In Search of Credit Crunch (Rationing) Periods in Albania: A Disequilibrium Approach

by
GERTI SHIJAKU

Bank of Albania
Research Department

December 7, 2021

15th Research Workshop in SEE

Introduction...(1)

- The main role of the banks, in emerging countries, is allocation of liquidity (credit) to borrowers with the highest valuation.

- Market equilibrium occurs when credit demand (d_t) equals credit supply (s_t), at the equilibrium real interest rate (price).

- **BUT**, as Yuan and Zimmermann (1999) imply, if prices are thought to be:

  - "**Too high**", supply will exceed demand, and sellers will have to reduce their prices until the market clears (i.e. equilibrium is reached).

  - "**Too low**", then demand will be higher than supply, and prices will have to be raised to obtain market clearing.

Introduction...(2)

- In such market imperfection, as Torsten and Lina (2012) imply, two situations have to be distinguished:

  - Credit crunch (CC) – describes a situation in which an unusually sharp decline in the supply of credit, as banks are less willing to lend, generates an unsatisfied excess demand for real credit in the loan market at the prevailing lending interest rates, which do not rise [Council of Economic Advisors (1991)].

    - Asymmetric information;
    - Problems of moral hazard between lenders and borrowers;
    - Monitoring cost due to regulatory pressures;
    - Over-reaction to deteriorating bank asset values and profitability;

  - Credit rationing (CR) - describes a situation of permanent excess demand due to imperfect information on credit markets [Soana, et al (2017)].

Introduction...(3)

- Little evidences on episodes of CC concerning credit market in Albania.
- **Main RQ**: Did credit market in Albania experience episodes of CC or (CR)?
- Albanian credit market is an excellent laboratory for two main reasons:
  - Banks operating in Albania have been affected in the aftermath of GFC, **BUT** their systemic stability has not been endangered.
  - Albania is a bank-oriented economy and changes in credit supply entails a financial accelerator effect and can be of big impact for propagating monetary policy shocks.
- In the realm of previous studies focusing in Albanian credit market, the novelty of this study is that to the best of our knowledge it is the first paper to analyse credit market:
  - From a disequilibrium point of view.
  - In the case of firms and households.

Literature Review – Theoretical Approach

- CC (CR) is explained through supply and demand side point of view.
  - **THE SUPPLY-SIDE** sees this as an inefficient situation. It explains it through the:
    - Lenders point of view – reducing credit supply, without allowing for interest rate adjustment can be rational, which for Nehls and Schmidt (2003) is explained by:
      - A monetary policy transmission (bank lending channel) approach;
      - A portfolio theory;
      - In extreme, it is related also with the risk premium of flight to quality [Baek (2002)];
    - Borrowers' point of view – demand for credit in not fully met as lenders show undue caution, ending up with credit-worthy borrowers that do not receive adequate financing, either cannot get it at reasonable terms or see their loan applications turned down and are unable to fund their investment projects [Ślazak (2011)];
  - **THE DEMAND-SIDE** - the low volume of credit could also result from weak demand, due to worsening business outlooks or the phenomenon of "disintermediation" [Nehls and Schmidt (2003)].

Literature Review – Empirical Approach

- Soana, *et al.* (2017) identifies three approached to identify credit crunch (rationing):
  - Use credit registry data on firms that have multiply lenders [e.g. Lyer, *et al*. (2014)];
  - Use survey data [Popov and Udell (2012); and Presbitero, *et al*. (2014)];
  - Use a disequilibrium model [e.g. Kremp and Sevestre (2013); Farinha and Felix, (2015)] that includes use of maximum likelihood, simple OLS and GMM approach, as well more complex Bayesian VAR method.

- The disequilibrium model requires the separate identification of (d) and (s), by either:
  - Using microeconomic survey approach [Rottmann and Wollmershäuser (2011)];
  - Macroeconomic and banking sector time series [Borensztein and Lee (2002)].
    - DEMAND SIDE VARIABLES include backwards and forwards looking (e.g. interest rates, inflation, industrial production, investments, real GDP, and output gap.
    - SUPPLY SIDE VARIABLES include financial variables corporate net worth, stock market prices, risk-premium, and banks' lending capacity, as well as macroeconomic variables such as interest rates, industrial production, real GDP, and output gap.

Methodology – Theoretical Approach...(1)

- Banks face a demand for loans (ld_t) and decides the amount of actual credit allocation (ls_t) 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:

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

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

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

- The economic theory, as Hoque, *et al*. (2016) advocates, suggest that an equilibrium in credit market:

$$ld_t = ls_t \quad [3]$$

at least, as Sóvágó (2011) advocates, related to the fact that the observed (or published) actual data do not distinguish between the exact extent of real credit demand and supply.

Methodology – Theoretical Approach...(2)

- The assumption of perfect equilibrium credit market is, **HOWEVER**, not applicable to reality [Tirole (2006)] due to:
  - Information asymmetry;
  - Problems of moral hazard between lenders and borrowers;
  - Monitoring cost due to regulatory pressures;
  - Over-reaction to deteriorating bank asset values and profitability;

  that means, that credit market can at any time be in equilibrium or disequilibrium due to incomplete adjustment of real interest rate to equalise credit demand and supply so that,

$$ld_t \neq ls_t \qquad [4]$$

- This means that a disequilibrium condition occurs as:
  - Credit market does not clear in each period of time [Čeh, *et al.* (2011)];
  - Banks never fully achieve a correct adjustment of pricing-to-risk [Nehls and Schmidt (2003)];

Methodology – Theoretical Approach...(3)

- The simplest form of a credit market disequilibrium consists of three distinguish equations [Maddada and Nelson (1974)], which takes the form:

$$ld'_t = a_1 + a_2 Z^d_{i,t} + \mu^{d'}_t \quad [5]$$

$$ls'_t = \beta_1 + \beta_2 Z^s_{i,t} + \mu^{s'}_t \quad [6]$$

And,

$$q_t = min(ld'_t, ls'_t) \quad [7]$$

where, q_t transitory bank lending, considered as the actual ratio; ld'_t and ls'_t denote the unobservable quantity of loan demanded and supplied at period t, respectively, $Z^d_{i,t}$ and $Z^s_{i,t}$ with i=1,2,…n are vectors of K_1 and K_2 exogenous explanatory variables that influence ld'_t and ls'_t. For identification, as Schmidt and Zwick (2012) implies, it is crucial that these vectors differ in at least one variable. a_2 and β_2 are (K_1,1) and (K_2,2) vectors of parameters. a_1 and β_1 are constants. $\mu^{d'}_t$ and $\mu^{s'}_t$ are independent random error terms with $\mu^{d'}_t \sim N(0, \sigma^2_{d'})$ and $\mu^{s'}_t \sim N(0, \sigma^2_{s'})$ respectively.

Methodology – Empirical Approach

- This paper builds upon the empirical work by *Schmidt and Zwick (2012)* and *Dumičić and Ljubaj (2017)* and apply a dynamic demand-supply disequilibrium model approach, as follows:

$$ld_t^{firms} = a_{11} + a_{12} ld_{t-j}^{firms} + a_{13} BLS_{t-j}^{d^{firms}} + a_{14} Z_{t-j}^{d^{firms}} + \mu_t^{d^{firms}} \quad [8]$$

$$ld_t^{HH} = a_{21} + a_{22} ld_{t-j}^{HH} + a_{23} BLS_{t-j}^{d^{HH}} + a_{24} \boldsymbol{Z_{t-j}^{d^{HH}}} + \mu_t^{d^{HH}} \quad [9]$$

$$ls_t^{firms} = \beta_{11} + \beta_{12} ls_{t-j}^{firms} + \beta_{13} BLS_{t-j}^{s^{firms}} + \beta_{14} Z_{t-j}^{s^{firms}} + \mu_t^{s^{firms}} \quad [10]$$

$$ls_t^{HH} = \beta_{21} + \beta_{22} ls_{t-j}^{HH} + \beta_{23} BLS_{t-j}^{s^{HH}} + \beta_{24} \boldsymbol{Z_{t-j}^{s^{HH}}} + \mu_t^{s^{HH}} \quad [11]$$

Where, $ld_t^{firms\prime}$ and $ld_t^{HH\prime}$ is the volume of CD by firms and households. $s_t^{firms\prime}$ and $s_t^{HH\prime}$ is the volume of CS provided by banks. BLS data related to easing credit standards on firms ($BLS_{t-j}^{s^{firms}}$) and households ($BLS_{t-j}^{s^{HH}}$) and increasing demand for loan by firms ($BLS_{t-j}^{d^{firms}}$) and households ($BLS_{t-j}^{d^{HH}}$). Finally, $Z_{i,t-j}^{d^{firms}}$ and $Z_{i,t-j}^{s^{firms}}$ is now a vector of variables related to other demand-side and supply-side factor explaining bank lending to firms, and similarly $Z_{i,t-j}^{d^{HH}}$ and $Z_{i,t-j}^{s^{HH}}$ represent those in the case of households.

Methodology – Credit Demand (Firms)

- This model is expressed mathematically as follows:

$$ld_t^{firms} = a_{11} + a_{12} ld_{t-j}^{firms} + a_{13}\left[BLS_{t-j}^{d^{firms}} ESI_{t+j}\right] \quad [12]$$
$$+a_{14} GDP_{t-j} + a_{15} PPI_{t-j} + a_{16} EC_{t-j}^{firms} + a_{17} i_{t-j}^{firms} + a_{18} DEP_{t-j}^{firms}$$
$$+ a_{19} REER_{t-j} + \mu_t^{d^{firms}}$$

Where, GDP_{t-j} denotes the level of economic performance and activity and controls the scale of economy; ESI_{t-j} represents expectation of firms' optimisms over the future performance of a given sector or the entire economy; PPI_{t-j} denotes an inflationary pressure indicator related to cost of production; EC_{t-j}^{firms} refer to demand consumption proxy by firms energy consumption, which is a proxy for firms degree of activity or firms investment behaviour; i_{t-j}^{firms} relates to bank lending rate to firms; DEP_{t-j}^{HH} captures effect with regards to internal available financial capital funds of firms; $REER_{t-j}$ refers exchange rate movements; a_i are empirical parameters to be estimated. Others are as previously explained.

Methodology – Credit Demand (Households)

- This model is expressed mathematically as follows:

$$ld_t^{HH} = a_{21} + a_{22} ld_{t-j}^{HH} + a_{23}\left[BLS_{t-j}^{d^{HH}} CC_{t+j}\right] + a_{24} W_{t-j} + a_{25} HPI_{t-j} + a_{26} EC_{t-j}^{HH} + a_{27} i_{t-j}^{HH} + a_{28} DEP_{t-j}^{HH} + a_{29} REER_{t-j} + \mu_t^{d^{HH}} \quad [13]$$

Where, W_{t-j} denotes wage bills, which is added to control the scale of economy; CC_{t-j} denotes consumer confidence; HPI_{t-j} refers to real estate prices; EC_{t-j}^{HH} is related to households energy consumption; i_{t-j}^{HH} relates to bank lending interest rate to households. DEP_{t-j}^{HH} captures effect with regards to stock of deposit claims by households. Others are as previously explained.

Methodology – Credit Supply (Firms)

- Consequently, the model is specified as follows:

$$ls_t^{firms} = a_{31} + a_{32}ls_{t-j}^{firms} + a_{33}\left(BLS_{t-j}^{s^{firms}} * GDP_{t+j}^{*}\right) + a_{34}LIQ_{t-j}^{tot} + a_{35}s_{t-j}^{firms} + a_{36}(Boone_{t-j} * BPI_{t-j}) + a_{37}(BSI_{t-j} * NPL_{t-j}^{firms}) + a_{38}REER_{t-j} + \mu_t^{d^{firms}} \quad [14]$$

And,

$$ls_t^{HH} = a_{41} + a_{42}ls_{t-j}^{HH} + a_{43}\left(BLS_{t-j}^{s^{HH}} * GDP_{t+j}^{*}\right) + a_{44}LIQ_{t-j}^{tot} + a_{45}s_{t-j}^{HH} + a_{46}\left(Boone_{t-j} * BPI_{t-j}\right) + a_{47}\left(BSI_{t-j} * NPL_{t-j}^{HH}\right) + a_{48}REER_{t-j} + \mu_t^{d^{firms}} \quad [15]$$

Where, ls_{t-j}^{firms} and ls_{t-j}^{HH} refer to the interest difference between the lending rate to firms and households compared to that of an asset risk-free borrowers; LIQ_{t-j}^{tot} denotes the financial ability of banks to lend from a capital disposable point of view; $Boone_{t-j}$ is an indicator related to bank competition; BPI_{t-j} refer to prudential behaviour of banks[1]; and BSI_{t-j} is a measure of bank stability conditions; NPL_{t-j}^{firms} and NPL_{t-j}^{HH} refer to the volume of non-performing loan with regards to firms and households. Others are as previously described.

[1] It is used previously by Shijaku (2019c).

Methodology – Data Generating Process

Table 1. The dataset included in the empirical approach.

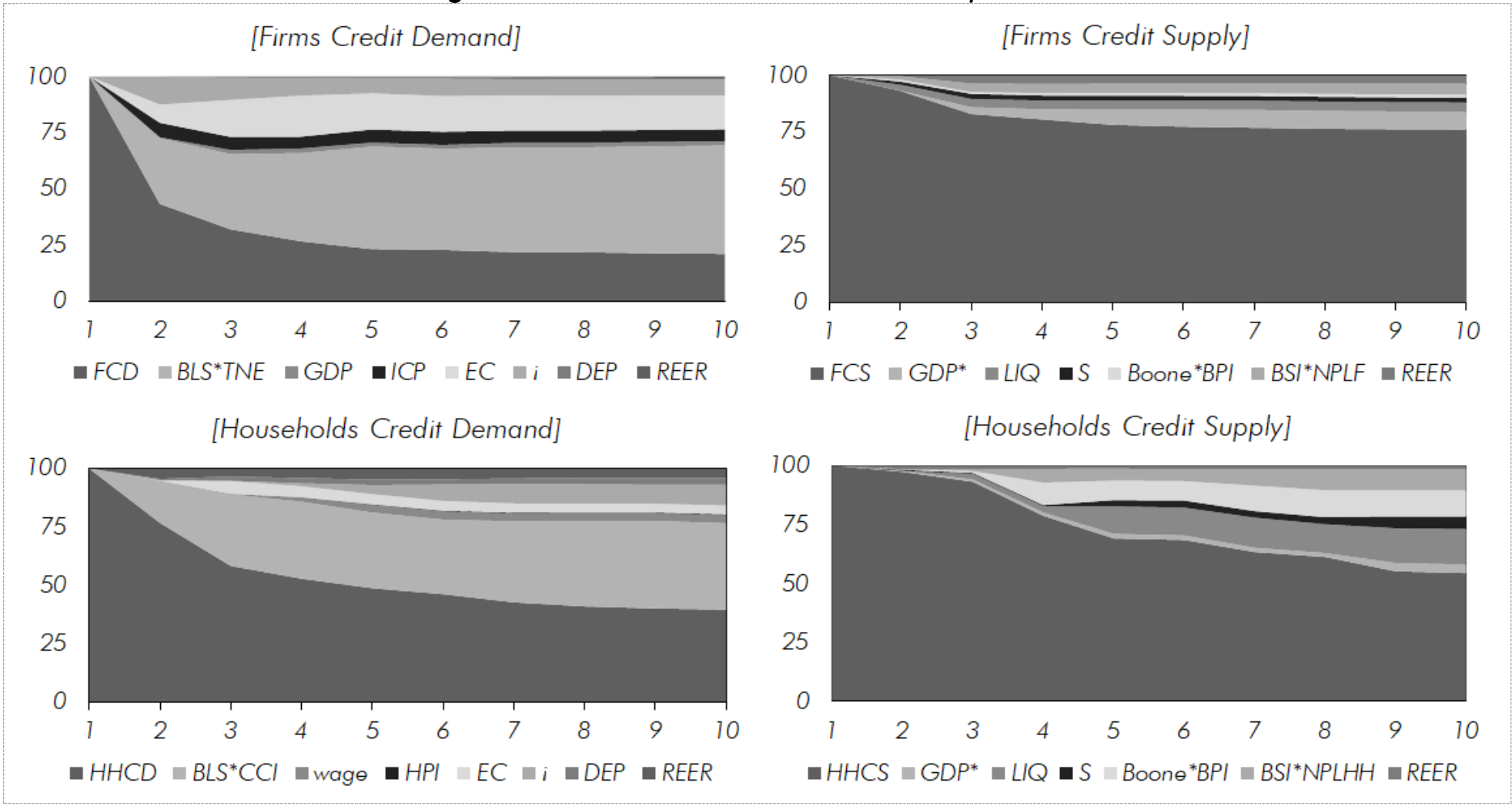
	L_t^{Firms}	-	end-period amounts of total new banking lending to firms / GDP (q_t^{Firms})
1	L_t^{HH}	-	end-period amounts of total new banking lending to households / GDP (q_t^{HH})
	ESI	-	Economic Sentiment Index
2	*CCI*	-	Consumer Confidence Index
	GDP	-	Annualised Gross Domestic Product
	*GDP**	-	Annual Real Economic Growth rate
3	*WAGE*	-	Average Wage Level in public and private sector in Albania
4	EC^F (EC^{HH})	-	Energy Consumption of firms and households (annualised by taking the moving sum of four quarters)
5	**i^F (i^{HH})**	**-**	**Average interest rate of lending to firms (households)**
	s^F (s^{HH})	-	Difference between the interest rate of bank lending to firms (and households) and the interest rate of 12 months T-Bills
6	*PPI*	-	Cost of production as measure by product cost index
	HPI	-	Housing price index
	REER	-	Real effective exchange rate
7	*Boone*	-	Boone indicator as an instrument of competition
	BSI	-	Bank stability index [Shijaku (2017)]
	BPI	-	Bank prudential behaviour [Shijaku (2019)]
	NPL^F (NPL^{HH})	-	non-performing loans related to firms and households
8	LIQ^{tot}	-	stock of active liquidity in the banking system as a ratio of GDP
	DEPT	-	total deposits in the banking sector / GDP
	DEPF (*DEPHH*)	-	total stock deposits of firms (and households) / GDP
	GFC	-	a financial crisis period dummy, being 1 during the period 2008 Q03 – 2010 Q04, and 0 otherwise
9	*EUROZONE*	-	a multi-year European debt crisis dummy, being 1 during the period 2009 Q03 – 2014 Q02, and 0 otherwise
	COVID	-	a pandemic crisis dummy, being 1 during the period 2020 Q1 to 2021 Q1, and 0 otherwise

Methodology – The Sample

- The sample includes quarterly data period 2007 Q4 – 2021 Q01.
- 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 between 2 – 4 depending on the results of the diagnostic tests;
  - Variance decomposition approach [Anderson, (2003)];
  - Analysis of the fitted value of credit demand and supply versus actual ratio;
- The data on quarterly CPI, GDP, WAGE, FEC and HEC are taken from the Albanian Institute of Statistics (INSTAT). Data related to BPI, BSI and Boone indicator are calculated by the author. The rest is taken from Bank of Albania.

Results – Variance Decomposition

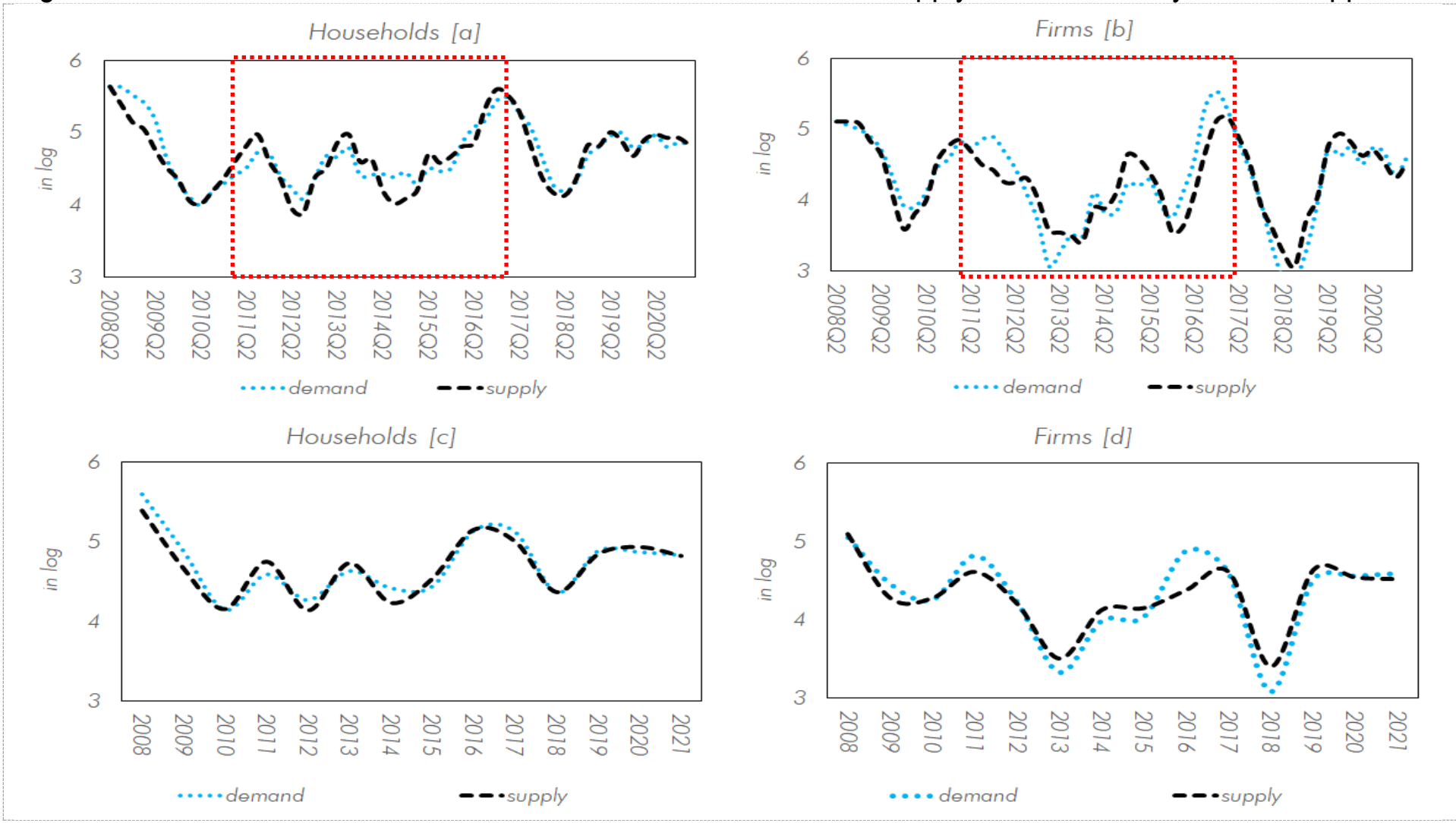
Figure 1. Results of Variance Decomposition.



Source: Author's Calculations

Results – Credit Crunch or Credit Rationing...(1)

Figure 2. The results of fitted value of credit demand versus credit supply as estimated by the VAR approach.



Source: Author's Calculations

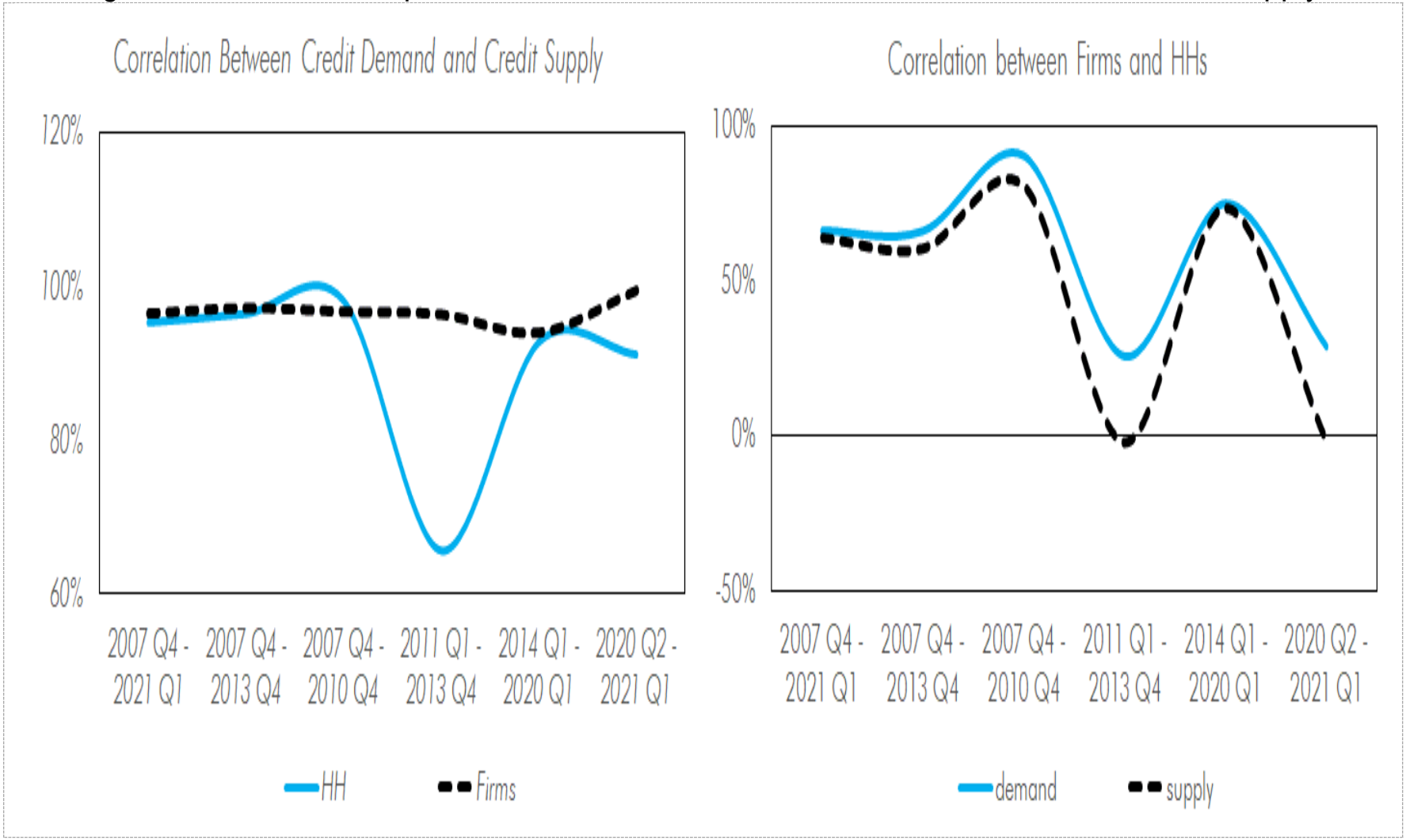
Results – Credit Crunch or Credit Rationing...(2)

Figure 3. The results of possible credit crunch episodes estimated as the difference between estimated fitted value of credit demand and supply, HH and Firms.

Source: Author's Calculations

Other Results...(1)

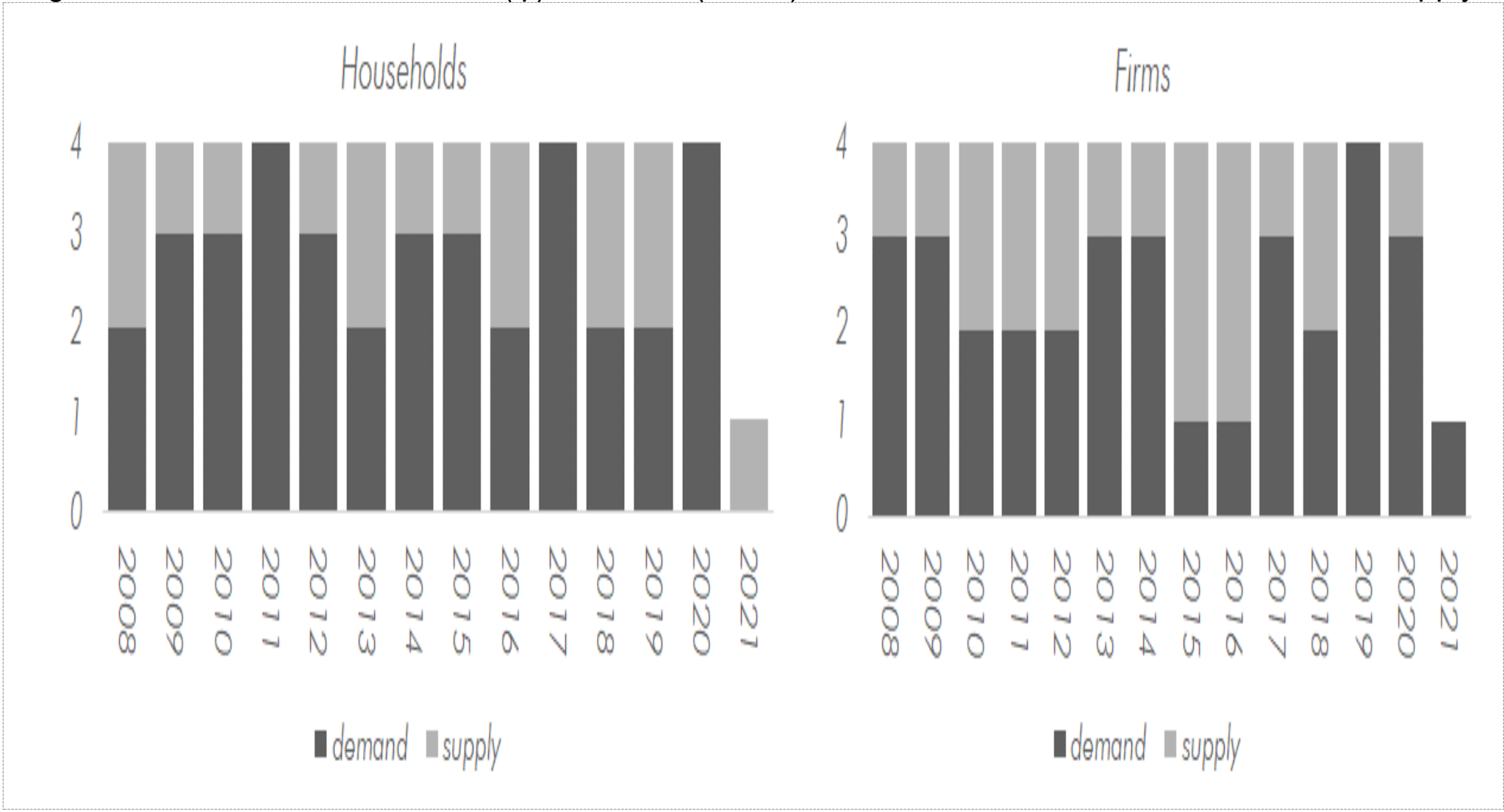
Figure 4. Results of simple correlation tests of the fitted value of credit demand and supply.



Source: Author's Calculations

Other Results...(2)

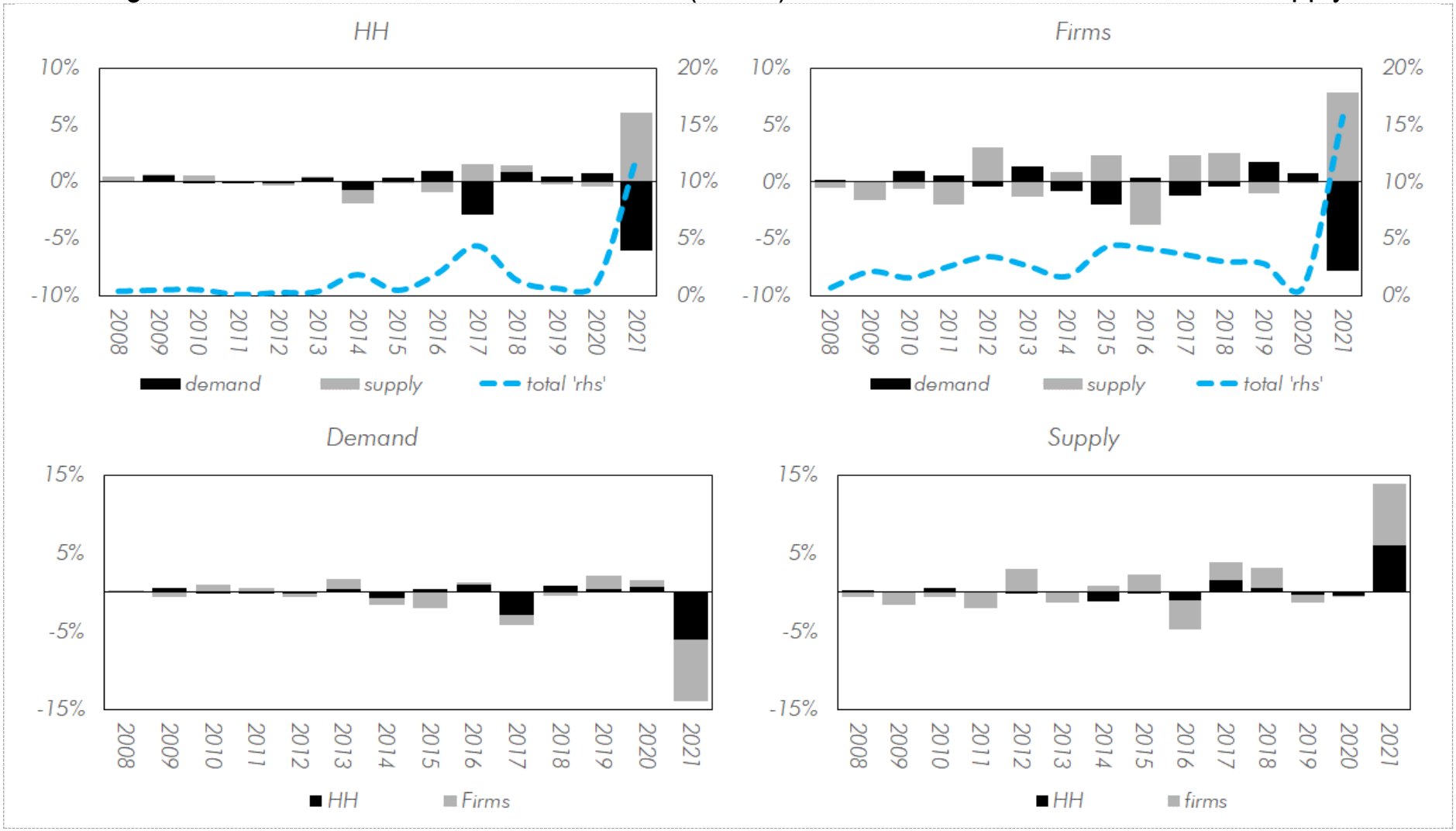
Figure 5. The difference between (q_t) new loan (actual) and estimated credit demand and credit supply.



Source: Author's Calculations

Other Results...(3)

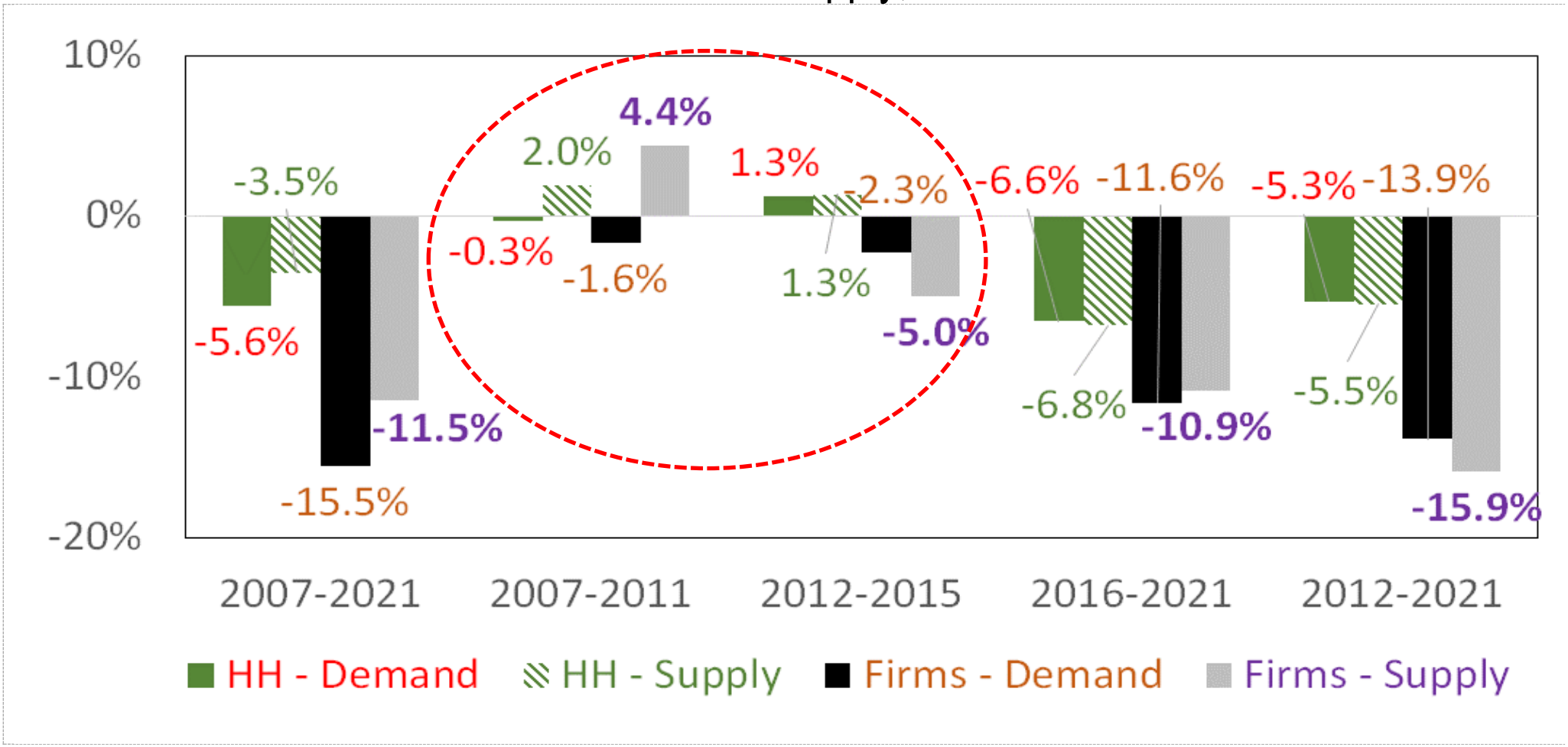
Figure 6. The difference between new loan (actual) and estimated credit demand and supply.



Source: Author's Calculations

Other Results...(4)

Figure 7. The credit patterns according to "sum up" differences between actual and estimated credit demand and supply, firms and households.



Source: Author's Calculations

Conclusions...

- The main empirical results demonstrate that:
  - Credit demand developments in Albania is mostly affected by confidence and propensity to invest.
  - Credit supply is mostly seemed to follow an autoregressive behaviour.
  - Other results do not support the hypothesis of credit crunch in the after math of global financial crisis. This is found to be the case also during the pandemic crisis of Covid-19. This set of evidences hold similarly in the case of firms and households.
  - These results do, however, provide evidence of credit rationing behaviour occurring at both demand-side and supply-side.
  - Patterns in credit market in Albania are homogenous between firms and households and banks.
- Future aspects should consider issue that are related to:
  - Credit rationing (credit crunch) for long and short term bank debt or lending in domestic versus FX currency.
  - The extent to which credit rationing (credit crunch) is effected by economic performance. Such understanding are also important for issues related to capital adequacy ratio and liquidity position.

Thank you for your attention!!!

Gerti SHIJAKU

gshijaku@bankofalbania.org