Analysing banks' opinions on the demand and supply drivers of credit channel using Bank Lending Survey data in the case of Albania

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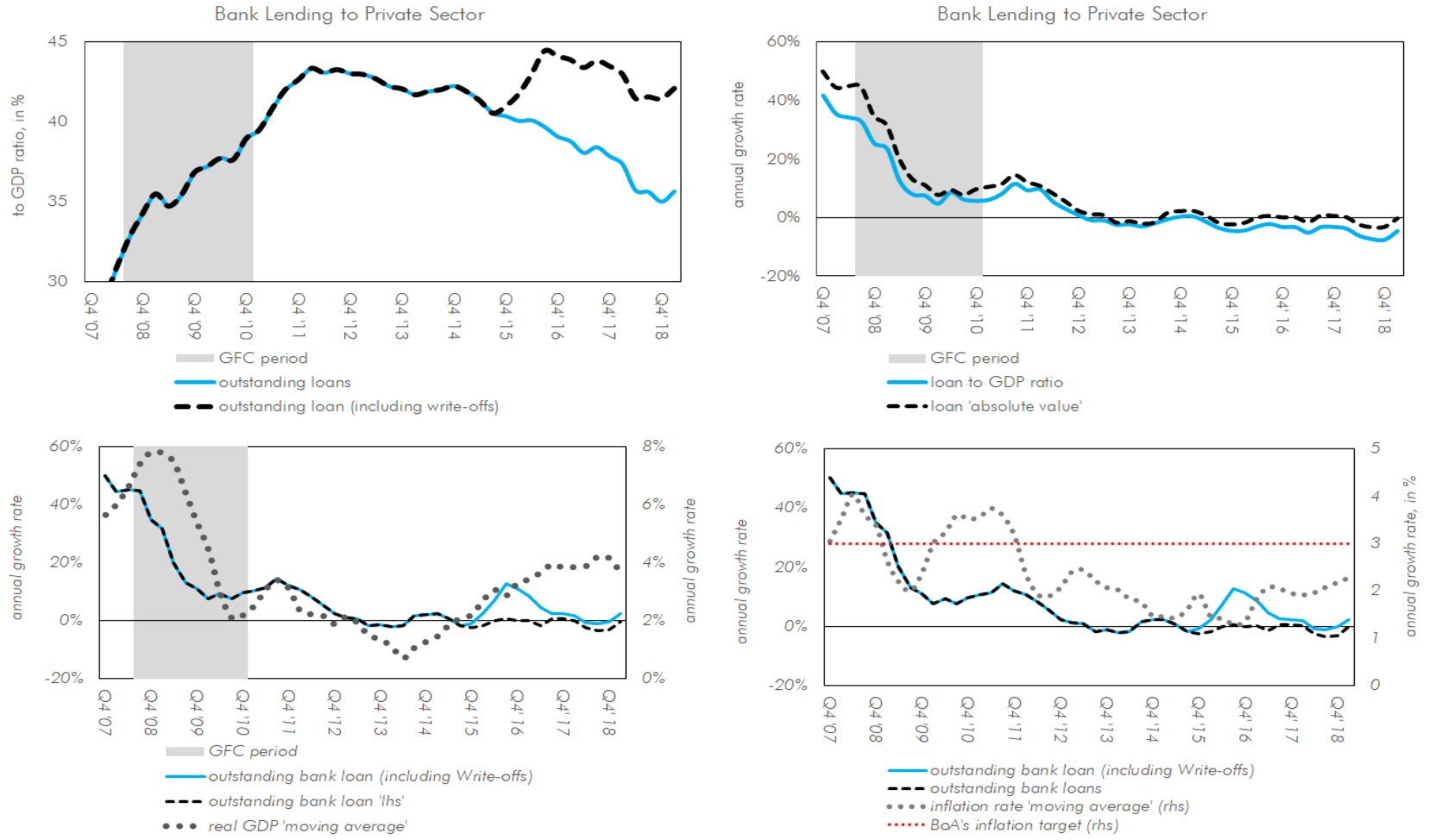
Motivation...(1)

Figure 1. Bank Lending and Macroeconomic Conditions, during 2007 Q4 – 2019 Q1.



Source: Bank of Albania

Motivation...(2)

- Unlike money demand, bank lending patterns in the case of Albania have only recently attracted increasing attention, considering various aspects of credit determinants. This includes the study by Kalluci (2012); Suljoti and Hashorva (2012); Note and Suljoti (2012), Shijaku and Kalluci (2013); Vika and Suljoti (2015); Vrioni and Abazaj (2015); Shijaku (2016); Shijaku (2018a).

- However, a crucial question, yet unanswered, is at what extend bank lending to firms (and households).
  - Banks' decision to change credit conditions and standards for their borrowers (linked to supply of loans);
  - Borrower's creditworthiness and balance sheet characteristics (linked to their demand for loans);

- The aim of this paper is to understand whether and how the estimated supply and demand-side shocks are meaningful in an economic sense for influencing bank lending in the case of Albania.

- This issues remains far from settled:
  - How to disentangle supply and demand effects on credit developments, given that the latter always reflect the combination of these two forces [Del Giovane, *et al*., (2010)].
  - Disentangling such factors is a difficult task [Everaert, *et al*., (2015)]:
    - Credit demand and supply are unobservable. Only actual credit outcomes can be observed.
    - Some factors generally drive demand and others supply and others drive both of them.

Literature Review

- Theoretical literature review [Fase (1995)] concerns two major streams:
  - The non-portfolio approach that focus mostly on demand side [Melitz and Pardue (1973)];
  - The portfolio approach that focus mostly on supply side [Cuthbertson (1985)];
- Empirical literature review analysis credit market, by:
  - Distinguishing demand and supply into two separated equations, *e.g. commonly in credit crunch studies or non-equilibrium approach*. This includes studies of Agénor, *et al*., (2004); Baek, (2005); Kanoh and Pumpaisanchai (2006); Allain and Oulidi (2009); Čeh, *et al*., (2011); Rottmann and Wollmershäuser, (2013).
  - Placing both factors in the same equation, *e.g. commonly in equilibrium approach studies*. This includes studies by Sóvágó, (2011); Jimenez, *et al*., (2012); Ciccarelli, *et al*., (2015); Altavilla, *et al*., (2018);
- However, as Everaert, *et al*., (2015) puts forward, one of the problem of most of the existing literature review is the inherently difficult task to disentangling the role of credit supply and demand conditions.
- Progress recently achieved through the use of information content of survey measures of credit demand and supply factors taken from Bank Lending Surveys. This includes among others Del Giovane, *et al*., (2011); Ciccarelli, *et al*., (2013); Kurul, (2013); Bassett, *et al*., (2014); Metiu, *et al*., (2016).

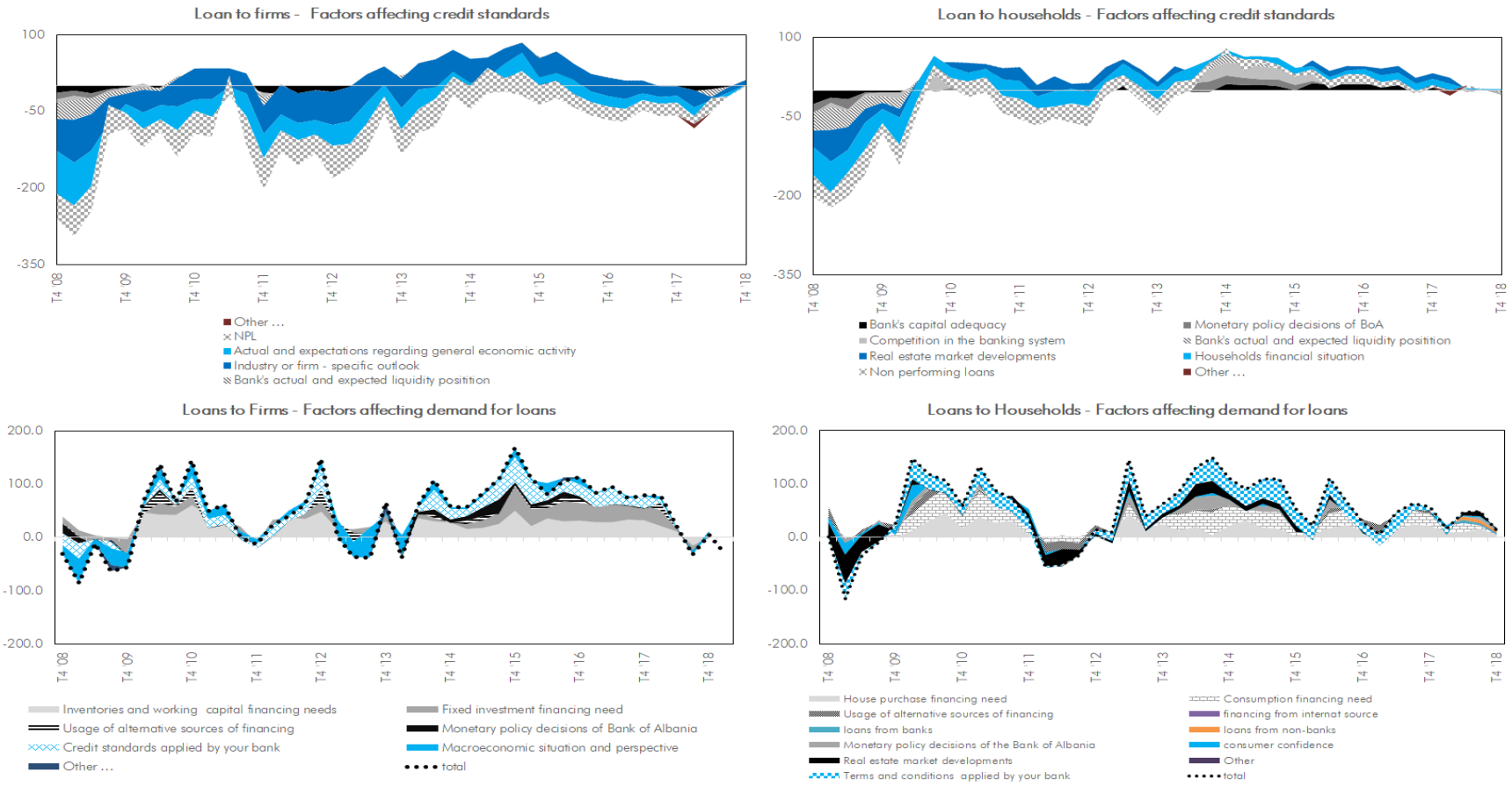
Bank Lending Survey Questionnaire on Firms (Households)

Table 1. Information used to build supply and demand side indicators in the case of Albania.

Bank Lending Survey organised by Bank of Albania	THE FACTORS AFFECTING CREDIT STANDARDS	Cost of funds and balance sheet constraints	Banks capital adequacy
			Bank's actual and expected liquidity position
		Pressure from competition	Competition in the banking system
			Competition from non-banks
		Perception of risk	Actual and expectations regarding general economic activity
			Industry or firm - specific outlook
			Non-performing loans
		Banks risk tolerance	
		Other …	
		Monetary policy decisions of Bank of Albania	
	FACTORS AFFECTING LOAN DEMAND	Financing Needs	Fixed investment financing need
			Inventories and working capital financing needs
			Mergers/acquisitions and corporate restructuring
			Debt refinancing
		Use of alternative finance	Internal financing
			Loans from other banks
			Loans from non-banks
			Issuance/redemption of debt securities/equities
		Financing conditions	Monetary policy decisions of Bank of Albania
			Macroeconomic situation and perspective
			Business confidence
		Other …	
		Usage of alternative sources of financing (internal funds, loans from non-bank institutions and loans from other banks)	
		Credit standards applied by your bank	

Bank Lending Survey Results on Firms (Households)

Figure 2. BLS Flows during 2008 Q4 – 2018 Q4.



Source: Bank of Albania

Quantifying Bank Lending Survey Results into Variables

- The BLS provides only qualitative answers, where:
  - Each of the values represent a balance, which is calculated as the difference between the positive and negative responses ranging from:
    - "eased considerably" to "tightened considerably" for the questions related to changes in the lending standards;
    - "decreased considerably" to "increased considerably" for the questions related to changes in the demand for loans;
  - The balance takes values ranging between -100 and 100.
- These data are quantified into useful time series data through a three step approach. Each of indicators:
  - Is initially normalised with a variance of 1 and a mean of 0, using the formula $Z_t = \frac{(X_t - \bar{X}_t)}{\delta}$, where X is the actual data from the BLS; $\bar{X}$ is the mean and δ is the standard deviation over the selected sample.
  - Is standardised into a notionally common scale taking a value between [0, 1], given that these are all proxy on different scale, using the formula given as $Z'_t = \left(\frac{1}{(1 + exp(-Z_t)}\right)$.
  - Finally, all these survey time series variables are transformed into index, respectively, by taking as the base year the average performance during the year 2010 and multiply it by 100.

Methodology – Baseline Model...(1)

- Supply or demand shifts that drives credit is as hard as assessing which one scissor blades cuts more the paper [Calani, *et al*., (2010)]. Hence the econometric model is built upon the assumptions:

  - Banks face a demand for loans (L_t^D) and decides the amount of actual credit allocation (L_t^S) according to a loan supply function that depends on the interest rate (r_t) it charges it and other control endogenous variables (Z_t), which contain more than one explanatory variable, as follows:

$$L_t^D = \beta_1 + \beta_2 r_t + \beta_3 Z_t + \varepsilon_t^D \quad [1]$$

$$L_t^S = a_1 + a_2 r_t + a_3 Z_t + \varepsilon_t^S \quad [2]$$

  Where, a_1 and β_1 are constants; [$a_2 and\ a_3$] and [$\beta_2 and\ \beta_3$] are long-run coefficients; ε_t^S and ε_t^D are error terms;

  - Credit market is an equilibrium market clearing one due to adjustments of the real lending rate [Sóvágó, (2011)]. Demand equals supply at each period and consequently the model is as follows:

$$L_t = \beta_1 + \beta_2 r_t + \beta_3 Z^D + \varepsilon_t^D \quad [3]$$

$$L_t = a_1 + a_2 r_t + a_3 Z^S + \varepsilon_t^S \quad [4]$$

  Where, L_t stands for outstanding loan stock; others are as previously discussed.

Methodology – Baseline Model...(2)

- **BUT**, to be able to identify the supply curve from demand curve there is at least one variable in Z^S which is not in Z^D [Calani, *et al*., (2010)], which based on Jimenez, *et al*., (2012) and Ciccarelli, *et al*., (2015) we solved this by employing the BLS information on supply and demand side drivers of credit.

- Assuming that credit allocation is a linear function also of other banks' balance sheet characteristics (B_t) and macroeconomics perspective (X_t), our disentangled model [3] and [4] takes the following form:

$$L_t^{Firms} = a_1 + a_2 r_t + a_3 BLS^S_{Firms_t} + a_4 X_t + a_5 B_t + a_6 GFC_t + a_7 EU_t + \varepsilon_t^S \quad [5]$$

$$L_t^{Firms} = \beta_1 + \beta_2 r_t + \beta_3 BLS^D_{Firms_t} + \beta_4 X_t + \beta_5 B_t + \beta_6 GFC_t + \beta_7 EU_t + \varepsilon_t^D \quad [6]$$

$$L_t^{HH} = \alpha_1' + \alpha_2' r_t + \alpha_3' BLS^S_{HH_t} + \alpha_4' X_t + \alpha_5' B_t + \alpha_6' GFC_t + \alpha_7' EU_t + \varepsilon_t^S \quad [7]$$

$$L_t^{HH} = \beta_1' + \beta_2' r_t + \beta_3' BLS^D_{HH_t} + \beta_4' X_t + \beta_5' B_t + \beta_6' GFC_t + \beta_7' EU_t + \varepsilon_t^D \quad [8]$$

Where, now Z^S and Z^D represent the individual information retain from BLS on the extent to which easing credit standards on firms ($BLS^S_{Firms_t}$) and households ($BLS^S_{HH_t}$) and the respective demand-side factor related to firms ($BLS^D_{Firms_t}$) and households ($BLS^D_{HH_t}$) affect respectively credit market developments. GFC_t and EU_t represent the financial crisis and the EU debt crisis periods.

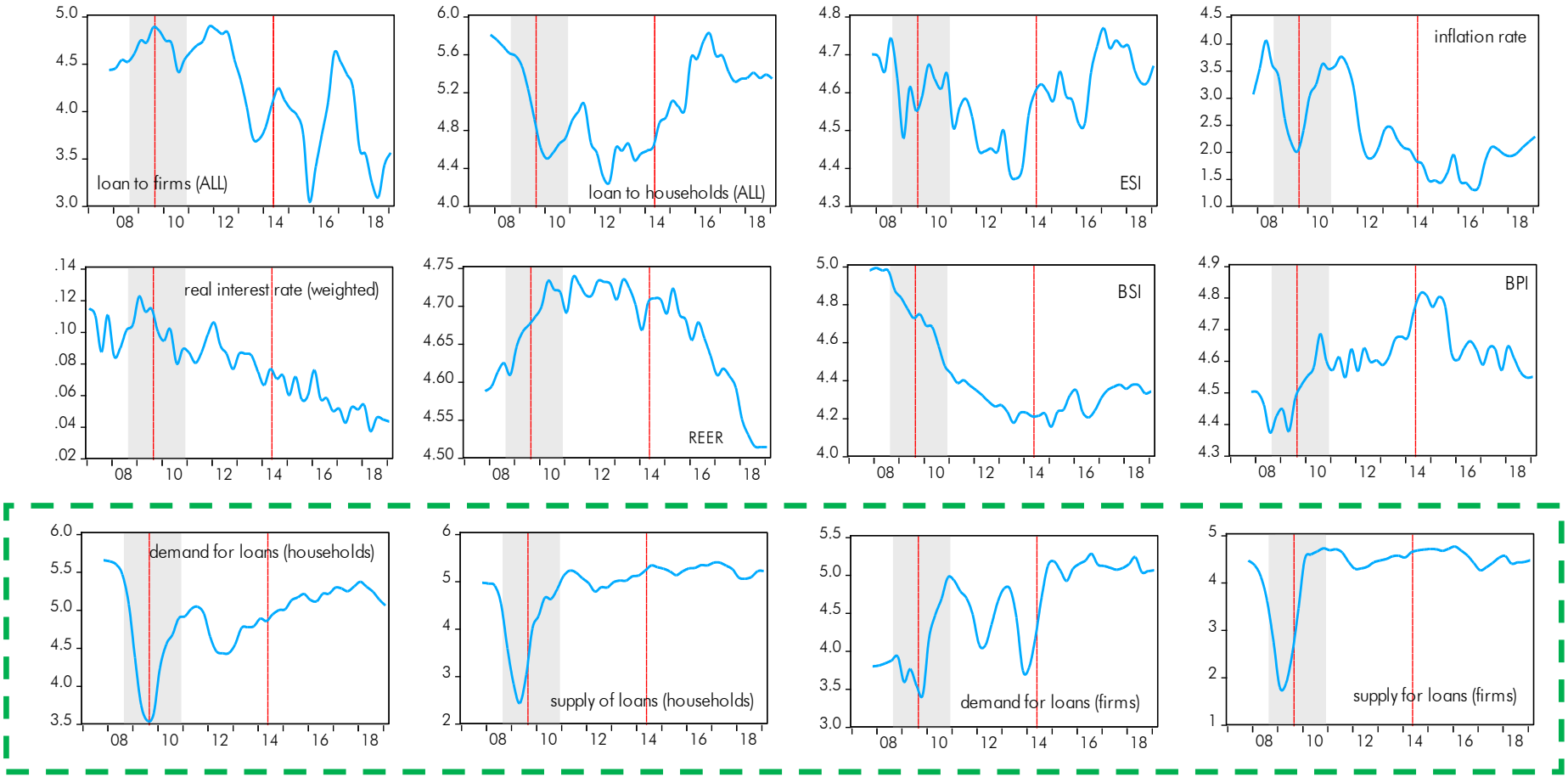
Methodology – Variable Description

Table 2. The description of variable used in model specification

Variable	Description
L^{FIRMS}	First difference of the logarithm of annualised new loans to firms in domestic currency to the ratio of GDP (which is firms transformed into an index taking as the base year 2010 after adjusting for write-offs).
L^{HH}	First difference of the logarithm of annualised new loans to households in domestic currency to the ratio of GDP (which is firms transformed into an index taking as the base year 2010 after adjusting for write-offs).
GDP	Annual growth rate of real GDP.
$INFLATION$	Annual change of the Consumer Price Index
r	Annual growth rate of the weighted averages of national short-term and long-term market interest rate on different bank lending maturities in domestic currency deflated by contemporaneous domestic rate of inflation measured as annual percentage change in CPI.
$REER$	First difference of the logarithm of real effective exchange rate.
BSI	First difference of the logarithm of bank stability index, which is an update series as suggested by Shijaku (2018).
GFC	Dummy variable taking the value of 1 during 2008 Q4 – 2010 Q4, 0 otherwise.
EU	Dummy variable taking the value of 1 during 2009 Q3 – 2014 Q2, 0 otherwise.
$BLS^{D}_{HH_t}$ $BLS^{S}_{HH_t}$ $BLS^{D}_{Firms_t}$ $BLS^{S}_{Firms_t}$	Each of the values represent a balance, which is calculated as the difference between the positive and negative responses ranging from “eased considerably” to “tightened considerably” for the questions related to changes in the lending standards and from ”decreased considerably” to “increased considerably” the questions related to the demand for loans. The balance takes values ranging between -100 and 100. They enter the model as the first difference of the logarithm of an index that is first standardised and then transformed into an index by taking 2010 as the base year.

Dataset used in empirical analysis

Figure 3. Dataset used in the empirical estimation, 2007 Q4 – 2018Q4.



Source: Bank of Albania

Methodology – Sample and Additional Information

- The sample includes quarterly data period 2007 Q4 – 2019 Q01. That includes 39 periods;
- The model is estimated, as in the case of Bassett, *et al*., (2014) and Ciccarelli, *et al*., (2015) through means a flexible VAR model approach that includes:
  - Exogenous variables;
  - Number of lags is set to two to correct for serial correlation (*VAR Lag Criteria suggested one lag*);
  - Sign Restriction are imposed as suggested by Uhlig (2005) and include;
    - Responses related only with loan indicator, namely L^{FIRMS} and L^{HH};
    - Horizon upon which imposed sign restriction is set at 4 lags, h=4;
    - Mean value of impulse response (looks at the first 500 of IRs for those *i* that satisfy the restrictions).
- This methodology is suitable to us for three reasons:
  - Eliminates any kind of possible puzzle by contraction [Canova and De Nicolo (2002)];
  - Does not drop any contemporaneous effects as the variance-covariance matrix is fully identified [Magliardo, (2010)];
  - IRFs report the median values as a good approach eliminate any outlier responses;

Diagnostic tests...(1)

Table 3. Unit Root Test Analysis

Variable	*Augmented Dickey-Fuller Test*					
	Level			*First Difference*		
	Constant	*Constant & trend*	*None*	*Constant*	*Constant & trend*	*None*
L^{Firms}	[0.8179]	[0.2162]	[0.2974]	[0.0000]	[0.0002]	[0.0000]
L^{HH}	[0.4302]	[0.5605]	[0.4876]	[0.0002]	[0.0006]	[0.0000]
GDP	[0.1406]	[0.3082]	[0.6034]	[0.0000]	[0.0000]	[0.0000]
PRICE	[0.3708]	[0.6516]	[0.9968]	[0.0658]	[0.0925]	[0.3061]
r	[0.0023]	[0.0051]	[0.0003]	[0.0000]	[0.0000]	[0.0000]
BLS^{D}_{Firms}	[0.0127]	[0.0072]	[0.6721]	[0.0000]	[0.0001]	[0.0000]
BLS^{S}_{Firms}	[0.0018]	[0.0006]	[0.4887]	[0.0781]	[0.2458]	[0.0069]
BLS^{D}_{HH}	[0.0012]	[0.0002]	[0.9993]	[0.0000]	[0.0000]	[0.0080]
BLS^{S}_{HH}	[0.2584]	[0.0072]	[0.9663]	[0.0041]	[0.0057]	[0.0007]
REER	[0.8495]	[0.9294]	[0.3372]	[0.0732]	[0.0260]	[0.3083]
BSI	[0.0932]	[0.9518]	[0.0230]	[0.0001]	[0.0000]	[0.0000]

Source: Author's Calculations

Diagnostic tests...(2)

Table 4. VAR Lag Order Selection Criteria

Endogenous variables: ΔL ΔGDP ΔPRICE r ΔBLS ΔREER ΔBSI
Exogenous variables: GFC EUROZONE
Sample: 2007Q1 2019Q1 [Included observations: 42]

Lag	LogL	LR	FPE	AIC	SC	HQ
0	453.3644	NA	1.25e-19	-20.82688	-20.16491*	-20.58424
1	519.7877	101.2165	1.20e-19	-20.94227	-17.63243	-19.72908
2	587.0641	76.88724	1.52e-19	-21.09829	-15.14056	-18.91455
3	723.2961	103.7958*	1.62e-20*	-24.53791*	-15.93231	-21.38362*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Source: Author's Calculations

Diagnostic tests...(3)

Table 5. Roots of Characteristic Polynomial

Endogenous variables: ΔL ΔGDP ΔPRICE r ΔBLS ΔREER ΔBSI Exogenous variables: GFC EUROZONE	
Lag specification: 1 1	
Root	Modulus
0.454808 - 0.297528i	0.543483
0.454808 + 0.297528i	0.543483
-0.242662 - 0.293416i	0.380759
-0.242662 + 0.293416i	0.380759
0.349595	0.349595
-0.248589 - 0.120126i	0.276092
-0.248589 + 0.120126i	0.276092
-0.042214	0.042214
No root lies outside the unit circle [VAR satisfies the stability condition]	

Source: Author's Calculations

Diagnostic tests...(4)

Table 6. VAR Residual Serial Correlation LM Tests

Sample: 2007Q1 2019Q1 [Included observations: 43]						
Null hypothesis: No serial correlation at lag h						
Lag	LRE* stat	Degree of freedom	Probability	F-stat	Degree of freedom	Probability
1	79.44093	64	0.0924	1.299032	(64, 116.1)	0.1113
2	68.46191	64	0.3284	1.075135	(64, 116.1)	0.3630
Null hypothesis: No serial correlation at lags 1 to h						
Lag	LRE* stat	Degree of freedom	Probability	F-stat	Degree of freedom	Probability
1	79.44093	64	0.0924	1.299032	(64, 116.1)	0.1113
2	161.4070	128	0.0244	1.317492	(128, 92.0)	0.0807
*Edgeworth expansion corrected likelihood ratio statistic.						

Source: Author's Calculations

Diagnostic tests...(5)

Table 7. VAR Residual Normality Tests

Orthogonalization: Cholesky (Lutkepohl)				
Null Hypothesis: Residuals are multivariate normal				
Sample: 2007Q1 2019Q1 [Included observations: 43]				
Component	Skewness	Chi^2	Degree of Freedom	Probability
Joint		13.24173	8	0.1038
Component	Kurtosis	Chi^2	Degree of Freedom	Probability
Joint		4.029444	8	0.8545
Component	Jarque-Bera		Degree of Freedom	Probability
Joint	17.27117		16	0.3683
*Approximate p-values do not account for coefficient estimation				

Source: Author's Calculations

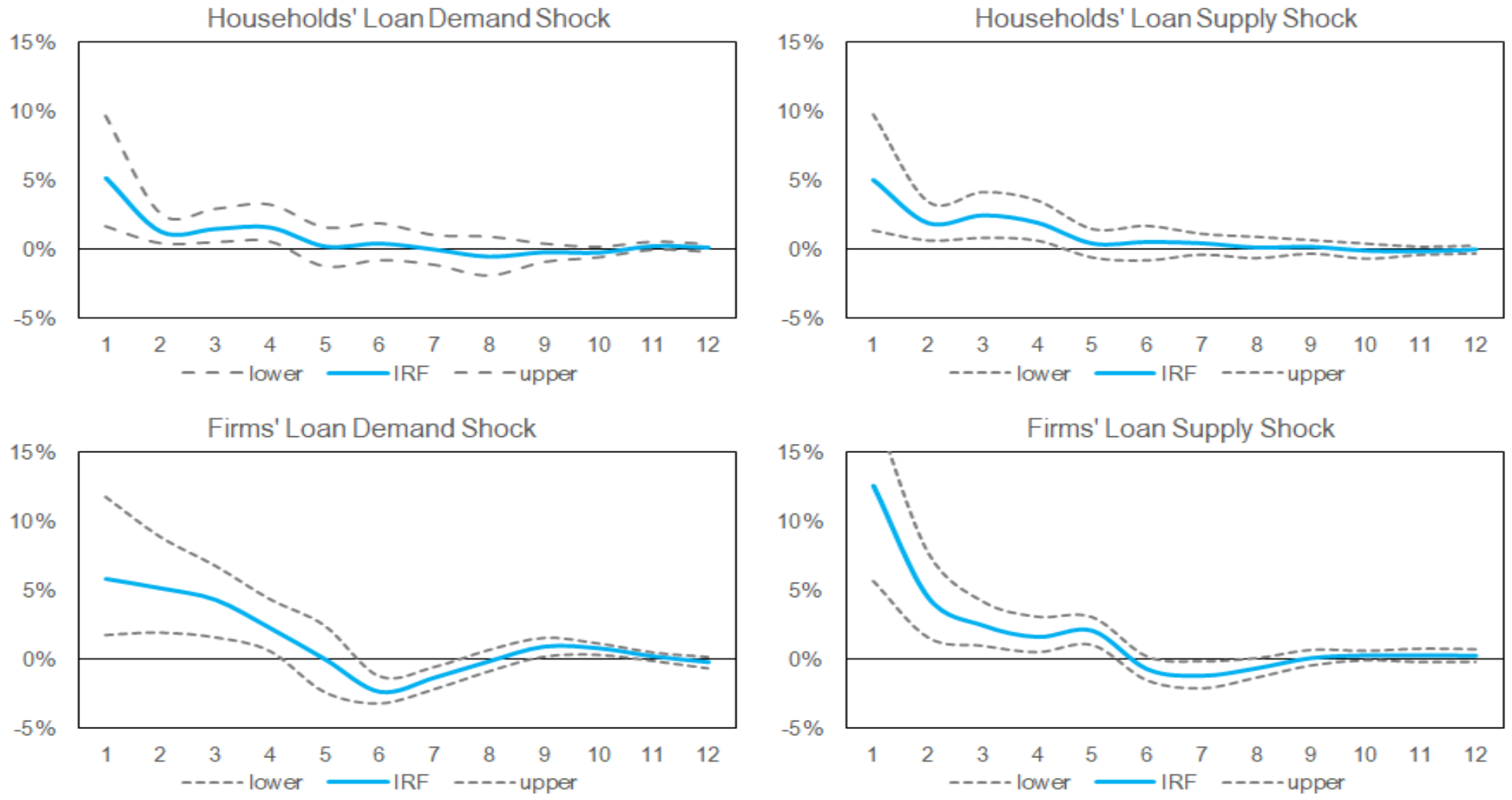
Table 8. VAR Residual Heteroskedasticity Tests (Levels and Squares)

Sample: 2007Q1 2019Q1 [Included observations: 43]		
Joint test:		
Chi^2	Degree of Freedom	Probability
1256.936	1224	0.2504

Source: Author's Calculations

The non-accumulated IRF based on baseline shock scenario

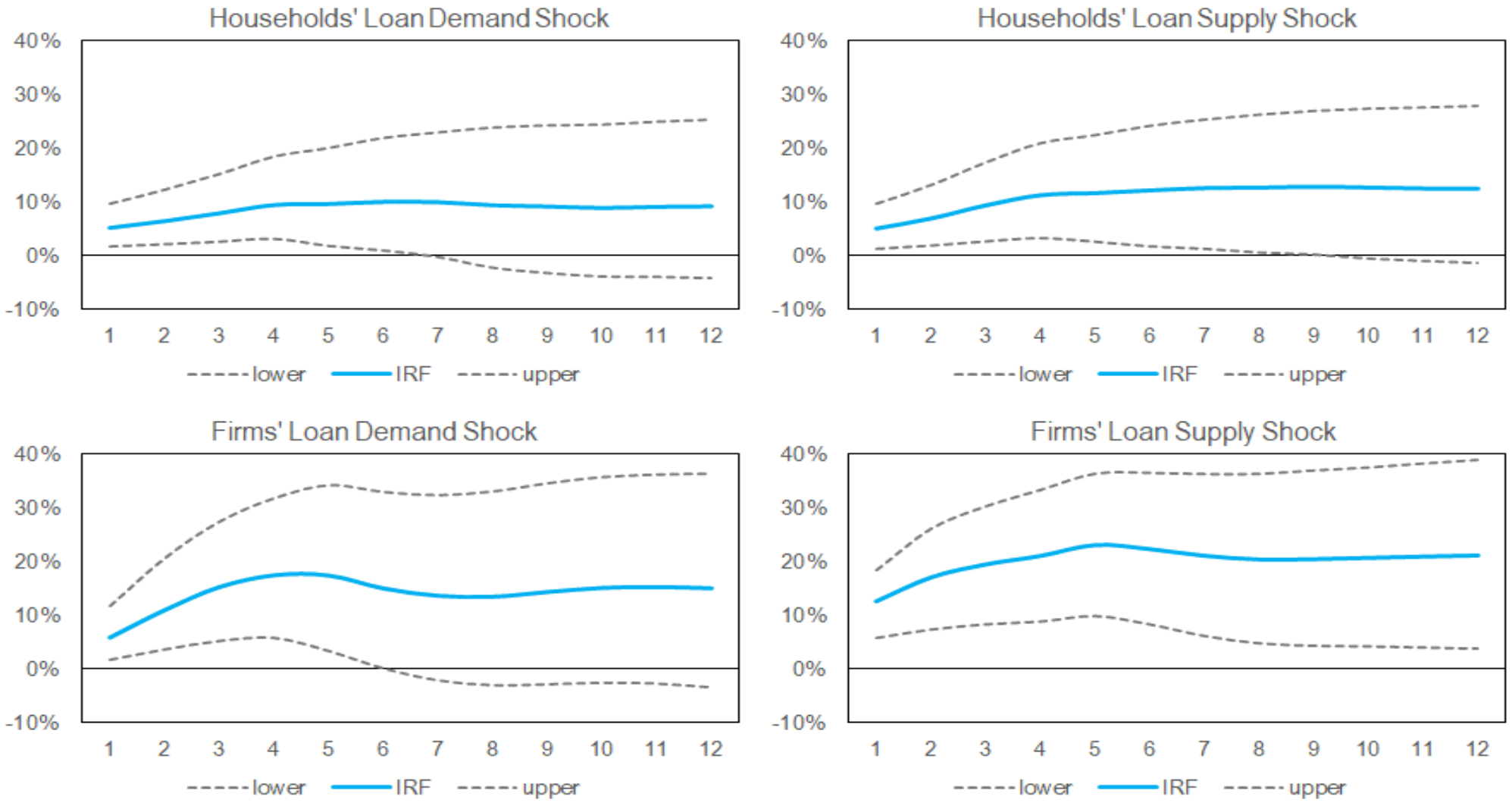
Figure 4. The non-accumulated IRFs results based on the baseline model shock scenario.



Source: Bank of Albania

The accumulated IRF based on baseline shock scenario

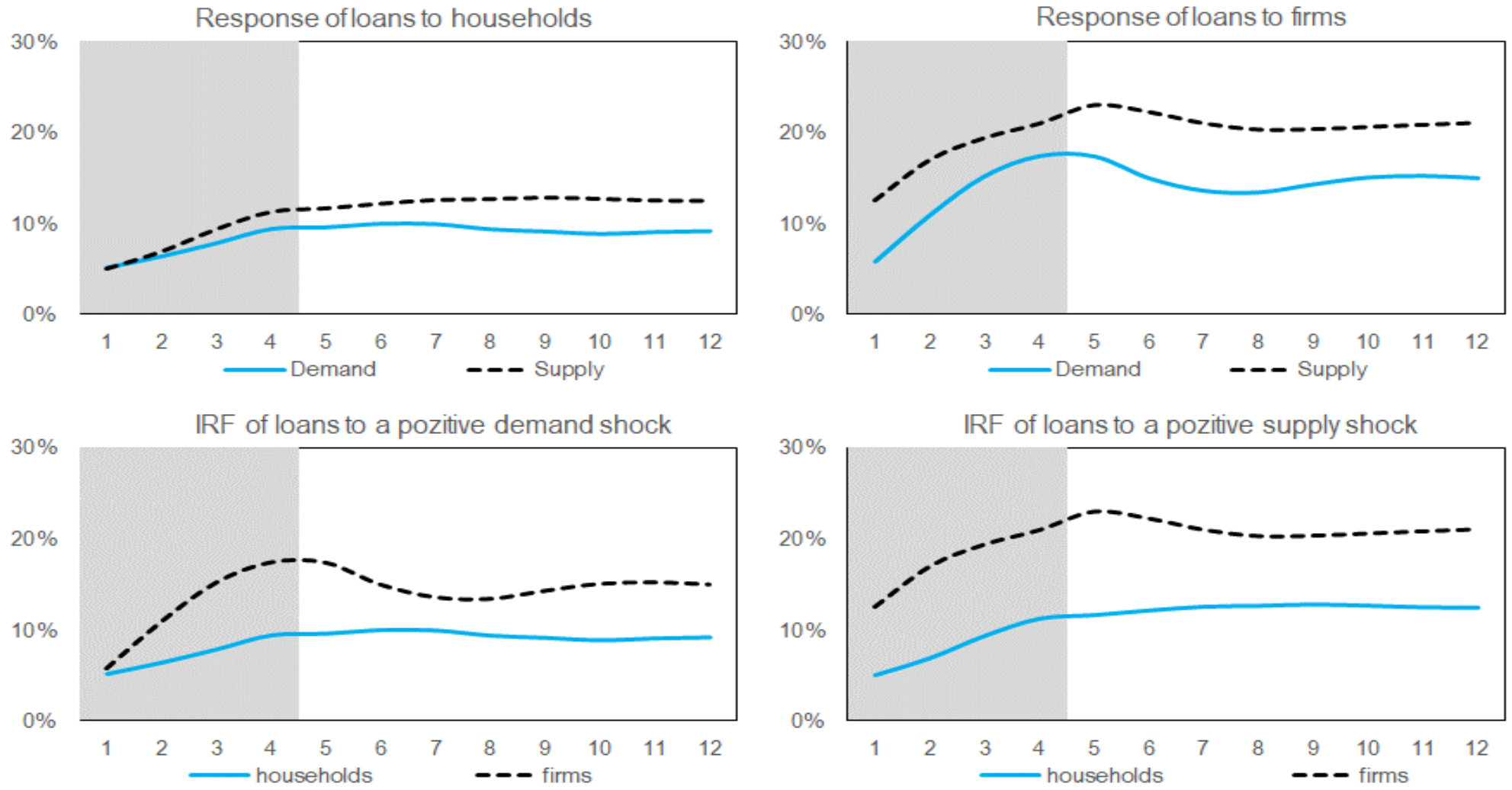
Figure 5. Cross-check analysis on baseline shock scenario (accumulating IRFs).



Source: Bank of Albania

Cross-check analysis on baseline shock scenario

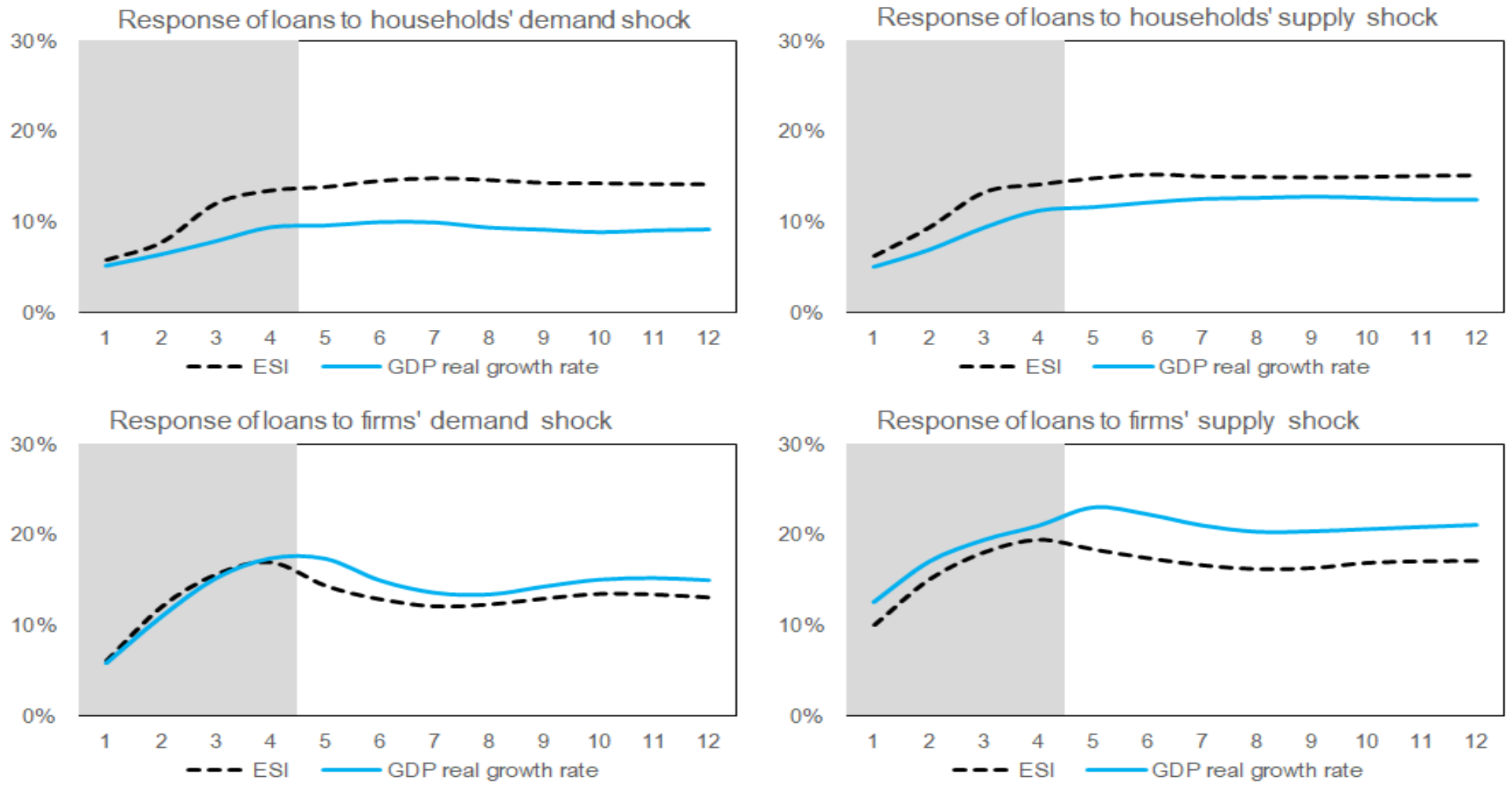
Figure 6. Cross-check analysis on baseline shock scenario (accumulating IRFs).



Source: Bank of Albania

Robustness Checks: ESI Versus GDP growth

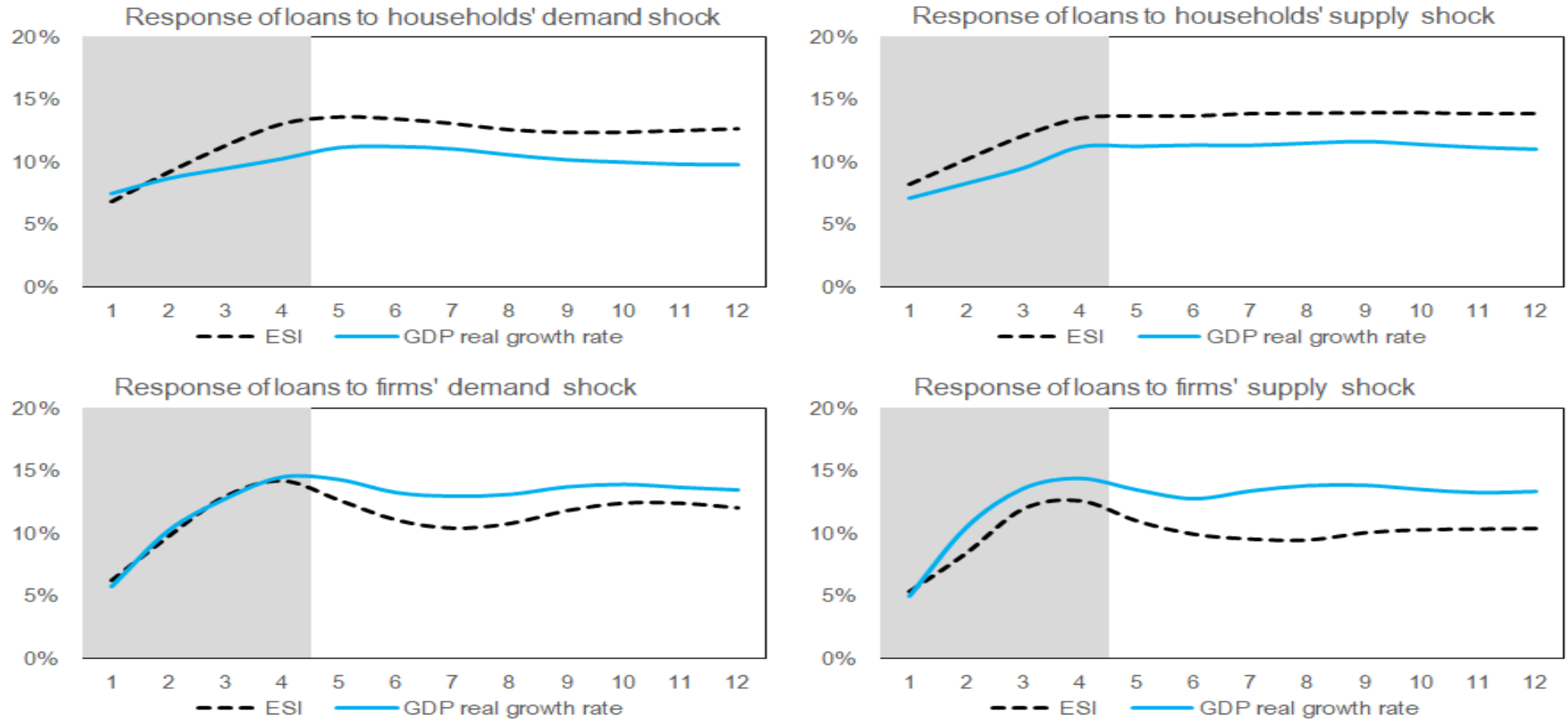
Figure 8. Robustness tests on accumulating IRFs using different explanatory variables



Source: Bank of Albania

Robustness Checks: ESI Versus GDP growth (Total Loan)

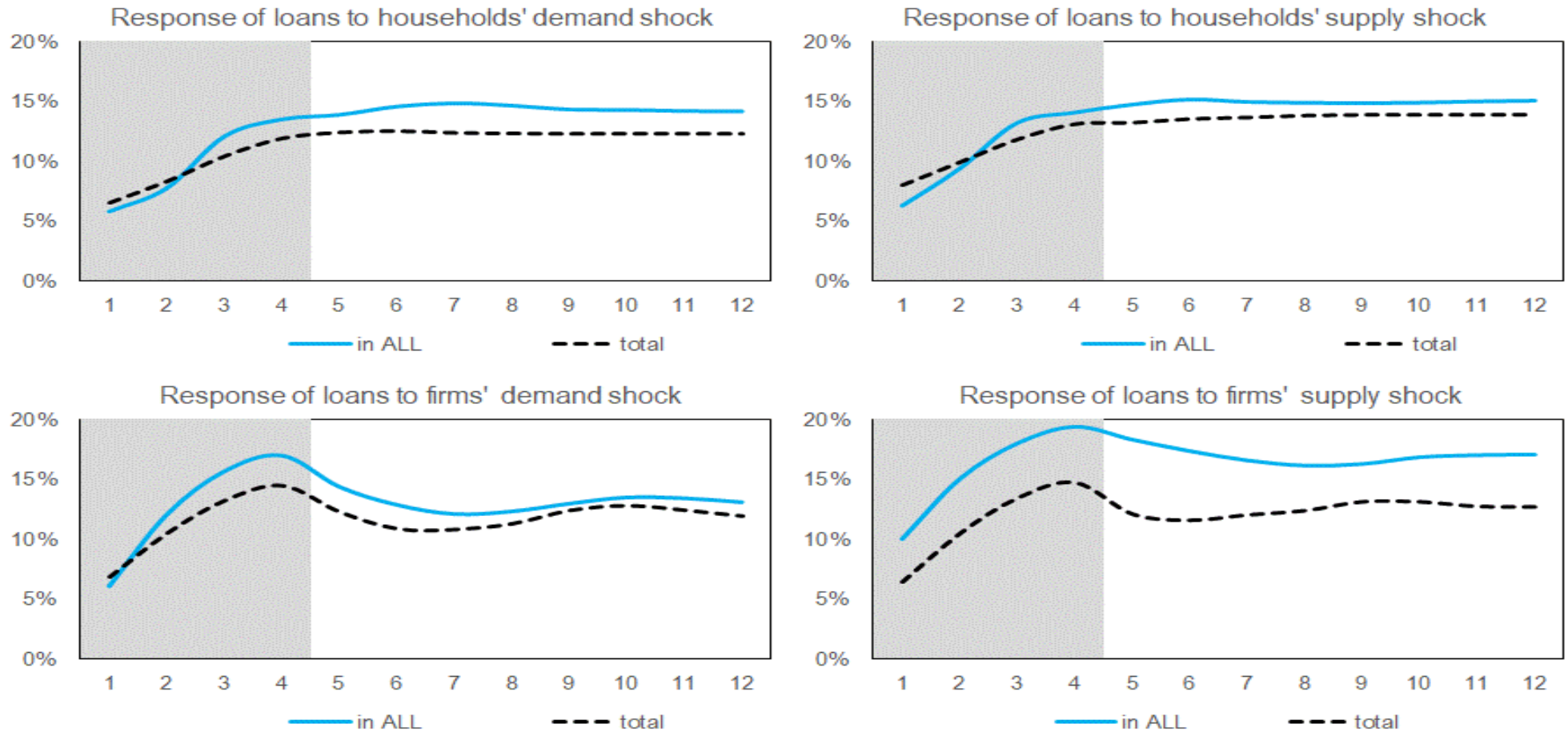
Figure 9. Robustness check on accumulated IRFs using total loan with different model specifications.



Source: Bank of Albania

Total lending versus lending in domestic currency

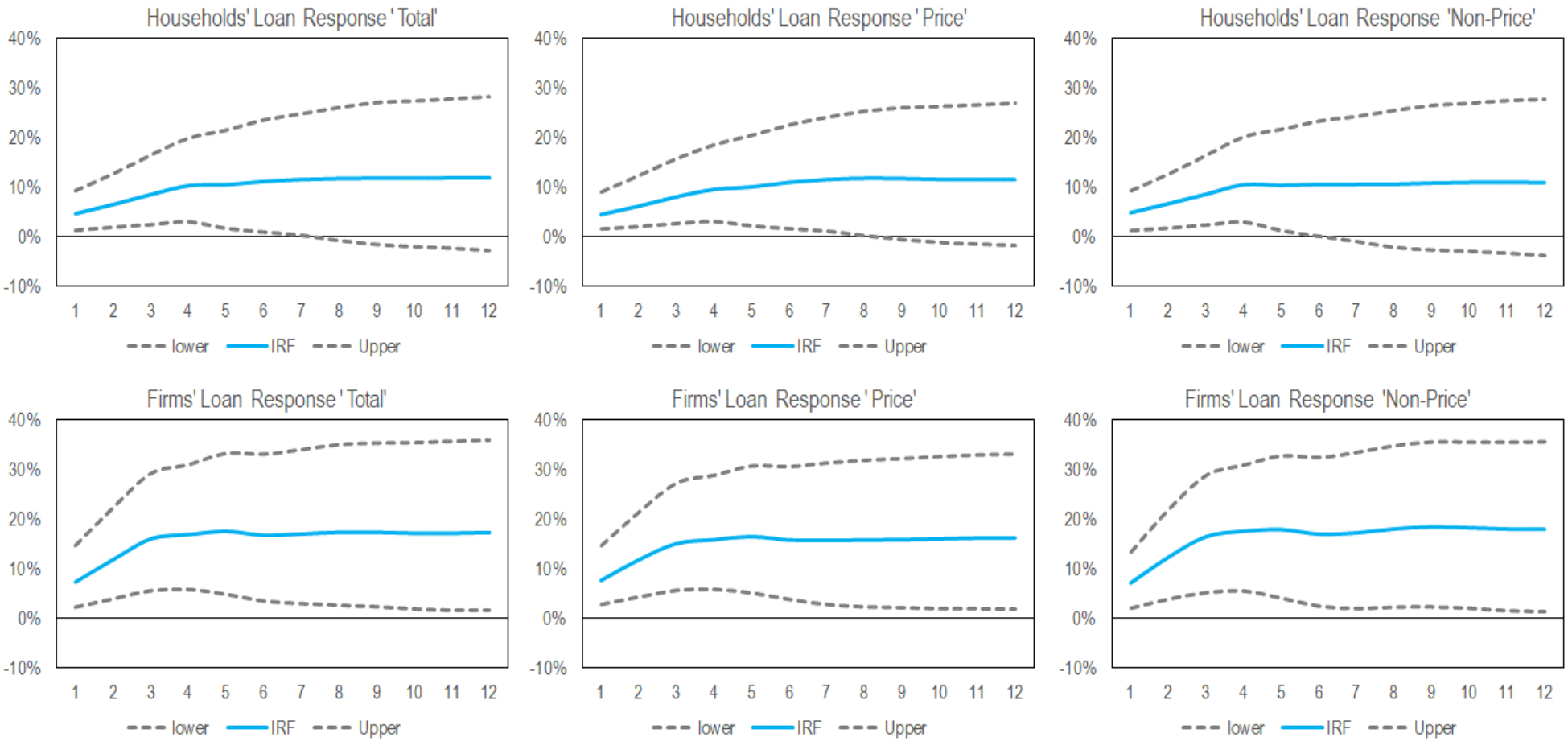
Figure 10. Cross-check analysis based on accumulated IRFs with different shock scenarios: total lending versus lending in domestic currency.



Source: Bank of Albania

Alternative results: Price Versus Non-Price factors

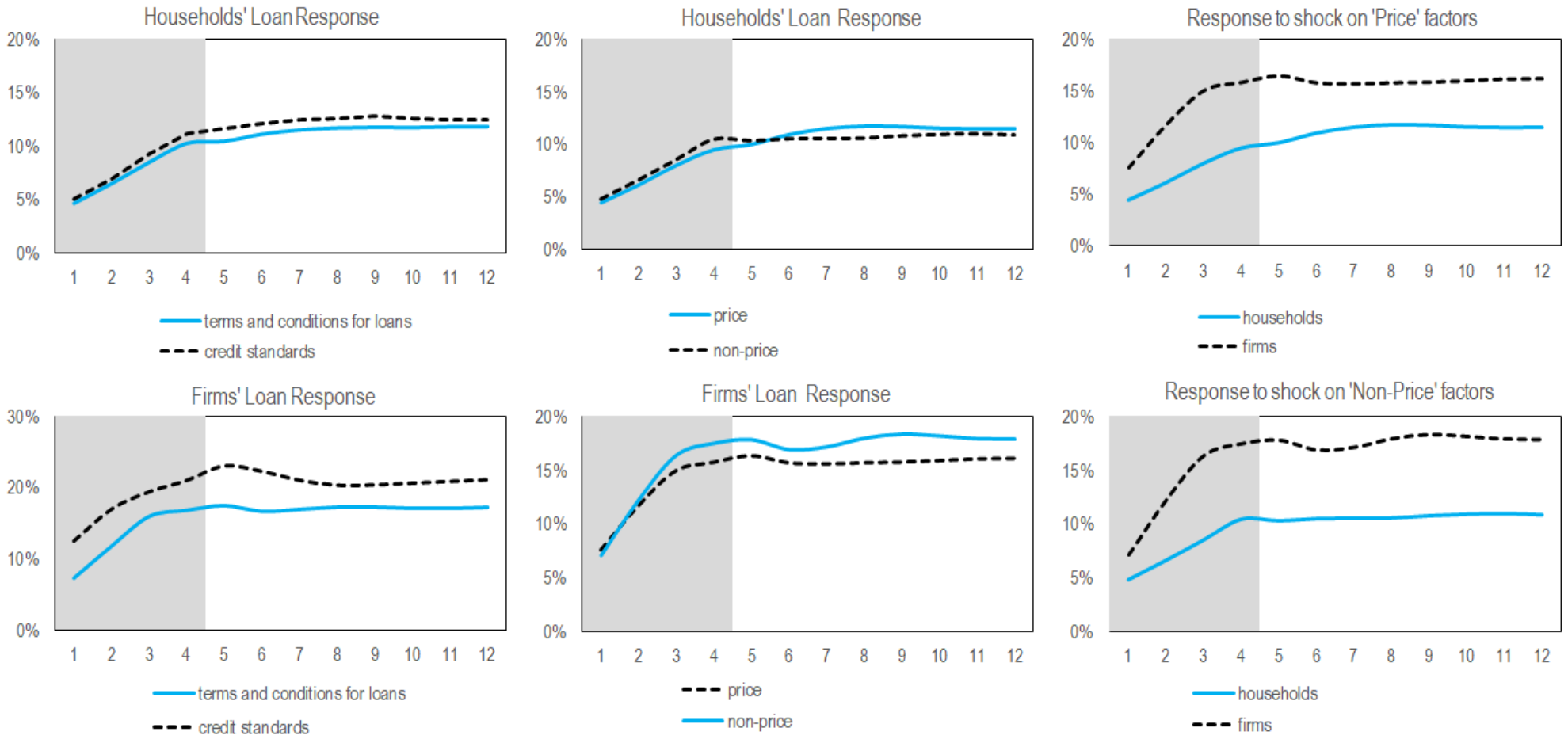
Figure 11. Accumulating IRF based on shock scenario on Terms and Conditions, Price versus Non-Prices.



Source: Bank of Albania

Cross check analysis: Price Versus Non-Price Factors

Figure 12. Cross check analysis on the accumulating effects with regards to shock on Terms and Conditions.



Source: Bank of Albania

Final Remarks...(1)

- This analysis credit market developments in Albania with the advantages that:
  - Addresses the identification challenges by separating supply from demand side factors effecting credit patterns.
  - Use a unique dataset information based on Bank of Albania quarterly Bank Lending Survey reports.
  - Disentangle the role of supply and demand shocks among firms and households respectively.
  - Focused in the period after the global financial crisis.
- The main empirical results highlight the importance of including credit patterns in the toolkit of monetary policy and underpins the reasoning behind giving credit analysis a prominent role in the monetary policy strategy of Bank of Albania.
- Demand and Supply Shocks have a stronger effect on lending to firms rather than lending to households.
- Supply side factors are found to be relatively more crucial for credit market developments. This support the policy actions taken by Bank of Albania aimed at alleviating the negative repercussions on credit supply due to balance sheet constraints that banks faced during this period.

Final Remarks...(1)

- A set of sensitive analysis show that results are robust to methodological modifications;
- Other results show that it is:
  - Not only the stability condition and prudential behaviour of the banks, but also their desire and willingness to provide loan that matter for bank lending.
  - The non-price-related factors that would have a stronger effect on bank lending. This is found to be stronger in the case of firms.
- Possible future research…
  - Relax the assumption of credit market equilibrium:
    - It fails to account for asymmetric information between lender and borrowers, causing market imperfection.
    - Need to examine whether developments in credit market are a result of credit crunch.
  - Test the ability of survey data in explaining and forecasting macroeconomic developments.
  - Analyse whether deviations from credit supply and demand expectation can explain financial and macroeconomic cycles in the case of Albania.

Thank you for your attention!!!

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