.67]	[1.81]
Measures 2 (lag 2)	-0.02	-0.03	-0.02	0.00	0.02	0.05	-0.05	0.16	0.54	0.36	0.20	0.47	0.62	1.18	1.38	1.57	2.14
	[0.02]	[0.06]	[0.13]	[0.20]	[0.27]	[0.36]	[0.40]	[0.47]	[0.60]	[0.48]	[0.50]	[0.68]	[1.01]	[1.26]	[1.46]	[1.62]	[1.69]
Measures 2 (lag 3)	0.02	0.06	0.12	0.18	0.22	0.25	0.43	0.66	0.57	0.45	0.77	0.98	1.39	1.53	1.70	2.30	2.78
	[0.02]	[0.07]	[0.13]	[0.20]	[0.28]	[0.37]	[0.45]	[0.53]	[0.49]	[0.61]	[0.78]	[1.15]	[1.33]	[1.51]	[1.68]	[1.69]	[2.45]
Measures 2 (lag 4)	0.02	0.05	0.07	0.09	0.07	0.20	0.38	0.32	0.17	0.51	0.89	1.24	1.26	1.44	2.10	2.11	1.80
	[0.01]	[0.05]	[0.10]	[0.16]	[0.27]	[0.33]	[0.37]	[0.40]	[0.52]	[0.57]	[0.84]	[1.02]	[1.23]	[1.46]	[1.59]	[2.04]	[1.87]
Dependent variable (lag 1)	2.07***	4.54***	7.05***	9.52***	11.71***	13.16***	13.96***	14.16***	13.84***	13.19***	12.38***	11.22***	9.78***	8.61***	7.58***	6.20***	4.54**
	[0.07]	[0.32]	[0.66]	[0.92]	[1.08]	[1.22]	[1.32]	[1.40]	[1.51]	[1.64]	[1.78]	[1.94]	[2.05]	[2.13]	[2.18]	[2.20]	[2.21]
Dependent variable (lag 2)	-3.63***	-8.38***	-13.47***	-18.91***	-24.12***	-27.84***	-30.17***	-31.20***	-31.05***	-30.13***	-28.90***	-26.76***	-23.73***	-21.48***	-19.65***	-16.78***	-12.89***
	[0.19]	[0.87]	[1.89]	[2.74]	[3.29]	[3.73]	[4.00]	[4.04]	[4.02]	[3.96]	[3.94]	[4.09]	[4.22]	[4.30]	[4.35]	[4.46]	[4.57]
Dependent variable (lag 3)	1.99***	4.85***	8.10***	11.96***	16.05***	19.16***	21.30***	22.50***	22.79***	22.48***	21.98***	20.64***	18.40***	16.89***	15.87***	13.79***	10.51**
	[0.15]	[0.79]	[1.81]	[2.71]	[3.34]	[3.87]	[4.22]	[4.30]	[4.23]	[4.02]	[3.76]	[3.68]	[3.66]	[3.56]	[3.46]	[3.59]	[3.86]
Dependent variable (lag 4)	-0.43***	-1.04***	-1.72***	-2.65***	-3.77***	-4.67***	-5.35***	-5.79***	-5.99***	-6.02***	-6.01***	-5.73***	-5.14***	-4.79***	-4.62***	-4.10***	-3.12*
	[0.04]	[0.24]	[0.57]	[0.89]	[1.13]	[1.34]	[1.51]	[1.57]	[1.58]	[1.53]	[1.44]	[1.40]	[1.39]	[1.34]	[1.29]	[1.36]	[1.52]
Change in monetary policy rate (lag 1)	-0.02***	-0.08***	-0.17***	-0.29***	-0.42***	-0.53***	-0.62**	-0.66**	-0.67**	-0.64*	-0.57	-0.52	-0.50	-0.50	-0.46	-0.47	-0.44
	[0.01]	[0.03]	[0.06]	[0.10]	[0.14]	[0.19]	[0.23]	[0.27]	[0.32]	[0.35]	[0.37]	[0.40]	[0.42]	[0.43]	[0.41]	[0.39]	[0.39]
Change in monetary policy rate (lag 2)	-0.01*	-0.04**	-0.10**	-0.18**	-0.25**	-0.31**	-0.35**	-0.35*	-0.33	-0.26	-0.20	-0.17	-0.18	-0.17	-0.19	-0.19	-0.18
	[0.01]	[0.02]	[0.04]	[0.07]	[0.10]	[0.13]	[0.16]	[0.20]	[0.23]	[0.26]	[0.29]	[0.32]	[0.36]	[0.36]	[0.34]	[0.33]	[0.33]
Change in monetary policy rate (lag 3)	-0.01**	-0.04**	-0.09**	-0.16***	-0.21**	-0.25**	-0.26*	-0.25	-0.19	-0.14	-0.11	-0.13	-0.12	-0.15	-0.15	-0.14	-0.15
	[0.00]	[0.02]	[0.03]	[0.06]	[0.08]	[0.11]	[0.14]	[0.17]	[0.20]	[0.23]	[0.27]	[0.32]	[0.32]	[0.31]	[0.31]	[0.29]	[0.29]
Change in monetary policy rate (lag 4)	-0.01**	-0.05**	-0.11**	-0.17**	-0.23*	-0.27*	-0.28	-0.26	-0.23	-0.23	-0.23	-0.24	-0.28	-0.29	-0.27	-0.27	-0.21
	[0.01]	[0.02]	[0.04]	[0.07]	[0.11]	[0.15]	[0.20]	[0.23]	[0.27]	[0.31]	[0.36]	[0.37]	[0.38]	[0.38]	[0.35]	[0.34]	[0.32]
Real GDP growth (lag 1)	0.00	0.01	0.03	0.05	0.07	0.08	0.10	0.11	0.16	0.19	0.24	0.30	0.36	0.47	0.56	0.56	0.60
	[0.01]	[0.04]	[0.09]	[0.14]	[0.19]	[0.23]	[0.27]	[0.31]	[0.35]	[0.45]	[0.45]	[0.46]	[0.42]	[0.41]	[0.42]	[0.42]	[0.43]
Real GDP growth (lag 2)	0.00	0.02	0.05	0.08	0.11	0.13	0.17	0.24	0.32	0.40	0.50	0.58	0.73*	0.84*	0.85*	0.89*	1.01*
	[0.01]	[0.03]	[0.06]	[0.09]	[0.11]	[0.15]	[0.19]	[0.23]	[0.30]	[0.32]	[0.35]	[0.34]	[0.38]	[0.42]	[0.46]	[0.50]	[0.56]
Real GDP growth (lag 3)	0.01	0.02	0.05	0.06	0.08	0.11	0.18	0.23	0.31	0.42	0.50	0.64*	0.78*	0.83*	0.92*	1.03*	1.08*
	[0.01]	[0.03]	[0.05]	[0.07]	[0.10]	[0.14]	[0.18]	[0.25]	[0.27]	[0.31]	[0.31]	[0.35]	[0.40]	[0.44]	[0.49]	[0.54]	[0.61]
Real GDP growth (lag 4)	-0.01	-0.01	-0.01	-0.01	0.00	0.04	0.05	0.10	0.19	0.26	0.36	0.49	0.58	0.67	0.76*	0.84*	0.89*
	[0.01]	[0.02]	[0.04]	[0.07]	[0.10]	[0.14]	[0.19]	[0.23]	[0.27]	[0.28]	[0.32]	[0.35]	[0.38]	[0.41]	[0.42]	[0.47]	[0.45]
Crisis dummy (lag 1)	0.04	0.07	0.06	-0.06	-0.11	-0.23	-0.71	-1.14	-1.60	-2.35	-2.72	-3.33	-3.74*	-4.26*	-4.14*	-5.35**	-5.37**
	[0.04]	[0.15]	[0.31]	[0.53]	[0.73]	[0.98]	[1.22]	[1.43]	[1.60]	[1.79]	[1.86]	[2.01]	[2.09]	[2.14]	[2.14]	[2.44]	[2.44]
Crisis dummy (lag 2)	-0.08**	-0.23*	-0.39*	-0.40	-0.60	-0.97*	-0.87	-0.89	-1.17*	-0.83	-0.99	-0.77	-0.99	-0.42	-1.62**	-0.58	0.25
	[0.04]	[0.13]	[0.23]	[0.31]	[0.39]	[0.50]	[0.56]	[0.60]	[0.62]	[0.67]	[0.64]	[0.59]	[0.61]	[0.46]	[0.77]	[0.39]	[0.69]
Crisis dummy (lag 3)	0.02	0.09	0.25	0.27	0.23	0.39	0.36	0.13	0.37	0.11	0.18	-0.05	0.42	-0.76	0.18	0.87	-0.54
	[0.04]	[0.11]	[0.20]	[0.25]	[0.34]	[0.43]	[0.47]	[0.48]	[0.54]	[0.50]	[0.47]	[0.50]	[0.45]	[0.82]	[0.49]	[0.60]	[0.91]
Crisis dummy (lag 4)	-0.01	-0.12	-0.37	-0.68*	-0.95**	-1.25**	-1.56*	-1.59	-1.85	-1.88	-1.95	-1.82	-2.14	-1.13	-0.86	-1.46	-0.60
	[0.04]	[0.14]	[0.24]	[0.34]	[0.46]	[0.61]	[0.77]	[0.97]	[1.12]	[1.28]	[1.38]	[1.50]	[1.58]	[1.70]	[1.72]	[1.69]	[1.72]
Constant	0.23***	0.92***	2.16***	4.11***	8.85***	11.94***	9.83***	15.09***	18.88***	19.02***	20.47***	24.07***	25.74***	26.19***	27.34***	29.43***	29.82***
	[0.03]	[0.15]	[0.42]	[0.86]	[1.70]	[2.33]	[2.11]	[3.46]	[4.37]	[4.41]	[4.52]	[5.05]	[5.83]	[5.70]	[6.10]	[6.70]	[7.09]
# observations	1,587	1,586	1,585	1,583	1,568	1,541	1,523	1,496	1,469	1,442	1,415	1,388	1,361	1,334	1,307	1,280	1,253
Log-likelihood	55	-1,863	-2,961	-3,696	-4,207	-4,556	-4,821	-4,981	-5,078	-5,124	-5,132	-5,114	-5,075	-5,016	-4,943	-4,861	-4,773
# countries	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
R^2	0.99	0.97	0.94	0.91	0.88	0.86	0.83	0.81	0.80	0.79	0.79	0.78	0.79	0.79	0.80	0.81	0.82

Source: Bank for International Settlements, International Financial Statistics, Budnik and Kleibl (2018), Lo Duca and others (2017), and IMF staff calculations.

Note: Estimations are performed using the local projections methodology. Robust standard errors are in brackets. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table 11. Differential Effects Across Legally-Binding Measures and Recommendations (Credit)

	Credit																	
	h=0	h=1	h=2	h=3	h=4	h=5	h=6	h=7	h=8	h=9	h=10	h=11	h=12	h=13	h=14	h=15	h=16
Measures 1 (legally-binding measures)	-0.03	-0.12	-0.29	-0.50	-0.74	-0.97*	-1.26*	-1.60**	-1.98**	-2.17**	-2.28***	-2.35***	-2.32**	-2.24**	-2.36**	-2.35**	-2.26**
	[0.03]	[0.12]	[0.24]	[0.34]	[0.45]	[0.56]	[0.64]	[0.67]	[0.76]	[0.80]	[0.82]	[0.80]	[0.83]	[0.86]	[0.97]	[1.02]	[1.10]
Measures 1 (recommendations)	0.01	0.02	0.04	0.10	0.17	0.28	0.42	0.52	0.52	0.70	0.66	0.80	0.39	-0.36*	-0.34	-0.22	-0.46
	[0.01]	[0.05]	[0.10]	[0.18]	[0.26]	[0.37]	[0.51]	[0.56]	[0.60]	[0.72]	[0.74]	[0.93]	[0.67]	[0.20]	[0.22]	[0.32]	[0.32]
Measures 1 (lag 1)	-0.03	-0.14*	-0.31*	-0.48**	-0.63*	-0.81**	-1.02**	-1.28**	-1.37*	-1.41*	-1.42**	-1.34*	-1.19	-1.13	-1.05	-0.86	-0.88
	[0.02]	[0.08]	[0.16]	[0.24]	[0.31]	[0.39]	[0.46]	[0.61]	[0.67]	[0.69]	[0.68]	[0.72]	[0.76]	[0.91]	[1.03]	[1.12]	[1.18]
Measures 1 (lag 2)	-0.04	-0.12	-0.24	-0.33	-0.41	-0.54	-0.72	-0.79	-0.84	-0.87	-0.84	-0.78	-0.72	-0.65	-0.46	-0.51	-0.61
	[0.02]	[0.08]	[0.15]	[0.22]	[0.31]	[0.41]	[0.58]	[0.64]	[0.68]	[0.69]	[0.71]	[0.77]	[0.92]	[1.03]	[1.11]	[1.15]	[1.17]
Measures 1 (lag 3)	0.00	-0.03	-0.06	-0.10	-0.16	-0.22	-0.30	-0.37	-0.42	-0.42	-0.38	-0.37	-0.31	-0.14	-0.25	-0.39	-0.56
	[0.02]	[0.07]	[0.13]	[0.20]	[0.29]	[0.41]	[0.48]	[0.53]	[0.55]	[0.60]	[0.66]	[0.79]	[0.89]	[0.97]	[1.03]	[1.07]	[1.10]
Measures 1 (lag 4)	-0.03	-0.06	-0.10	-0.13	-0.20	-0.25	-0.29	-0.31	-0.31	-0.20	-0.20	-0.10	0.03	-0.05	-0.18	-0.37	-0.65
	[0.02]	[0.06]	[0.13]	[0.23]	[0.36]	[0.46]	[0.53]	[0.58]	[0.63]	[0.67]	[0.80]	[0.92]	[1.02]	[1.08]	[1.14]	[1.18]	[1.46]
Measures 2 (lag 1)	-0.01	-0.01	0.02	0.07	0.14	0.27	0.37	0.42	0.62	0.59	0.76	0.41	-0.23	-0.24	-0.16	-0.41	-0.38
	[0.01]	[0.05]	[0.11]	[0.19]	[0.28]	[0.39]	[0.43]	[0.48]	[0.62]	[0.61]	[0.82]	[0.56]	[0.22]	[0.25]	[0.33]	[0.37]	[0.41]
Measures 2 (lag 2)	0.02	0.08	0.15	0.24	0.38	0.51	0.59	0.79	0.78	0.91	0.64	0.04	-0.03	-0.01	-0.21	-0.22	-0.48
	[0.02]	[0.06]	[0.12]	[0.19]	[0.28]	[0.34]	[0.39]	[0.51]	[0.53]	[0.71]	[0.55]	[0.29]	[0.33]	[0.39]	[0.40]	[0.44]	[0.61]
Measures 2 (lag 3)	0.02*	0.07	0.14	0.24	0.37	0.51	0.71	0.70	0.82	0.57	0.08	0.03	0.00	-0.18	-0.21	-0.43	-0.43
	[0.01]	[0.05]	[0.10]	[0.17]	[0.24]	[0.31]	[0.44]	[0.47]	[0.65]	[0.53]	[0.32]	[0.37]	[0.41]	[0.40]	[0.43]	[0.59]	[0.65]
Measures 2 (lag 4)	-0.01	-0.01	0.04	0.13	0.23	0.40	0.40	0.50	0.28	-0.07	-0.06	-0.06	-0.27	-0.41	-0.57	-0.56	-0.02
	[0.01]	[0.06]	[0.12]	[0.21]	[0.32]	[0.44]	[0.51]	[0.68]	[0.59]	[0.46]	[0.51]	[0.57]	[0.57]	[0.57]	[0.66]	[0.70]	[0.95]
Dependent variable (lag 1)	1.91***	3.87***	5.61***	7.37***	9.01***	10.07***	10.65***	11.07***	11.24***	11.04***	10.57***	10.03***	9.63***	9.08***	8.43***	7.66***	6.74***
	[0.07]	[0.28]	[0.56]	[0.84]	[1.10]	[1.33]	[1.49]	[1.57]	[1.59]	[1.54]	[1.48]	[1.35]	[1.27]	[1.24]	[1.18]	[1.06]	[0.95]
Dependent variable (lag 2)	-3.28***	-6.76***	-9.77***	-13.16***	-16.68***	-19.08***	-20.43***	-21.59***	-22.41***	-22.40***	-21.74***	-20.83***	-20.20***	-19.26***	-18.26***	-16.92***	-15.21***
	[0.14]	[0.61]	[1.30]	[1.98]	[2.62]	[3.20]	[3.67]	[3.92]	[4.03]	[3.94]	[3.77]	[3.48]	[3.22]	[3.05]	[2.84]	[2.46]	[2.04]
Dependent variable (lag 3)	1.76***	3.62***	5.02***	6.95***	9.37***	11.10***	12.08***	13.09***	14.08***	14.47***	14.32***	13.88***	13.61***	13.14***	12.74***	12.08***	11.05***
	[0.08]	[0.42]	[0.98]	[1.56]	[2.10]	[2.63]	[3.10]	[3.41]	[3.62]	[3.62]	[3.47]	[3.23]	[2.98]	[2.85]	[2.68]	[2.40]	[2.08]
Dependent variable (lag 4)	-0.39***	-0.74***	-0.89***	-1.21***	-1.77***	-2.21***	-2.45**	-2.76**	-3.15**	-3.39**	-3.48**	-3.47***	-3.47***	-3.43***	-3.44***	-3.38***	-3.20***
	[0.02]	[0.10]	[0.25]	[0.43]	[0.60]	[0.79]	[0.97]	[1.12]	[1.24]	[1.30]	[1.27]	[1.22]	[1.13]	[1.10]	[1.06]	[1.00]	[0.93]
Change in monetary policy rate (lag 1)	-0.03*	-0.11*	-0.19	-0.26	-0.32	-0.40	-0.48	-0.56	-0.65	-0.74	-0.83	-0.88	-0.93	-0.93	-0.91	-0.85	-0.76
	[0.01]	[0.06]	[0.12]	[0.19]	[0.27]	[0.37]	[0.47]	[0.58]	[0.69]	[0.78]	[0.85]	[0.91]	[0.92]	[0.90]	[0.86]	[0.81]	[0.77]
Change in monetary policy rate (lag 2)	-0.01	-0.01	-0.01	0.00	0.00	-0.02	-0.05	-0.09	-0.14	-0.22	-0.28	-0.36	-0.38	-0.37	-0.34	-0.28	-0.25
	[0.01]	[0.04]	[0.08]	[0.13]	[0.20]	[0.27]	[0.36]	[0.44]	[0.50]	[0.55]	[0.58]	[0.59]	[0.55]	[0.50]	[0.45]	[0.41]	[0.37]
Change in monetary policy rate (lag 3)	0.01	0.03	0.06	0.08	0.07	0.05	0.03	-0.01	-0.07	-0.13	-0.20	-0.23	-0.21	-0.16	-0.10	-0.05	-0.01
	[0.01]	[0.04]	[0.08]	[0.13]	[0.19]	[0.27]	[0.34]	[0.40]	[0.44]	[0.46]	[0.45]	[0.41]	[0.35]	[0.29]	[0.25]	[0.22]	[0.21]
Change in monetary policy rate (lag 4)	-0.01	-0.04	-0.07	-0.11	-0.17	-0.23	-0.29	-0.36	-0.44	-0.52	-0.56	-0.55	-0.50	-0.42	-0.34	-0.27	-0.18
	[0.01]	[0.04]	[0.08]	[0.15]	[0.23]	[0.33]	[0.42]	[0.49]	[0.56]	[0.59]	[0.58]	[0.53]	[0.47]	[0.41]	[0.37]	[0.34]	[0.31]
Real GDP growth (lag 1)	-0.01	-0.03	-0.05	-0.06	-0.07	-0.06	-0.05	-0.02	-0.01	0.02	0.05	0.32	0.33	0.37	0.42	0.39	0.52
	[0.01]	[0.02]	[0.04]	[0.06]	[0.09]	[0.12]	[0.15]	[0.17]	[0.19]	[0.20]	[0.22]	[0.31]	[0.31]	[0.30]	[0.31]	[0.30]	[0.32]
Real GDP growth (lag 2)	0.01*	0.03	0.05	0.07	0.11	0.15	0.19	0.24	0.27*	0.30	0.44*	0.46	0.50*	0.57*	0.55*	0.65**	0.69**
	[0.00]	[0.02]	[0.04]	[0.06]	[0.08]	[0.10]	[0.12]	[0.14]	[0.16]	[0.18]	[0.25]	[0.27]	[0.28]	[0.30]	[0.28]	[0.29]	[0.29]
Real GDP growth (lag 3)	0.01	0.03	0.06	0.10*	0.14**	0.19**	0.23*	0.27*	0.31	0.45**	0.49**	0.50**	0.57**	0.56***	0.65***	0.69***	0.69***
	[0.01]	[0.02]	[0.04]	[0.05]	[0.07]	[0.09]	[0.12]	[0.15]	[0.19]	[0.20]	[0.21]	[0.24]	[0.23]	[0.20]	[0.21]	[0.22]	[0.24]
Real GDP growth (lag 4)	0.00	0.01	0.03	0.06	0.08	0.11	0.15	0.18	0.29*	0.33**	0.37**	0.40**	0.47***	0.54***	0.59***	0.61***	0.65***
	[0.00]	[0.01]	[0.02]	[0.04]	[0.06]	[0.09]	[0.12]	[0.15]	[0.14]	[0.15]	[0.17]	[0.19]	[0.15]	[0.17]	[0.17]	[0.18]	[0.19]
Crisis dummy (lag 1)	-0.06	-0.22	-0.39	-0.51	-0.53	-0.48	-0.50	-0.49	-0.43	-0.36	-0.33	-0.28	-0.23	-0.13	0.02	-0.08	0.03
	[0.04]	[0.14]	[0.29]	[0.45]	[0.58]	[0.73]	[0.87]	[1.01]	[1.11]	[1.20]	[1.29]	[1.44]	[1.52]	[1.59]	[1.66]	[2.02]	[2.05]
Crisis dummy (lag 2)	0.04	0.15**	0.31**	0.50**	0.65*	0.68	0.69	0.74	0.73	0.66	0.47	0.45	0.46	0.51	0.01	0.23	0.23
	[0.03]	[0.06]	[0.13]	[0.24]	[0.35]	[0.43]	[0.50]	[0.52]	[0.52]	[0.48]	[0.55]	[0.42]	[0.40]	[0.42]	[0.57]	[0.39]	[0.46]
Crisis dummy (lag 3)	0.05	0.15	0.30	0.39	0.41	0.41	0.46	0.46	0.40	0.27	0.40	0.40	0.47	-0.18	0.29	0.32	0.19
	[0.04]	[0.11]	[0.20]	[0.29]	[0.36]	[0.40]	[0.42]	[0.43]	[0.42]	[0.51]	[0.43]	[0.42]	[0.42]	[0.52]	[0.42]	[0.41]	[0.45]
Crisis dummy (lag 4)	-0.03	-0.11	-0.28	-0.49*	-0.68*	-0.85*	-1.04**	-1.22*	-1.34*	-1.32	-1.42	-1.56	-1.82	-1.34	-1.50	-1.75	-1.90
	[0.03]	[0.10]	[0.17]	[0.25]	[0.34]	[0.42]	[0.50]	[0.60]	[0.72]	[0.82]	[0.98]	[1.14]	[1.28]	[1.58]	[1.74]	[1.87]	[1.96]
Constant	3.10***	12.11***	27.31***	48.18***	75.44***	109.40***	147.99***	189.48***	232.68***	278.79***	325.07***	367.79***	411.91***	458.74***	506.50***	553.73***	599.42***
	[0.38]	[1.45]	[3.30]	[5.92]	[9.34]	[13.73]	[19.08]	[25.12]	[31.74]	[38.94]	[47.06]	[56.85]	[66.67]	[75.62]	[83.13]	[89.47]	[94.30]
# observations	1,759	1,759	1,759	1,759	1,737	1,715	1,688	1,661	1,634	1,607	1,580	1,553	1,526	1,499	1,472	1,445	1,418
Log-likelihood	115	-1,949	-3,083	-3,830	-4,350	-4,743	-5,012	-5,194	-5,316	-5,392	-5,430	-5,435	-5,418	-5,384	-5,333	-5,269	-5,193
# countries	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
R^2	0.99	0.96	0.93	0.91	0.89	0.86	0.84	0.83	0.81	0.81	0.81	0.81	0.81	0.81	0.82	0.83	0.83

Source: Bank for International Settlements, International Financial Statistics, Budnik and Kleibl (2018), Lo Duca and others (2017), and IMF staff calculations.
Note: Estimations are performed using the local projections methodology. Robust standard errors are in brackets. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table 12. Estimation Results: Differential Effects Across Measures with and Without Sanctions (House Prices)

	House prices																
	h=0	h=1	h=2	h=3	h=4	h=5	h=6	h=7	h=8	h=9	h=10	h=11	h=12	h=13	h=14	h=15	h=16
Measures 1 (sanctions)	0.04	0.12	0.15	0.08	-0.04	-0.22	-0.53	-0.98	-1.79	-2.42	-2.74	-3.08	-3.58*	-3.44**	-3.13**	-2.73**	-2.26**
	[0.03]	[0.11]	[0.18]	[0.25]	[0.39]	[0.62]	[0.91]	[1.22]	[1.58]	[1.85]	[1.91]	[1.82]	[1.82]	[1.58]	[1.33]	[1.13]	[1.01]
Measures 1 (no sanctions)	0.03	0.07	0.10	0.10	0.03	0.03	0.01	-0.05	0.19	0.36	0.41	0.56	0.40	0.56	0.76	1.30	1.84
	[0.03]	[0.10]	[0.18]	[0.26]	[0.34]	[0.43]	[0.49]	[0.56]	[0.75]	[0.88]	[0.80]	[1.13]	[1.22]	[1.73]	[2.12]	[2.17]	[2.41]
Measures 1 (lag 1)	0.01	-0.06	-0.25	-0.50	-0.78	-1.17	-1.61	-2.32	-2.90	-3.14*	-3.38*	-3.81**	-3.53**	-3.15**	-2.70**	-2.10**	-1.38
	[0.02]	[0.07]	[0.15]	[0.31]	[0.56]	[0.86]	[1.18]	[1.49]	[1.74]	[1.78]	[1.69]	[1.65]	[1.41]	[1.19]	[1.02]	[0.92]	[0.88]
Measures 1 (lag 2)	-0.08*	-0.27*	-0.53*	-0.86	-1.26	-1.70	-2.32	-2.87	-3.11*	-3.37*	-3.84**	-3.65**	-3.33**	-2.93**	-2.37**	-1.72*	-1.48*
	[0.04]	[0.14]	[0.29]	[0.54]	[0.82]	[1.14]	[1.49]	[1.74]	[1.80]	[1.74]	[1.71]	[1.48]	[1.25]	[1.07]	[0.95]	[0.85]	[0.85]
Measures 1 (lag 3)	-0.03	-0.09	-0.21	-0.42	-0.74	-1.18	-1.63	-1.90	-2.26	-2.68	-2.60*	-2.42*	-2.21*	-1.77	-1.22	-1.02	-0.65
	[0.03]	[0.13]	[0.33]	[0.59]	[0.88]	[1.22]	[1.49]	[1.60]	[1.61]	[1.67]	[1.50]	[1.33]	[1.21]	[1.07]	[1.00]	[0.94]	[0.90]
Measures 1 (lag 4)	0.03	0.02	-0.11	-0.36	-0.68	-1.02	-1.28	-1.60	-1.95	-1.92	-1.80*	-1.65*	-1.40	-1.06	-0.75	-0.42	0.30
	[0.05]	[0.18]	[0.39]	[0.63]	[0.88]	[1.11]	[1.21]	[1.23]	[1.27]	[1.14]	[1.02]	[0.94]	[0.89]	[0.82]	[0.81]	[0.81]	[0.96]
Measures 2 (lag 1)	-0.02	-0.06	-0.11	-0.19	-0.28	-0.35	-0.42	-0.43	-0.31	-0.10	-0.19	-0.29	-0.25	-0.09	0.44	1.07	1.27
	[0.02]	[0.07]	[0.11]	[0.16]	[0.22]	[0.27]	[0.32]	[0.45]	[0.52]	[0.49]	[0.64]	[0.70]	[1.03]	[1.32]	[1.54]	[1.72]	[1.85]
Measures 2 (lag 2)	-0.02	-0.05	-0.09	-0.15	-0.18	-0.23	-0.32	-0.21	0.00	-0.13	-0.23	-0.16	-0.09	0.46	1.09	1.22	1.24
	[0.02]	[0.06]	[0.11]	[0.15]	[0.20]	[0.23]	[0.30]	[0.37]	[0.37]	[0.50]	[0.61]	[0.97]	[1.22]	[1.48]	[1.63]	[1.76]	[1.81]
Measures 2 (lag 3)	0.01	0.02	0.00	-0.02	-0.04	-0.02	0.06	0.14	0.11	-0.02	0.10	0.16	0.38	0.85	0.94	0.99	1.26
	[0.02]	[0.06]	[0.10]	[0.15]	[0.21]	[0.36]	[0.46]	[0.43]	[0.63]	[0.77]	[1.12]	[1.40]	[1.64]	[1.76]	[1.85]	[1.86]	[2.70]
Measures 2 (lag 4)	-0.01	-0.06	-0.11	-0.14	-0.16	-0.13	-0.05	-0.12	-0.29	-0.12	-0.05	0.15	0.44	0.54	0.74	0.80	0.33
	[0.02]	[0.07]	[0.13]	[0.19]	[0.30]	[0.40]	[0.39]	[0.56]	[0.70]	[0.96]	[1.19]	[1.48]	[1.59]	[1.78]	[1.84]	[2.29]	[2.16]
Dependent variable (lag 1)	2.07***	4.54***	7.05***	9.53***	11.70***	13.16***	13.94***	14.12***	13.79***	13.11***	12.28***	11.14***	9.68***	8.52***	7.53***	6.16***	4.47**
	[0.07]	[0.32]	[0.65]	[0.90]	[1.06]	[1.19]	[1.30]	[1.39]	[1.51]	[1.66]	[1.80]	[1.95]	[2.05]	[2.12]	[2.16]	[2.17]	[2.16]
Dependent variable (lag 2)	-3.63***	-8.39***	-13.48***	-18.91***	-24.10***	-27.83***	-30.11***	-31.08***	-30.88***	-29.88***	-28.60***	-26.48***	-23.42***	-21.16***	-19.44***	-16.59***	-12.63***
	[0.19]	[0.86]	[1.86]	[2.69]	[3.22]	[3.62]	[3.88]	[3.93]	[3.92]	[3.91]	[3.94]	[4.10]	[4.20]	[4.26]	[4.29]	[4.36]	[4.44]
Dependent variable (lag 3)	1.99***	4.87***	8.11***	11.95***	16.03***	19.13***	21.23***	22.35***	22.59***	22.20***	21.64***	20.32***	18.04***	16.53***	15.59***	13.54***	10.20**
	[0.15]	[0.78]	[1.77]	[2.66]	[3.26]	[3.75]	[4.08]	[4.15]	[4.07]	[3.89]	[3.68]	[3.61]	[3.56]	[3.45]	[3.34]	[3.44]	[3.71]
Dependent variable (lag 4)	-0.43***	-1.04***	-1.72***	-2.65***	-3.75***	-4.65***	-5.31***	-5.73***	-5.90***	-5.90***	-5.87***	-5.60***	-5.00***	-4.65***	-4.51***	-4.00***	-2.99*
	[0.04]	[0.23]	[0.56]	[0.87]	[1.10]	[1.30]	[1.45]	[1.52]	[1.52]	[1.47]	[1.39]	[1.36]	[1.34]	[1.29]	[1.24]	[1.30]	[1.46]
Change in monetary policy rate (lag 1)	-0.02***	-0.08***	-0.17***	-0.29***	-0.42***	-0.53***	-0.62**	-0.66**	-0.67**	-0.63*	-0.55	-0.51	-0.49	-0.48	-0.44	-0.46	-0.42
	[0.01]	[0.03]	[0.06]	[0.10]	[0.14]	[0.19]	[0.23]	[0.27]	[0.31]	[0.34]	[0.36]	[0.39]	[0.41]	[0.42]	[0.41]	[0.38]	[0.38]
Change in monetary policy rate (lag 2)	-0.01*	-0.04**	-0.11**	-0.18**	-0.25**	-0.31**	-0.35**	-0.34*	-0.32	-0.25	-0.19	-0.16	-0.17	-0.16	-0.17	-0.17	-0.16
	[0.01]	[0.02]	[0.04]	[0.07]	[0.09]	[0.12]	[0.15]	[0.19]	[0.22]	[0.25]	[0.28]	[0.31]	[0.34]	[0.34]	[0.32]	[0.32]	[0.32]
Change in monetary policy rate (lag 3)	-0.01**	-0.04**	-0.09***	-0.15***	-0.20**	-0.23**	-0.24*	-0.23	-0.16	-0.11	-0.08	-0.09	-0.09	-0.11	-0.12	-0.11	-0.11
	[0.00]	[0.02]	[0.03]	[0.05]	[0.08]	[0.10]	[0.13]	[0.16]	[0.18]	[0.22]	[0.25]	[0.30]	[0.30]	[0.29]	[0.28]	[0.27]	[0.26]
Change in monetary policy rate (lag 4)	-0.01**	-0.05**	-0.10**	-0.16**	-0.22*	-0.25*	-0.26	-0.23	-0.21	-0.19	-0.19	-0.20	-0.24	-0.25	-0.23	-0.23	-0.18
	[0.01]	[0.02]	[0.04]	[0.07]	[0.11]	[0.14]	[0.18]	[0.21]	[0.25]	[0.29]	[0.32]	[0.34]	[0.34]	[0.34]	[0.32]	[0.30]	[0.28]
Real GDP growth (lag 1)	0.00	0.01	0.03	0.05	0.07	0.08	0.10	0.12	0.16	0.19	0.25	0.31	0.36	0.47	0.56	0.56	0.61
	[0.01]	[0.04]	[0.09]	[0.14]	[0.19]	[0.23]	[0.28]	[0.32]	[0.36]	[0.45]	[0.46]	[0.46]	[0.42]	[0.41]	[0.41]	[0.42]	[0.43]
Real GDP growth (lag 2)	0.00	0.02	0.05	0.07	0.11	0.13	0.17	0.24	0.31	0.39	0.48	0.55	0.70*	0.80*	0.81*	0.86	0.97
	[0.01]	[0.03]	[0.06]	[0.09]	[0.11]	[0.15]	[0.18]	[0.23]	[0.29]	[0.31]	[0.35]	[0.34]	[0.38]	[0.43]	[0.47]	[0.51]	[0.58]
Real GDP growth (lag 3)	0.01	0.02	0.04	0.06	0.08	0.11	0.17	0.21	0.29	0.40	0.47	0.61	0.74*	0.80*	0.89*	1.00*	1.05
	[0.01]	[0.03]	[0.05]	[0.07]	[0.10]	[0.13]	[0.18]	[0.24]	[0.27]	[0.31]	[0.32]	[0.37]	[0.42]	[0.47]	[0.51]	[0.56]	[0.63]
Real GDP growth (lag 4)	-0.01	-0.01	-0.01	-0.01	0.00	0.03	0.04	0.10	0.18	0.25	0.35	0.47	0.57	0.66	0.75	0.83	0.88*
	[0.01]	[0.02]	[0.05]	[0.07]	[0.11]	[0.14]	[0.20]	[0.24]	[0.28]	[0.29]	[0.34]	[0.37]	[0.40]	[0.43]	[0.44]	[0.49]	[0.47]
Crisis dummy (lag 1)	0.04	0.08	0.08	-0.03	-0.07	-0.19	-0.66	-1.08	-1.55	-2.31	-2.68	-3.30	-3.73*	-4.24*	-4.13*	-5.39**	-5.32**
	[0.04]	[0.15]	[0.31]	[0.53]	[0.72]	[0.97]	[1.22]	[1.43]	[1.59]	[1.78]	[1.85]	[1.99]	[2.07]	[2.12]	[2.13]	[2.43]	[2.42]
Crisis dummy (lag 2)	-0.08**	-0.23*	-0.39	-0.39	-0.58	-0.95*	-0.84	-0.86	-1.14*	-0.79	-0.95	-0.73	-0.94	-0.39	-1.64**	-0.52	0.28
	[0.04]	[0.13]	[0.23]	[0.31]	[0.39]	[0.49]	[0.56]	[0.59]	[0.61]	[0.66]	[0.62]	[0.56]	[0.59]	[0.43]	[0.80]	[0.36]	[0.70]
Crisis dummy (lag 3)	0.02	0.09	0.24	0.25	0.20	0.36	0.31	0.05	0.29	0.02	0.10	-0.14	0.29	-0.94	0.11	0.82	-0.70
	[0.04]	[0.11]	[0.20]	[0.26]	[0.35]	[0.46]	[0.51]	[0.54]	[0.59]	[0.56]	[0.54]	[0.53]	[0.50]	[0.89]	[0.51]	[0.66]	[0.92]
Crisis dummy (lag 4)	-0.02	-0.12	-0.37	-0.68*	-0.95**	-1.27**	-1.57*	-1.59	-1.83	-1.87	-1.95	-1.84	-2.14	-1.07	-0.82	-1.46	-0.50
	[0.04]	[0.13]	[0.24]	[0.35]	[0.46]	[0.61]	[0.78]	[0.98]	[1.13]	[1.28]	[1.39]	[1.50]	[1.58]	[1.71]	[1.73]	[1.68]	[1.75]
Constant	0.23***	0.93***	2.17***	4.12***	8.90***	12.00***	9.65***	14.80***	18.40***	18.56***	20.05***	24.18***	25.88***	26.33***	27.21***	29.25***	29.61***
	[0.04]	[0.16]	[0.42]	[0.84]	[1.66]	[2.31]	[2.00]	[3.33]	[4.19]	[4.20]	[4.41]	[5.03]	[5.81]	[5.68]	[6.13]	[6.75]	[7.17]
# observations	1,587	1,586	1,585	1,583	1,568	1,541	1,523	1,496	1,469	1,442	1,415	1,388	1,361	1,334	1,307	1,280	1,253
Log-likelihood	55	-1,864	-2,963	-3,699	-4,209	-4,558	-4,824	-4,984	-5,080	-5,126	-5,134	-5,116	-5,077	-5,017	-4,944	-4,863	-4,774
# countries	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
R^2	0.99	0.97	0.94	0.91	0.88	0.86	0.83	0.81	0.80	0.79	0.78	0.78	0.79	0.79	0.80	0.81	0.82

Source: Bank for International Settlements, International Financial Statistics, Budnik and Kleibl (2018), Lo Duca and others (2017), and IMF staff calculations.
Note: Estimations are performed using the local projections methodology. Robust standard errors are in brackets. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table 13. Estimation Results: Differential Effects Across Measures with and Without Sanctions (Credit)

	Credit																	
	h=0	h=1	h=2	h=3	h=4	h=5	h=6	h=7	h=8	h=9	h=10	h=11	h=12	h=13	h=14	h=15	h=16
Measures 1 (sanctions)	-0.03	-0.12	-0.29	-0.50	-0.75	-0.98	-1.26*	-1.57**	-1.96**	-2.11**	-2.22**	-2.29***	-2.26**	-2.68***	-2.84***	-2.83**	-2.86**
	[0.03]	[0.12]	[0.24]	[0.35]	[0.47]	[0.59]	[0.69]	[0.74]	[0.79]	[0.83]	[0.84]	[0.81]	[0.84]	[0.82]	[0.99]	[1.05]	[1.18]
Measures 1 (no sanctions)	0.01	0.00	0.01	0.05	0.09	0.18	0.28	0.32	0.51	0.71	0.67	0.78	0.41	0.13	0.19	0.34	0.26
	[0.01]	[0.05]	[0.10]	[0.17]	[0.25]	[0.35]	[0.47]	[0.51]	[0.63]	[0.76]	[0.78]	[0.95]	[0.70]	[0.47]	[0.53]	[0.62]	[0.74]
Measures 1 (lag 1)	-0.04	-0.15	-0.32*	-0.50*	-0.66*	-0.84*	-1.02*	-1.28*	-1.35*	-1.39*	-1.36*	-1.28	-1.46	-1.44	-1.36	-1.28	-1.32
	[0.02]	[0.09]	[0.18]	[0.27]	[0.37]	[0.47]	[0.56]	[0.68]	[0.74]	[0.77]	[0.76]	[0.80]	[0.89]	[1.04]	[1.16]	[1.28]	[1.34]
Measures 1 (lag 2)	-0.04	-0.13	-0.26	-0.36	-0.45	-0.56	-0.73	-0.79	-0.83	-0.84	-0.80	-0.98	-0.96	-0.91	-0.83	-0.90	-1.04
	[0.02]	[0.09]	[0.17]	[0.26]	[0.37]	[0.48]	[0.63]	[0.70]	[0.75]	[0.76]	[0.79]	[0.90]	[1.05]	[1.16]	[1.26]	[1.30]	[1.33]
Measures 1 (lag 3)	-0.01	-0.05	-0.10	-0.12	-0.16	-0.22	-0.28	-0.33	-0.35	-0.33	-0.51	-0.53	-0.50	-0.44	-0.57	-0.72	-0.93
	[0.02]	[0.06]	[0.12]	[0.18]	[0.26]	[0.38]	[0.46]	[0.52]	[0.54]	[0.59]	[0.70]	[0.81]	[0.92]	[1.01]	[1.08]	[1.12]	[1.16]
Measures 1 (lag 4)	-0.03	-0.07	-0.08	-0.07	-0.09	-0.11	-0.13	-0.11	-0.09	-0.21	-0.24	-0.17	-0.14	-0.25	-0.39	-0.61	-1.00
	[0.02]	[0.05]	[0.11]	[0.20]	[0.32]	[0.43]	[0.50]	[0.56]	[0.61]	[0.72]	[0.83]	[0.96]	[1.06]	[1.12]	[1.19]	[1.24]	[1.56]
Measures 2 (lag 1)	-0.01	-0.02	0.00	0.04	0.11	0.22	0.27	0.44	0.64	0.60	0.70	0.36	0.07	0.13	0.25	0.16	0.23
	[0.01]	[0.05]	[0.11]	[0.18]	[0.26]	[0.36]	[0.40]	[0.51]	[0.64]	[0.65]	[0.81]	[0.56]	[0.36]	[0.42]	[0.50]	[0.65]	[0.66]
Measures 2 (lag 2)	0.02	0.07	0.13	0.23	0.35	0.44	0.61	0.80	0.79	0.88	0.61	0.25	0.25	0.31	0.29	0.31	0.12
	[0.01]	[0.05]	[0.11]	[0.18]	[0.27]	[0.31]	[0.42]	[0.54]	[0.53]	[0.68]	[0.52]	[0.29]	[0.35]	[0.42]	[0.52]	[0.55]	[0.67]
Measures 2 (lag 3)	0.03	0.08	0.15	0.24	0.33	0.51	0.70	0.68	0.77	0.52	0.28	0.22	0.24	0.25	0.26	0.08	0.12
	[0.02]	[0.06]	[0.12]	[0.19]	[0.25]	[0.35]	[0.47]	[0.47]	[0.62]	[0.48]	[0.39]	[0.45]	[0.51]	[0.57]	[0.60]	[0.71]	[0.70]
Measures 2 (lag 4)	-0.01	-0.01	0.02	0.07	0.14	0.28	0.26	0.34	0.12	0.03	0.05	0.10	0.02	-0.02	-0.16	-0.10	0.55
	[0.01]	[0.05]	[0.10]	[0.17]	[0.29]	[0.41]	[0.46]	[0.60]	[0.49]	[0.40]	[0.46]	[0.52]	[0.59]	[0.62]	[0.69]	[0.70]	[0.73]
Dependent variable (lag 1)	1.91***	3.87***	5.61***	7.37***	9.01***	10.08***	10.66***	11.07***	11.26***	11.05***	10.58***	10.04***	9.62***	9.05***	8.41***	7.62***	6.69***
	[0.07]	[0.28]	[0.56]	[0.84]	[1.10]	[1.32]	[1.49]	[1.57]	[1.59]	[1.54]	[1.48]	[1.36]	[1.28]	[1.25]	[1.20]	[1.08]	[0.97]
Dependent variable (lag 2)	-3.28***	-6.76***	-9.77***	-13.15***	-16.68***	-19.08***	-20.42***	-21.58***	-22.43***	-22.42***	-21.75***	-20.84***	-20.17***	-19.21***	-18.20***	-16.84***	-15.11***
	[0.14]	[0.61]	[1.30]	[1.98]	[2.62]	[3.20]	[3.66]	[3.92]	[4.03]	[3.95]	[3.79]	[3.50]	[3.24]	[3.08]	[2.87]	[2.50]	[2.08]
Dependent variable (lag 3)	1.76***	3.61***	5.02***	6.94***	9.37***	11.09***	12.06***	13.07***	14.08***	14.48***	14.32***	13.88***	13.58***	13.10***	12.70***	12.02***	10.98***
	[0.08]	[0.42]	[0.98]	[1.56]	[2.11]	[2.64]	[3.12]	[3.43]	[3.64]	[3.65]	[3.50]	[3.27]	[3.01]	[2.88]	[2.72]	[2.44]	[2.12]
Dependent variable (lag 4)	-0.39***	-0.74***	-0.88***	-1.20***	-1.77***	-2.21***	-2.45**	-2.75**	-3.14**	-3.39**	-3.48**	-3.46***	-3.46***	-3.41***	-3.42***	-3.36***	-3.18***
	[0.02]	[0.10]	[0.26]	[0.43]	[0.61]	[0.79]	[0.98]	[1.13]	[1.26]	[1.32]	[1.29]	[1.24]	[1.15]	[1.12]	[1.08]	[1.02]	[0.95]
Change in monetary policy rate (lag 1)	-0.03*	-0.11*	-0.19	-0.26	-0.33	-0.41	-0.49	-0.57	-0.66	-0.75	-0.84	-0.89	-0.94	-0.95	-0.93	-0.87	-0.78
	[0.01]	[0.06]	[0.12]	[0.19]	[0.28]	[0.37]	[0.48]	[0.59]	[0.69]	[0.78]	[0.86]	[0.91]	[0.92]	[0.90]	[0.86]	[0.82]	[0.77]
Change in monetary policy rate (lag 2)	-0.01	-0.01	-0.01	0.00	0.00	-0.02	-0.05	-0.09	-0.15	-0.22	-0.28	-0.37	-0.39	-0.39	-0.36	-0.30	-0.27
	[0.01]	[0.04]	[0.08]	[0.13]	[0.20]	[0.27]	[0.36]	[0.44]	[0.50]	[0.56]	[0.59]	[0.59]	[0.55]	[0.50]	[0.45]	[0.41]	[0.37]
Change in monetary policy rate (lag 3)	0.01	0.03	0.06	0.08	0.07	0.05	0.02	-0.01	-0.07	-0.13	-0.20	-0.23	-0.22	-0.16	-0.10	-0.06	-0.02
	[0.01]	[0.04]	[0.08]	[0.13]	[0.19]	[0.27]	[0.34]	[0.40]	[0.44]	[0.46]	[0.45]	[0.41]	[0.35]	[0.29]	[0.25]	[0.22]	[0.20]
Change in monetary policy rate (lag 4)	-0.01	-0.04	-0.07	-0.11	-0.17	-0.23	-0.30	-0.36	-0.44	-0.53	-0.57	-0.56	-0.51	-0.43	-0.36	-0.29	-0.21
	[0.01]	[0.04]	[0.08]	[0.15]	[0.23]	[0.33]	[0.42]	[0.50]	[0.56]	[0.59]	[0.58]	[0.53]	[0.47]	[0.42]	[0.38]	[0.34]	[0.32]
Real GDP growth (lag 1)	-0.01*	-0.03	-0.05	-0.06	-0.07	-0.06	-0.05	-0.03	-0.01	0.01	0.05	0.32	0.32	0.36	0.41	0.39	0.51
	[0.01]	[0.02]	[0.04]	[0.06]	[0.09]	[0.12]	[0.14]	[0.17]	[0.19]	[0.20]	[0.22]	[0.31]	[0.30]	[0.30]	[0.31]	[0.30]	[0.31]
Real GDP growth (lag 2)	0.01*	0.02	0.04	0.07	0.11	0.15	0.19	0.23	0.26	0.29	0.42	0.45	0.49*	0.56*	0.53*	0.64**	0.67**
	[0.00]	[0.02]	[0.03]	[0.06]	[0.08]	[0.10]	[0.12]	[0.14]	[0.15]	[0.18]	[0.25]	[0.27]	[0.28]	[0.29]	[0.28]	[0.29]	[0.29]
Real GDP growth (lag 3)	0.01	0.03	0.06	0.10*	0.14*	0.18*	0.22*	0.26*	0.29	0.44**	0.47**	0.48*	0.56**	0.55***	0.64***	0.69***	0.68***
	[0.01]	[0.02]	[0.04]	[0.05]	[0.07]	[0.09]	[0.12]	[0.15]	[0.19]	[0.20]	[0.21]	[0.23]	[0.22]	[0.20]	[0.21]	[0.22]	[0.24]
Real GDP growth (lag 4)	0.00	0.01	0.03	0.05	0.08	0.11	0.14	0.18	0.29**	0.33**	0.36**	0.40**	0.47***	0.54***	0.60***	0.62***	0.65***
	[0.00]	[0.01]	[0.02]	[0.04]	[0.06]	[0.09]	[0.12]	[0.15]	[0.14]	[0.15]	[0.17]	[0.18]	[0.15]	[0.17]	[0.17]	[0.19]	[0.18]
Crisis dummy (lag 1)	-0.06	-0.22	-0.38	-0.49	-0.50	-0.43	-0.44	-0.41	-0.35	-0.30	-0.28	-0.28	-0.25	-0.16	-0.01	-0.17	-0.08
	[0.04]	[0.14]	[0.29]	[0.44]	[0.58]	[0.73]	[0.87]	[1.01]	[1.11]	[1.20]	[1.28]	[1.43]	[1.52]	[1.59]	[1.66]	[2.03]	[2.05]
Crisis dummy (lag 2)	0.04	0.15**	0.31**	0.50*	0.65*	0.67	0.68	0.72	0.69	0.63	0.42	0.42	0.44	0.49	-0.03	0.25	0.30
	[0.03]	[0.07]	[0.14]	[0.25]	[0.35]	[0.44]	[0.50]	[0.53]	[0.53]	[0.49]	[0.56]	[0.42]	[0.42]	[0.43]	[0.57]	[0.41]	[0.51]
Crisis dummy (lag 3)	0.04	0.15	0.30	0.39	0.40	0.40	0.45	0.43	0.38	0.21	0.37	0.38	0.45	-0.21	0.28	0.30	0.18
	[0.04]	[0.10]	[0.20]	[0.28]	[0.35]	[0.40]	[0.42]	[0.43]	[0.42]	[0.52]	[0.43]	[0.42]	[0.42]	[0.53]	[0.43]	[0.40]	[0.42]
Crisis dummy (lag 4)	-0.03	-0.11	-0.28	-0.49*	-0.68*	-0.86*	-1.05**	-1.23*	-1.35*	-1.30	-1.39	-1.53	-1.79	-1.30	-1.45	-1.70	-1.87
	[0.03]	[0.10]	[0.17]	[0.25]	[0.34]	[0.43]	[0.51]	[0.60]	[0.73]	[0.83]	[0.99]	[1.15]	[1.29]	[1.59]	[1.75]	[1.88]	[1.96]
Constant	3.05***	11.92***	26.90***	47.49***	74.54***	108.14***	146.38***	187.65***	230.42***	276.72***	323.38***	366.49***	411.29***	456.97***	504.59***	551.91***	597.77***
	[0.38]	[1.45]	[3.33]	[6.01]	[9.49]	[13.99]	[19.49]	[25.72]	[32.42]	[39.59]	[47.56]	[57.40]	[67.26]	[76.41]	[83.99]	[90.30]	[95.08]
# observations	1,759	1,759	1,759	1,759	1,737	1,715	1,688	1,661	1,634	1,607	1,580	1,553	1,526	1,499	1,472	1,445	1,418
Log-likelihood	116	-1,948	-3,083	-3,830	-4,350	-4,743	-5,013	-5,194	-5,316	-5,392	-5,430	-5,435	-5,417	-5,382	-5,332	-5,268	-5,191
# countries	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
R^2	0.99	0.96	0.93	0.91	0.89	0.86	0.84	0.83	0.81	0.81	0.81	0.81	0.81	0.81	0.82	0.83	0.83

Source: Bank for International Settlements, International Financial Statistics, Budnik and Kleibl (2018), Lo Duca and others (2017), and IMF staff calculations.

Note: Estimations are performed using the local projections methodology. Robust standard errors are in brackets. *, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

References

Alam, Z., Alter, A., Eiseman, J., Gelos, G., Kang, H., Narita, M., Nier, E. and N. Wang 2018, "Digging Deeper—Evidence on the Effects of Macroprudential Policies from a New Database," International Monetary Fund (IMF) Working Paper (*forthcoming*).

Aiyar, S., Calomiris, C., and T., Wieladek 2014, "Does Macroprudential Regulation Leak? Evidence from a UK Policy Experiment," *Journal of Money, Credit and Banking*, 46 (1): pp. 181–214.

Ahuja, A. and M. Nabar 2011, "Safeguarding Banks and Containing Property Booms: Cross-Country Evidence on Macroprudential Policies and Lessons from Hong Kong SAR," IMF Working Paper WP/11/284 (International Monetary Fund: Washington, D.C.).

Akinci, O., and J. Olmstead-Rumsey 2018, "How Effective are Macroprudential Policies? An Empirical Investigation," *Journal of Financial Intermediation*, 33: pp. 33–57.

BIS 2018, "Annual Economic Report," June 2018 (Bank for International Settlements: Basel).

Bruno, V., Shim, I., and H-S. Shin 2017, "Comparative Assessment of Macroprudential Policies," *Journal of Financial Stability*, 28: pp. 183–202.

Budnik, K. and J. Kleibl 2018, "Macroprudential Regulation in the European Union in 1995– 2014: Introducing a New Data Set on Policy Actions of a Macroprudential Nature," ECB Working Paper, 2123.

Carreras, O., Davis, P., and R. Piggot 2018, "Assessing Macroprudential Tools in OECD Countries within A Cointegrating Framework," *Journal of Financial Stability*, 37: pp. 112–30.

Cerutti, E., Claessens, S., and L. Laeven, 2017, "The Use and Effectiveness of Macroprudential Policies: New Evidence," *Journal of Financial Stability*, 28: pp. 203–24.

———, Dagher, J.., and G. Dell'Ariccia 2017, "Housing Finance and Real-Estate Booms: A Cross–Country Perspective," *Journal of Housing Economics*, 38: pp. 1–13.

———, Correa, R., Fiorentino, E., and E. Segalla 2017, "Changes in Prudential Policy Instruments —A New Cross–Country Database," *International Journal of Central Banking*, 13 (1): pp. 477–503.

Claessens, S. 2014, "An Overview of Macroprudential Policy Tools," IMF Working Paper WP/14/214 (International Monetary Fund: Washington, D.C.).

Fendoglu, S. 2017, "Credit Cycles and Capital Flows: Effectiveness of the Macroprudential Policy Framework in Emerging Market Economies," *Journal of Banking and Finance*, 79: pp. 110–28.

Galati, G. and R. Moessner 2018, "What Do We Know About the Effects of Macroprudential Policy?" *Economica*, 85: pp. 735–70.

Gourinchas, P.-O. and M. Obstfeld 2012, "Stories of the Twentieth Century for the Twenty-First," *American Economic Journal: Macroeconomics*, 4(1): pp. 226–65.

International Monetary Fund (IMF) 2012, "The Interaction of Monetary and Macroprudential Policies—Background Paper," International Monetary Fund, Washington.

———, 2014, "Staff Guidance Note on Macroprudential Policy," IMF Policy Paper (Washington: International Monetary Fund).

———, 2018, "The IMF's Annual Macroprudential Policy Survey—Objectives, Design and Policy Responses," IMF Policy Paper and Note to G20, April, (Washington: International Monetary Fund).

International Monetary Fund (IMF)–Financial Stability Board (FSB) – Bank for International Settlements (BIS) 2016, "Elements of Effective Macroprudential Policies: Lessons from International Experience," (available here).

Jacome, L. and S. Mitra 2015, "LTV and DTI Limits—Going Granular," IMF Working Paper WP/15/154 (International Monetary Fund: Washington, D.C.).

Jorda, O. 2005, "Estimation and Inference of Impulse Responses by Local Projections," *American Economic Review*, 95(1): pp. 161–182.

Kuttner, K. and I. Shim 2016, "Can Non-Interest Rate Policies Stabilize Housing Markets? Evidence from a Panel of 57 Economies," *Journal of Financial Stability*, 26: pp. 31– 44.

Lim, C., Costa, A., Columba, F., Kongsamut, P., Otani, A., Saiyid, M., Wezel, T., and X. Wu, 2011, "Macroprudential Policy: What Instruments and How to Use Them? Lessons from Country Experiences," IMF Working Paper WP/11/238 (International Monetary Fund: Washington, D.C.).

Lo Duca, M., Koban, A., Basten, M., Bengtsson, E., Klaus, B., Kusmierczyk, P., Lang, j, Detken, C., and T. Peltonen 2017, "A New Database for Financial Crises in European Countries," ECB Occasional Paper, 194.

Reinhardt, D., and R. Sowerbutts 2015, "Regulatory Arbitrage in Action: Evidence from Banking Flows and Macroprudential Policy," Bank of England Staff Working Paper 546.

Richter, B., Schularick, M., and I. Shim 2018, "The Costs of Macroprudential Policy," NBER Working Paper 24989.

Romer, C., and D. Romer 1989, "Does Monetary Policy Matter? A New Test in the Spirit of Friedman and Schwartz," *NBER Macroeconomics Annual*, 4: pp. 121–170.

Vandenbusche, J., Vogel, U., and E. Detragiache 2015, "Macroprudential Policies and Housing Prices: A New Database and Empirical Evidence for Central, Eastern, and Southeastern Europe," *Journal of Money, Credit, and Banking*, 47(1): pp. 343–77.

Zhang, L., and E. Zoli, 2014, "Leaning Against the Wind: Macroprudential Policy in Asia," IMF Working Paper WP/14/22 (International Monetary Fund: Washington, D.C.).