Interest differential and depreciation shocks on credit dollarization: Heterogeneous effects and dynamic spillover

The views expressed in this working paper correspond to those of the authors and do not necessarily reflect the position of the Central Reserve Bank of Peru.

BCRP

Motivation

- Credit dollarization in firms arises from the continuous interaction of macrofinancial forces.
- Key factors include exchange rate fluctuations, interest rate differentials, and the overall development of financial sector.
- Specific contributions of each factor can vary over time, across firms, economic sector and by geographic regions.
- Large corporations and smaller firms face markedly different borrowing conditions, both in terms of access to credit and financing costs.

Motivation

Table: Regression Results: Loan Dollarization by Firm Size

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	**DOL**	**DOL**	**DOL**	**DOL**	**DOL**	**DOL**
Sample	Full	Corporate	Large	Mid Size	Small	Micro
DOL(-1)	0.959***	0.894***	0.925***	0.959***	0.971***	0.864***
DEP(-6)	-0.00659***	-0.0640***	-0.0529***	-0.0108***	-0.00321***	-0.00189***
ID	0.00206***	0.298***	0.420***	0.0913***	-0.00230***	-2.14e-05
ERV	-0.107***	-0.156**	-0.209***	-0.259***	-0.0367***	-0.00770**
Constant	0.253***	4.537***	3.021***	0.412***	0.0580***	0.258***
Observations	11,151,902	110,861	586,569	2,423,974	6,034,693	1,994,575
R-squared	0.972	0.928	0.939	0.966	0.974	0.961

Notes: The table reports estimation results from single-equation regressions where the dependent variable is the loan dollarization ratio (DOL). Each column represents regressions for different firm types. The independent variables include lagged loan dollarization (DOL(-1)), depreciation (DEP(-6)), interest differential (ID), and exchange rate volatility (ERV). *** Statistically significant at 1%, ** statistically significant at 5%, * statistically significant at 10%. Robust standard errors. Period: 2010:M10-2024:M2.

Motivation

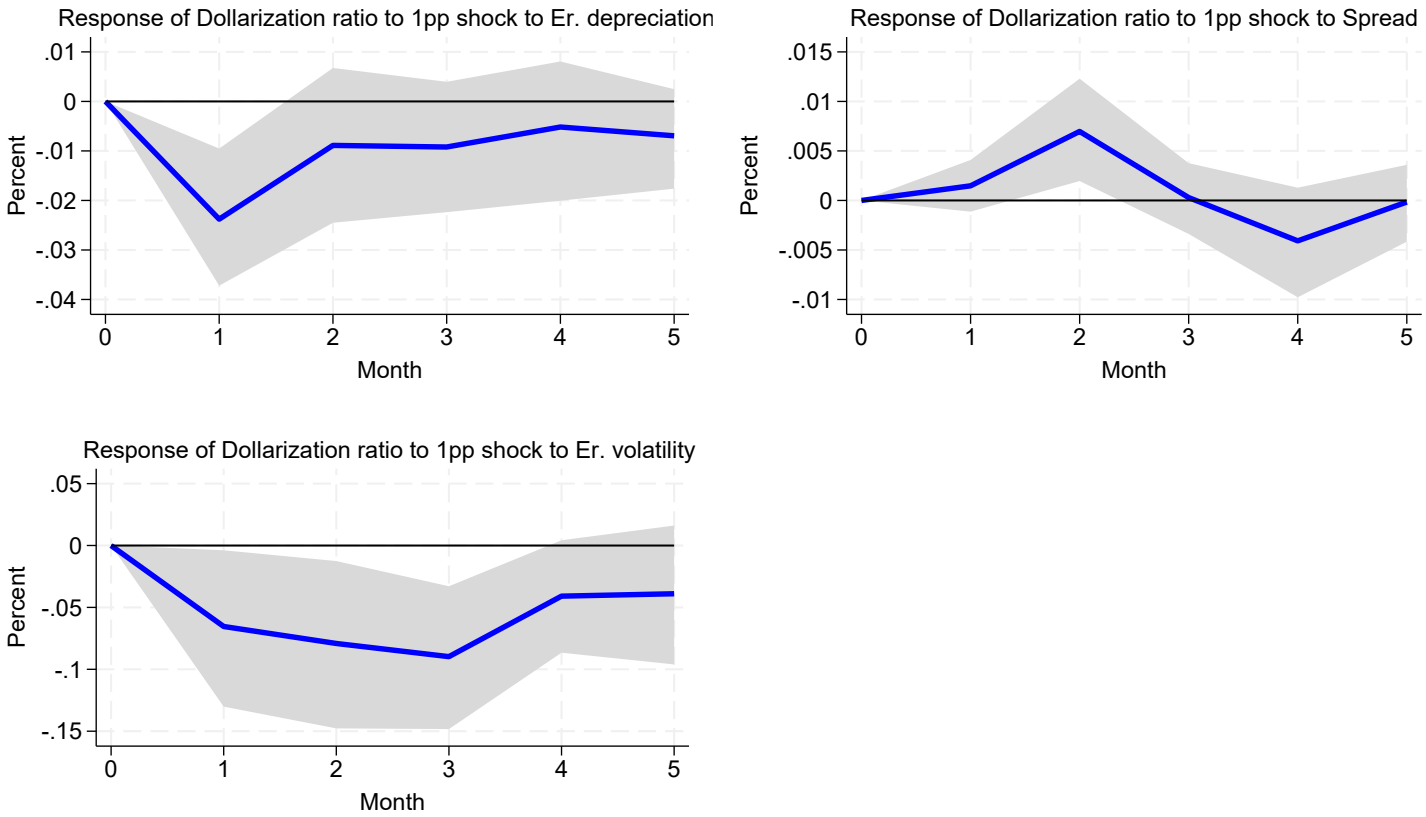


Figure: Local projections impulse response on Dollarization ratio. This figure shows the estimated coefficient from regression Equation, accompanied by a confidence interval of 90%. Period: 2010m10-2024m4.

Contribution and main ideas

- Larger firms demonstrate greater resilience to financial shocks, likely due to their access to foreign currency income and hedging instruments, whereas smaller firms are more vulnerable to interest rate differentials and exchange rate volatility.
- We found negative impact of dollarization shocks during 2013 and 2014, providing empirical support for the Central Bank's de-dollarization program in successfully reducing the credit dollarization ratio.
- Connectivity Analysis: exploring interconnectedness between firms' credit dollarization and macro-financial factors, using Diebold and Yilmaz's (2012) approach to measure shock transmission.

Literature

- Interest rate differentials and exchange rate depreciation drive foreign currency borrowing (Rosenberg & Tirpák, 2008; Catao, M. L. Terrones 2016).
- Interest rate differentials influence loan and deposit dollarization (Gutierrez et al., 2023).
- Firms borrow in foreign currency when domestic rates are higher (Keloharju & Niskanen, 2001).
- Greater access to foreign funds increases credit dollarization (Basso et al., 2007).
- Small firms' borrowing tied to foreign revenues, not carry trade (Brown et al., 2011).

Literature

- Small firms face higher loan spreads, pay more than large firms (Chodorow-Reich et al., 2022).
- Corporate firms manage exchange rate risk better than smaller firms (Martínez & Werner, 2002).
- Large firms use the dollar for revenue and expenses, limiting currency mismatches (Fernández et al., 2020).
- Exchange rate depreciation and debt cost affect dollar credit (Cowan, 2006).
- Corporate firms have better tools to manage exchange rate risk, using hedging instruments (Abbassi & Bräuning, 2023).

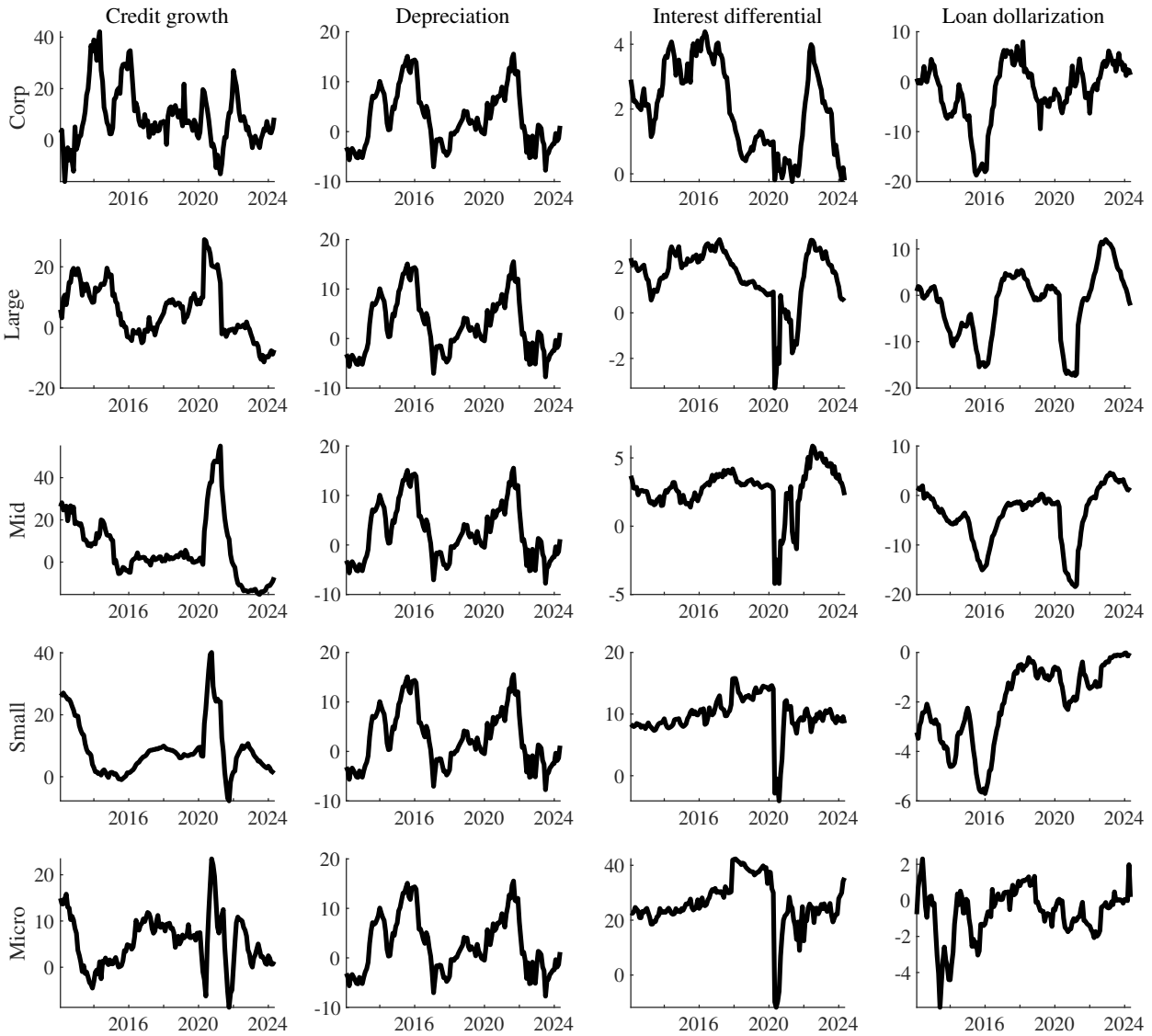
Methodology

- We estimate a Panel VAR to capture the differential impact of specific shocks on credit dollarization across firms of varying sizes.
- Connectedness Analysis:
- This analysis by providing a broader perspective on how these shocks propagate through the economy, influencing firm-level decisions on the composition of credit between foreign and local currencies.
- We estimate the models using 60-month rolling windows with a 10-step-ahead forecast horizon.

Data

- Covers 2010-2024 with 153 monthly observations.
- Key variables by firm size:
- Credit growth,
- Depreciation,
- Interest rate differencial and
- Credit dollarization ratio.

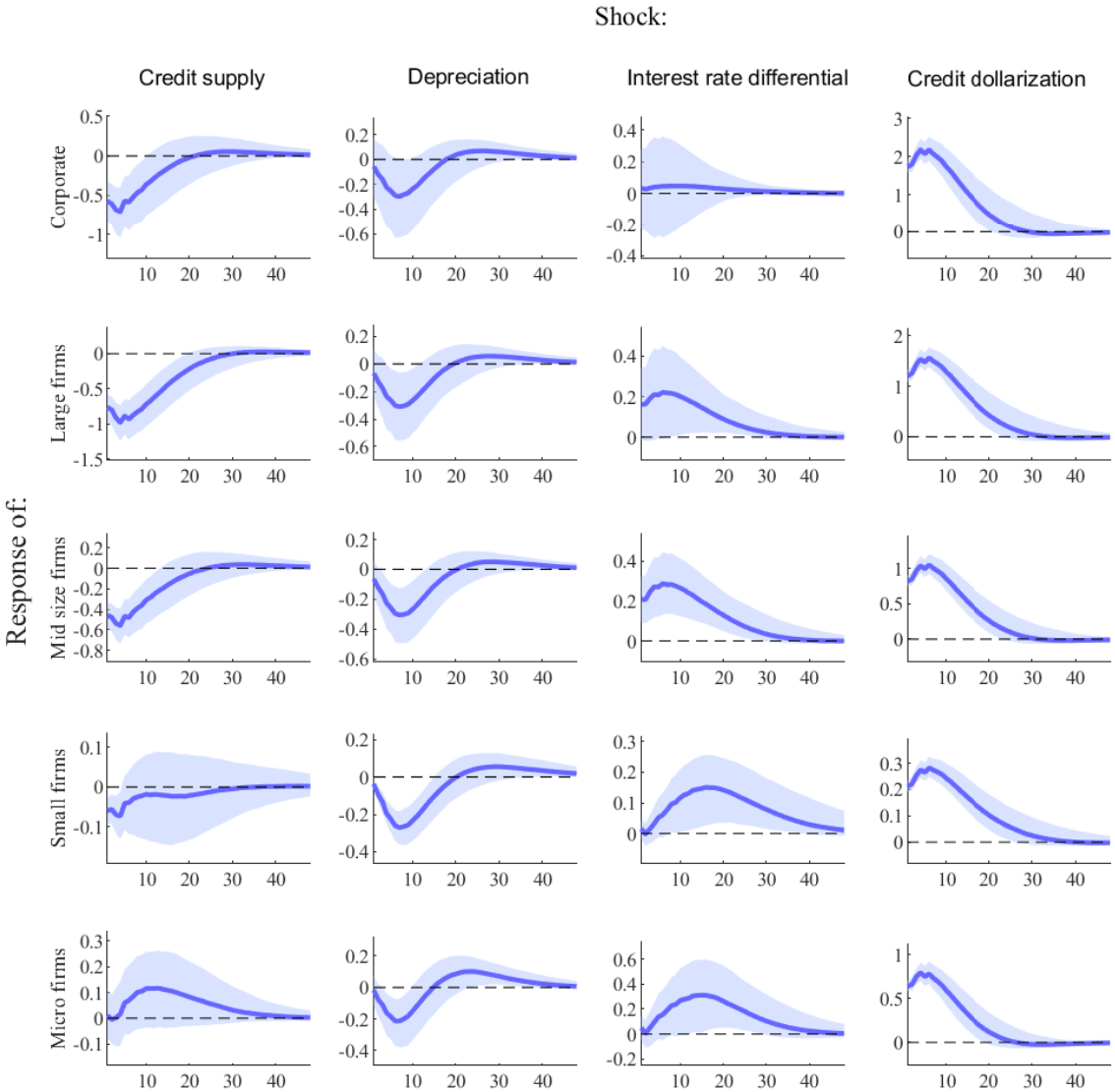
Data


Credit growth
Depreciation
Interest differential
Loan dollarization
Corp
Large
Mid
Small
Micro
2016
2020
2024

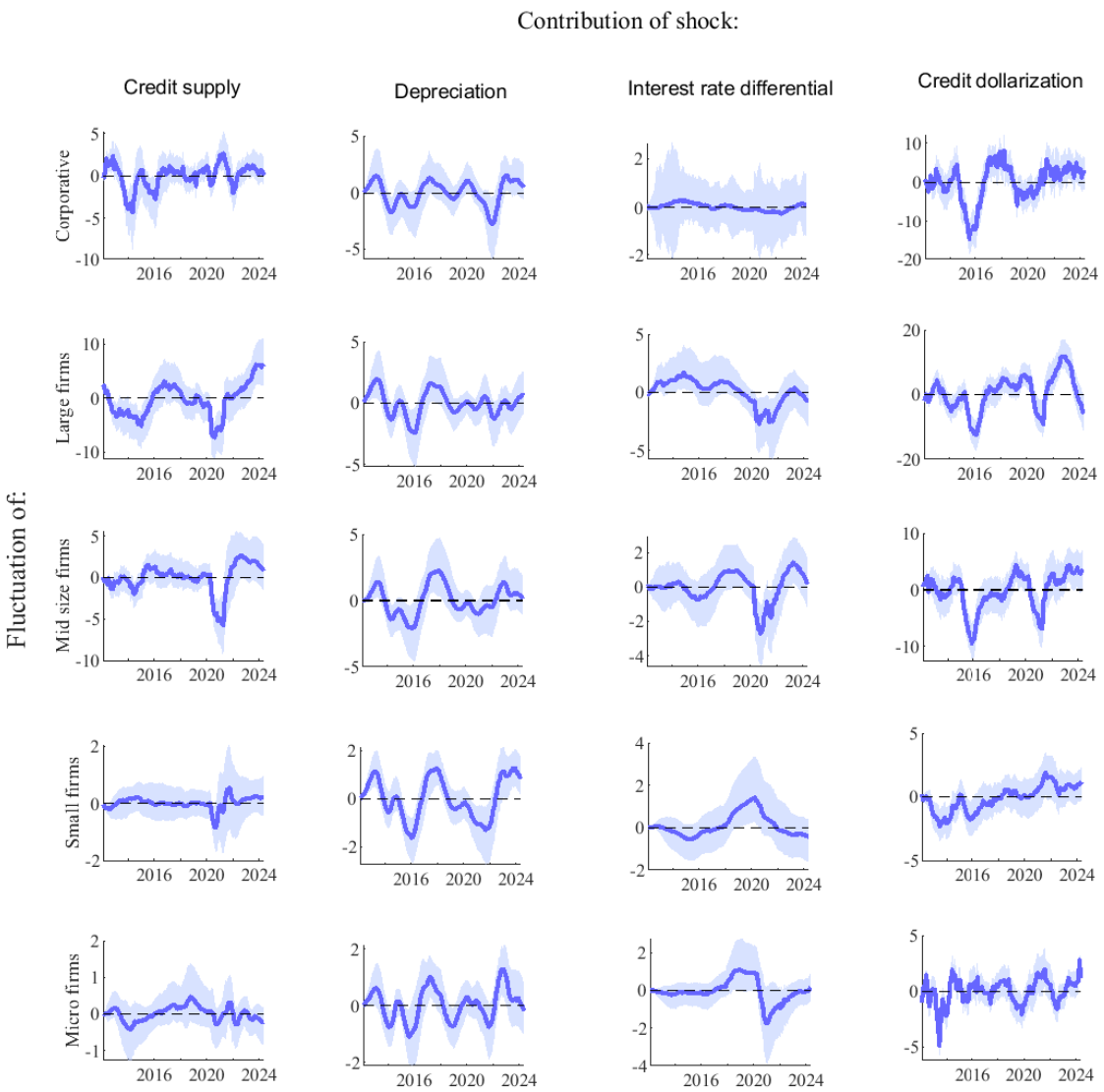
Results

- Exchange rate depreciation shocks have a negative impact on credit dollarization across all firm types.
- Corporate firms appear to have no significant response to either depreciation or interest rate differential shocks.
- Smaller firms, particularly small and micro firms, exhibit more pronounced responses to both depreciation and interest rate differential shocks.

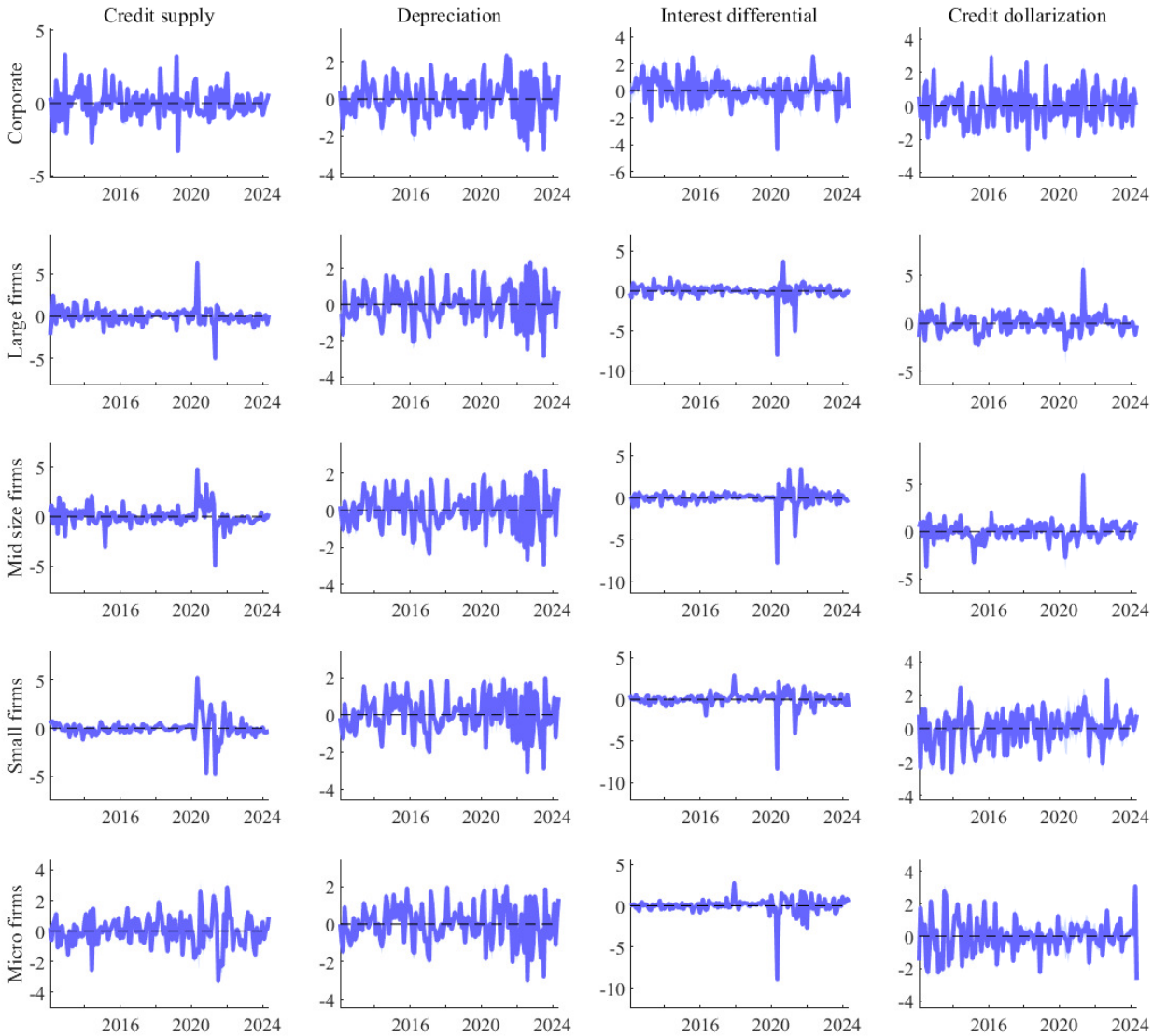
Impulse responses



HD


Contribution of shock:
Credit supply
Depreciation
Interest rate differential
Credit dollarization
Fluctuation of:
Corporative
Large firms
Mid size firms
Small firms
Micro firms
2016
2020
2024

Structural shocks



Total connectedness index

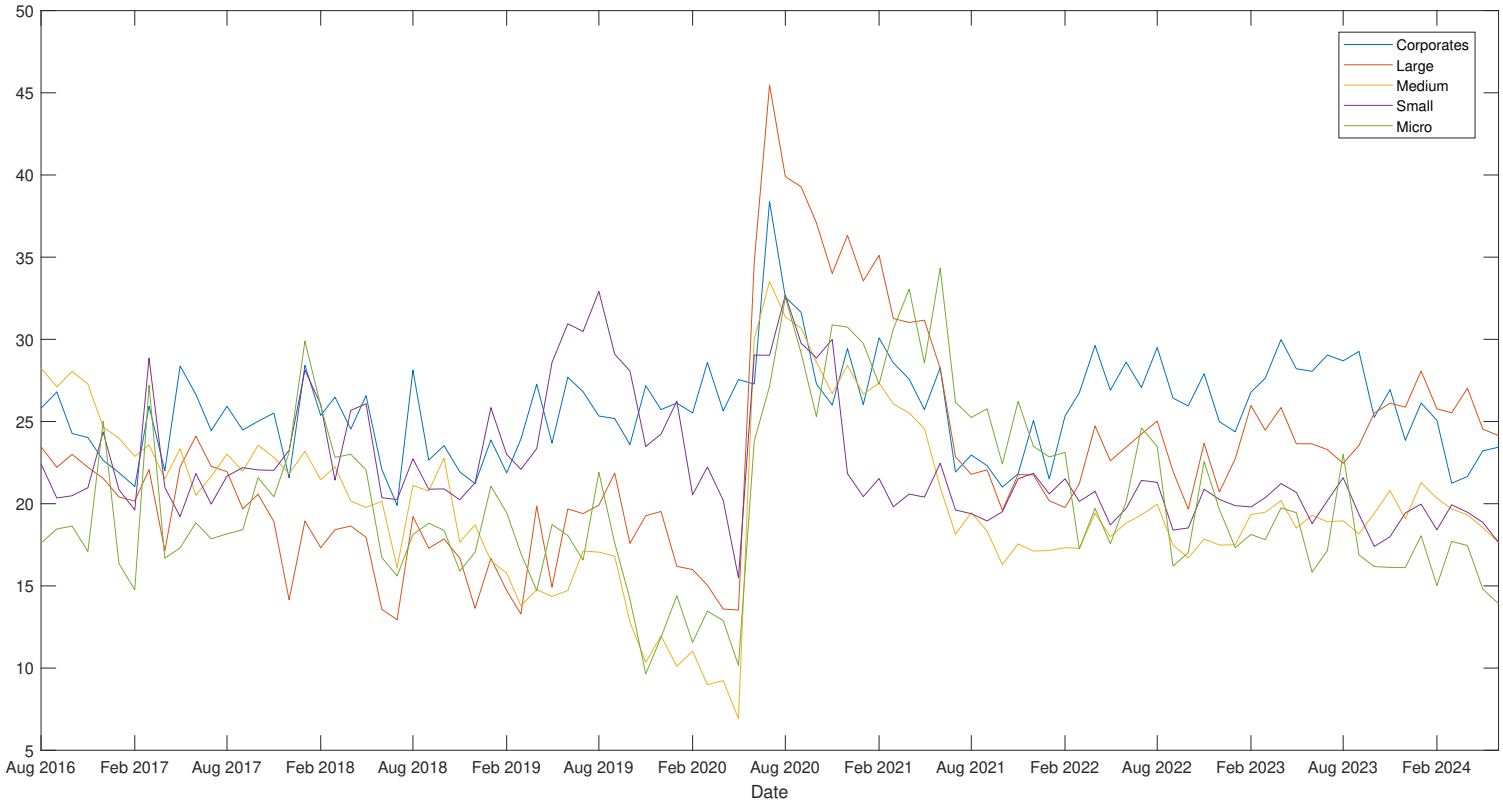


Figure: Dynamic total connectedness between credit supply, depreciation, interest rate differential shocks, and the credit dollarization by type of firms. Notes: Results are based on all 60-month rolling-window models with a 10-step-ahead forecast horizon.

Directional spillover TO

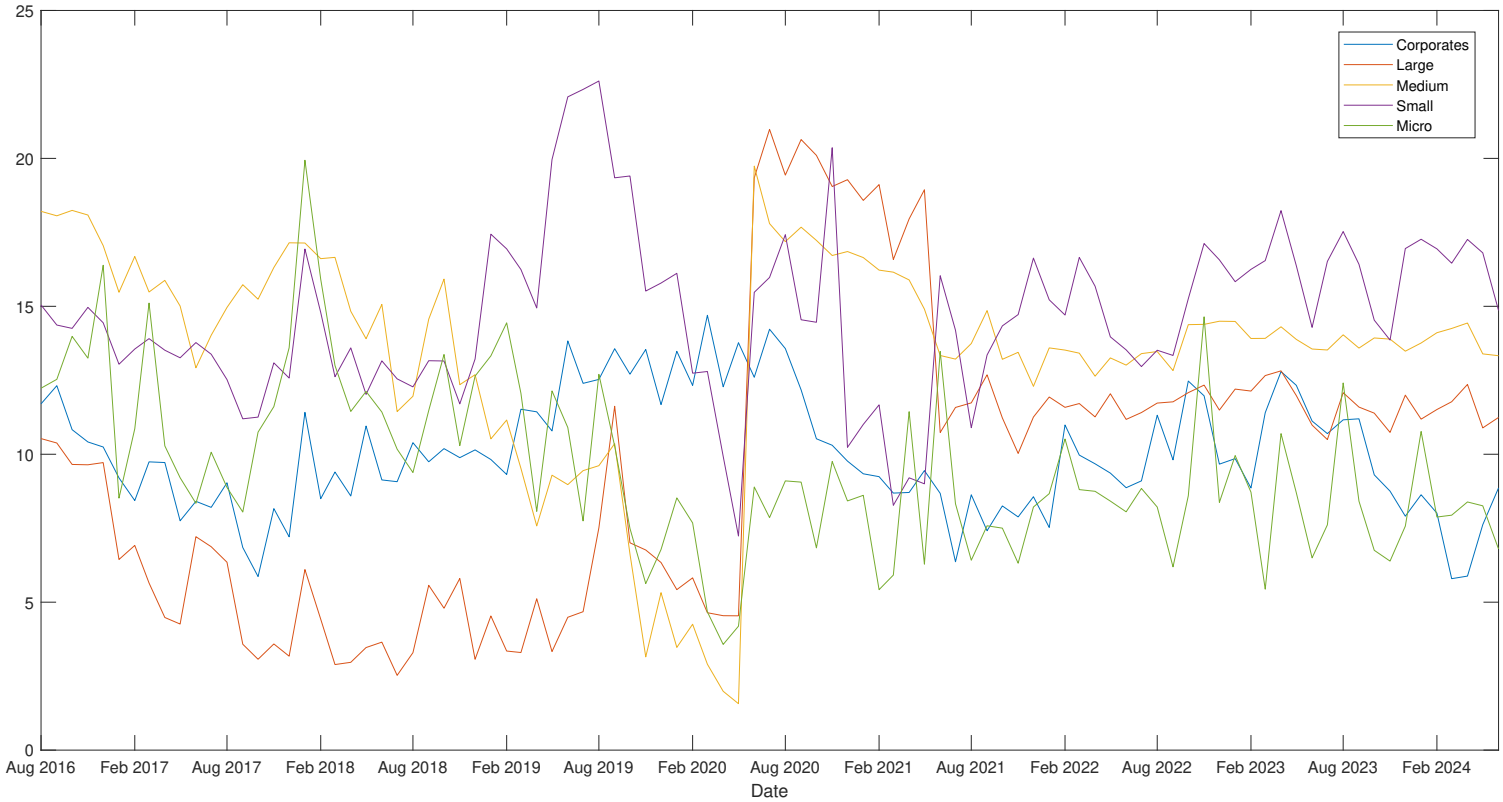


Figure: Dynamic spillover from all shocks to credit dollarization by type of firm. Notes: Results are based on all 60-month rolling-window models with a 10-step-ahead forecast horizon.

Directional spillover FROM

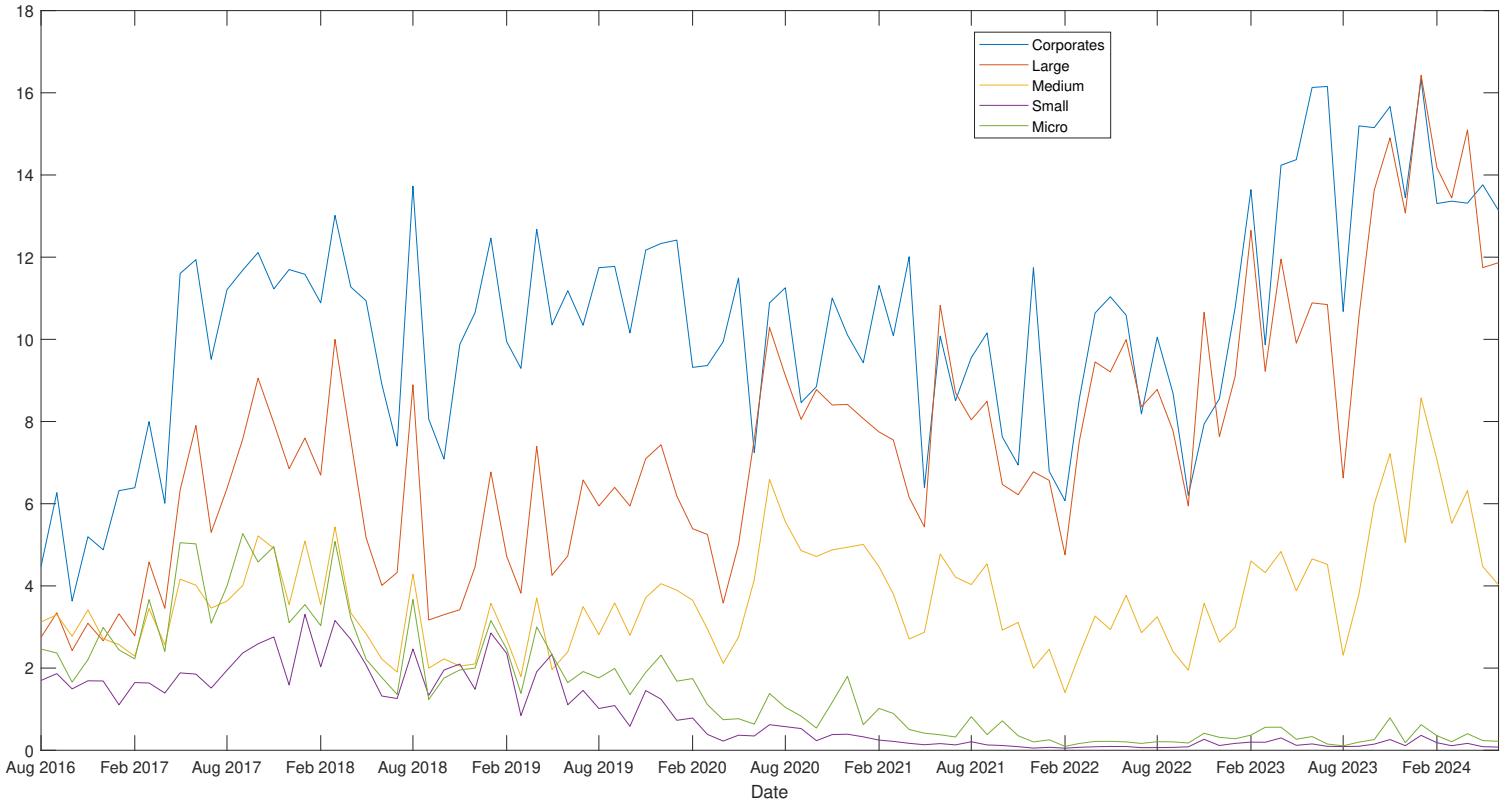


Figure: Dynamic spillover from credit dollarization shocks to all other variables by type of firm. Notes: Results are based on all 60-month rolling-window models with a 10-step-ahead forecast horizon.

TCI firm sizes

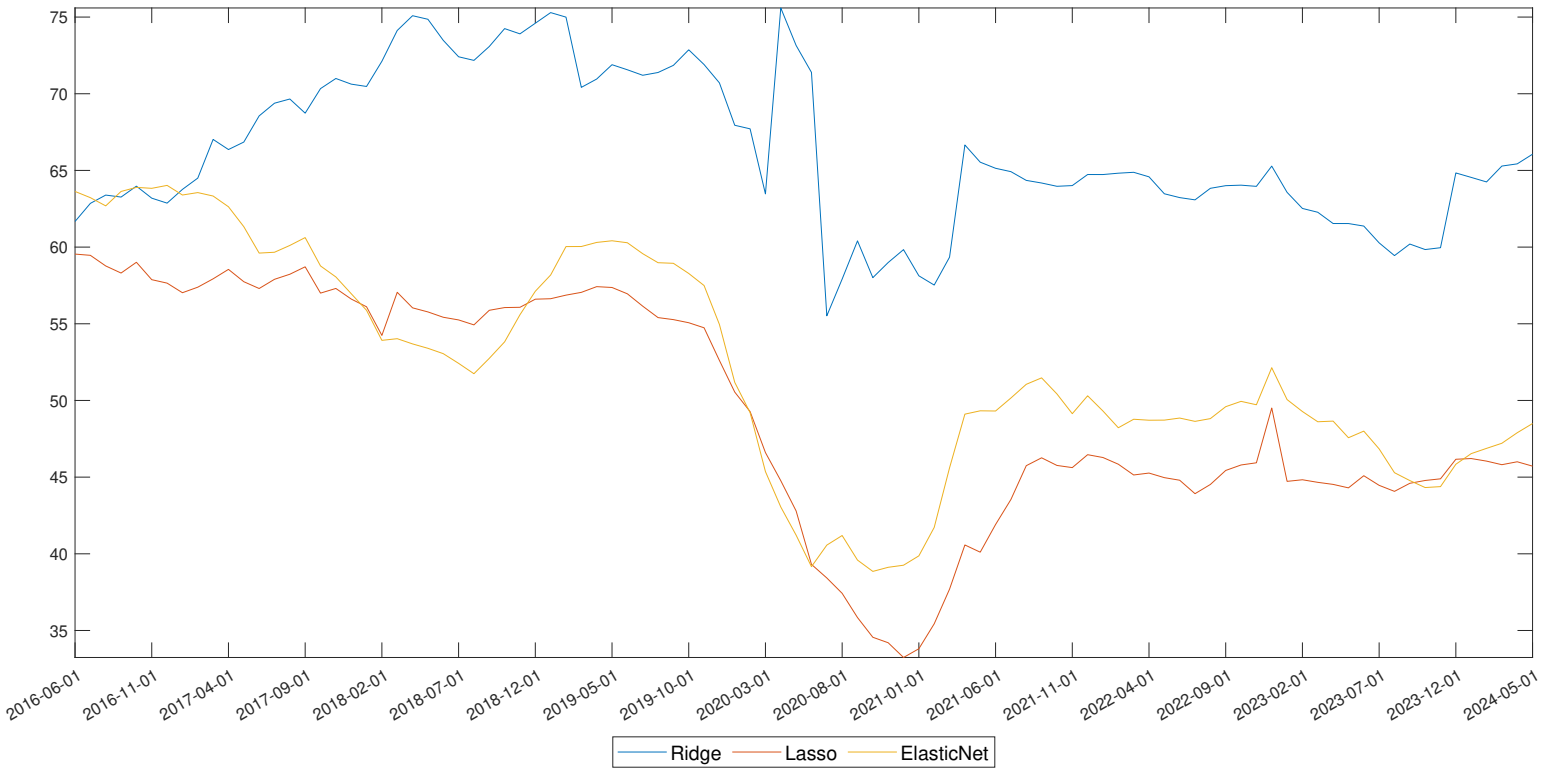


Figure: Dynamic total connectedness between type of firms. Notes: Results are based on all 60-month rolling-window models with a 10-step-ahead forecast horizon.

TCI sectors

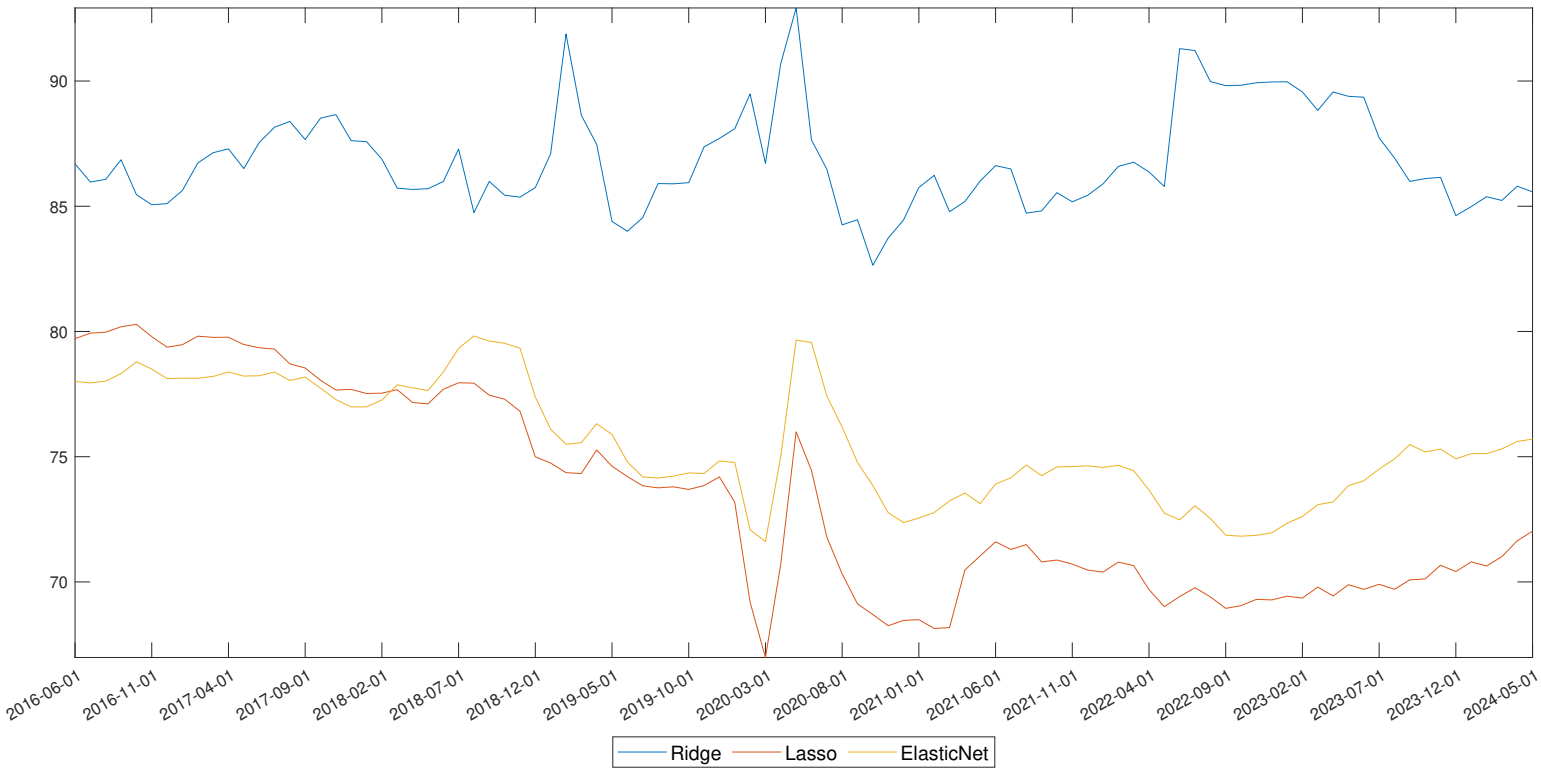


Figure: Dynamic total connectedness of firms between sectors. Notes: Results are based on all 60-month rolling-window models with a 10-step-ahead forecast horizon.

TCI regions

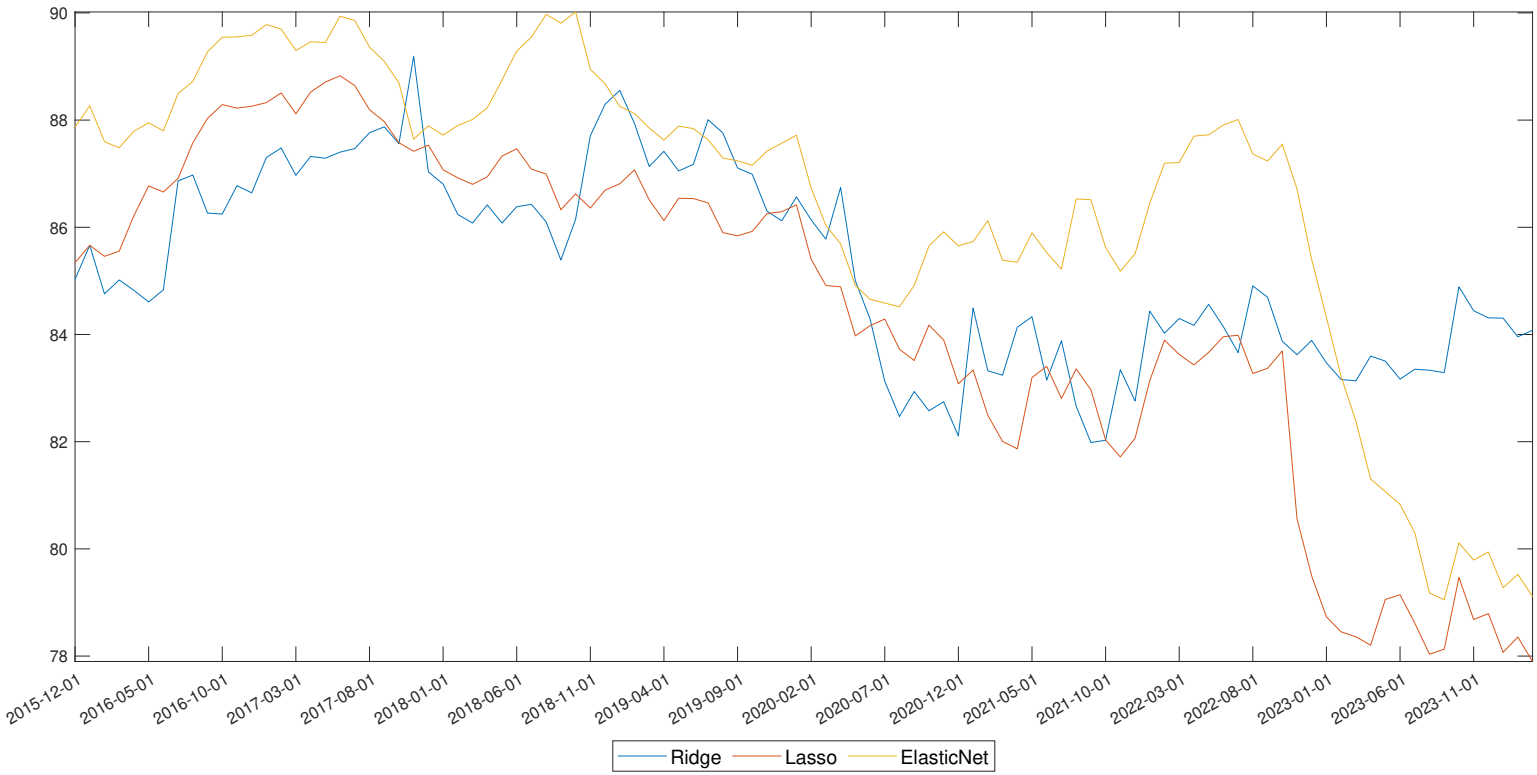


Figure: Dynamic total connectedness of firms across regions. Notes: Results are based on all 60-month rolling-window models with a 10-step-ahead forecast horizon.

Net spillover: firm sizes

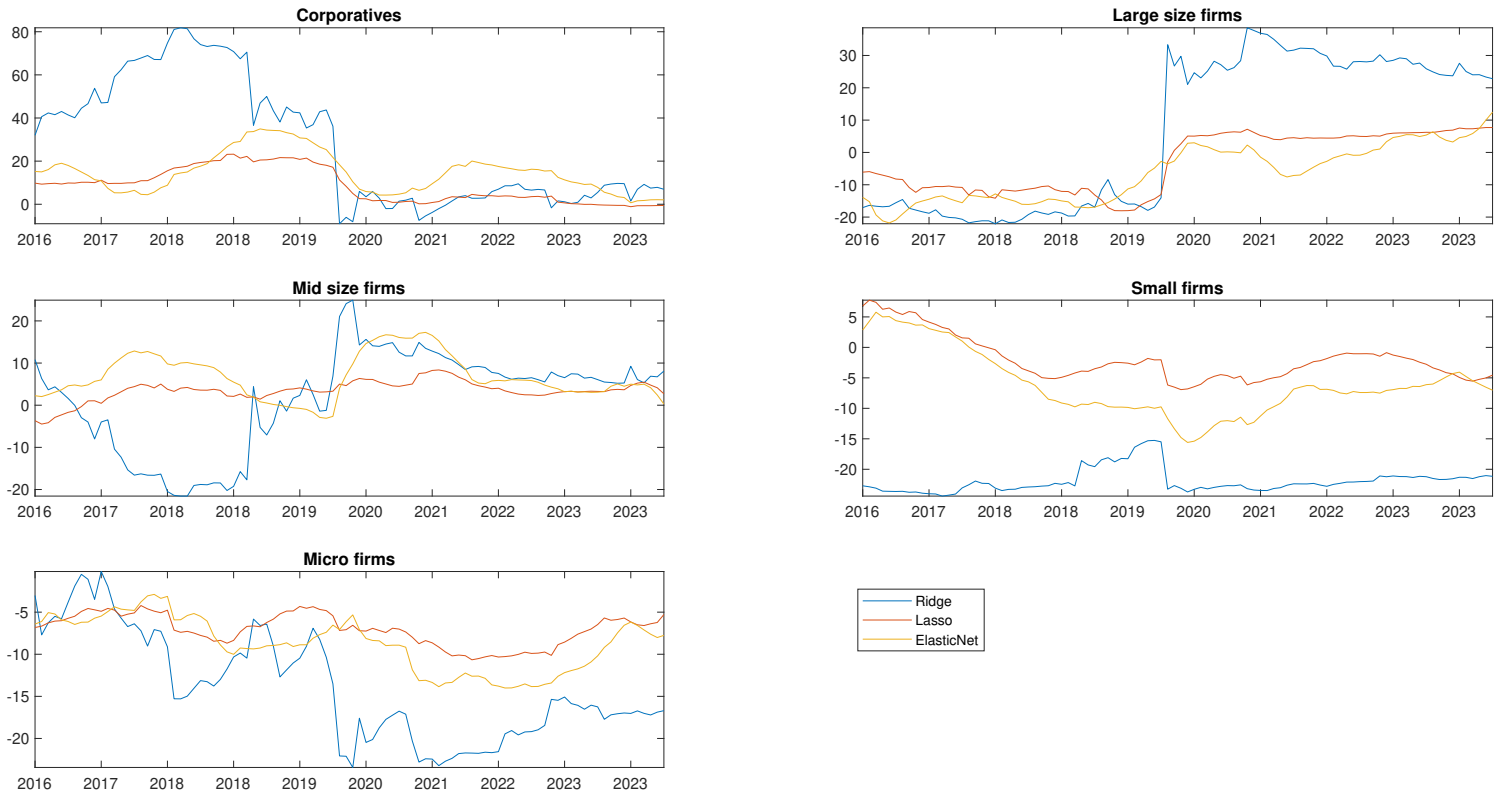


Figure: Net total directional connectedness by type of firms. Notes: Results are based on all 60-month rolling-window models with a 10-step-ahead forecast horizon.

Net spillover: sectors

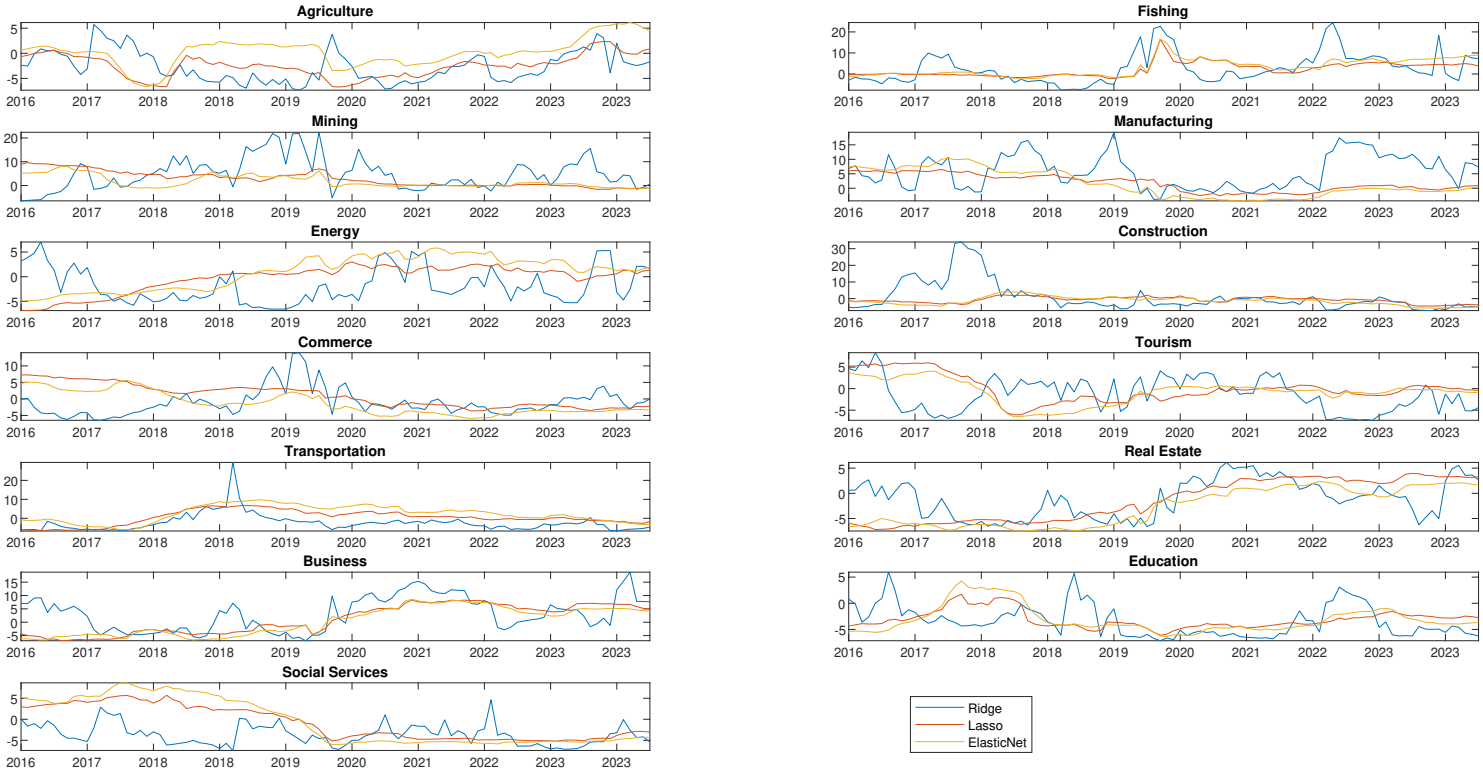


Figure: Net total directional connectedness between sectors. Notes: Results are based on all 60-month rolling-window models with a 10-step-ahead forecast horizon.

Net spillover: regions

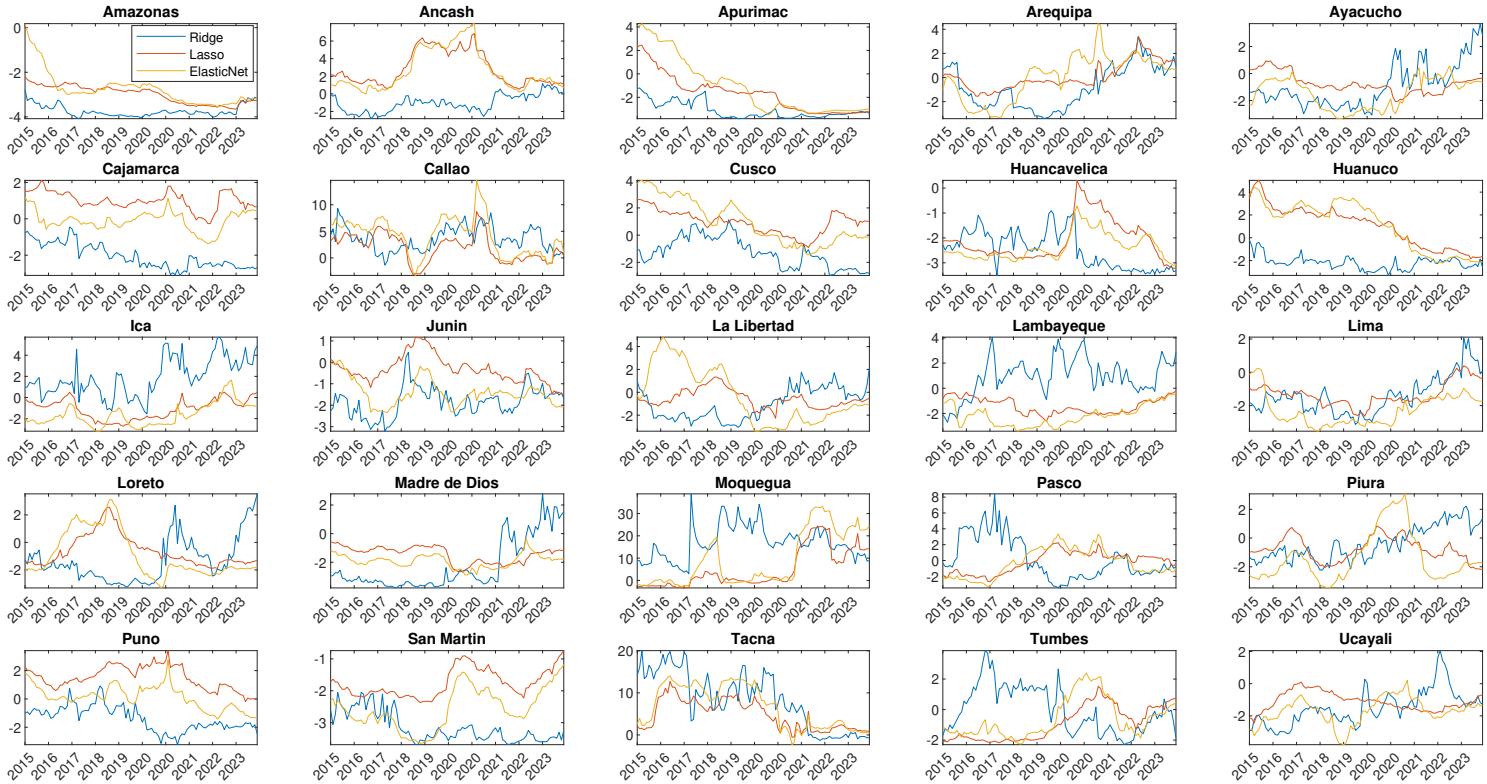


Figure: Net total directional connectedness between regions. Notes: Results are based on all 60-month rolling-window models with a 10-step-ahead forecast horizon.

Net spillover: macroregions

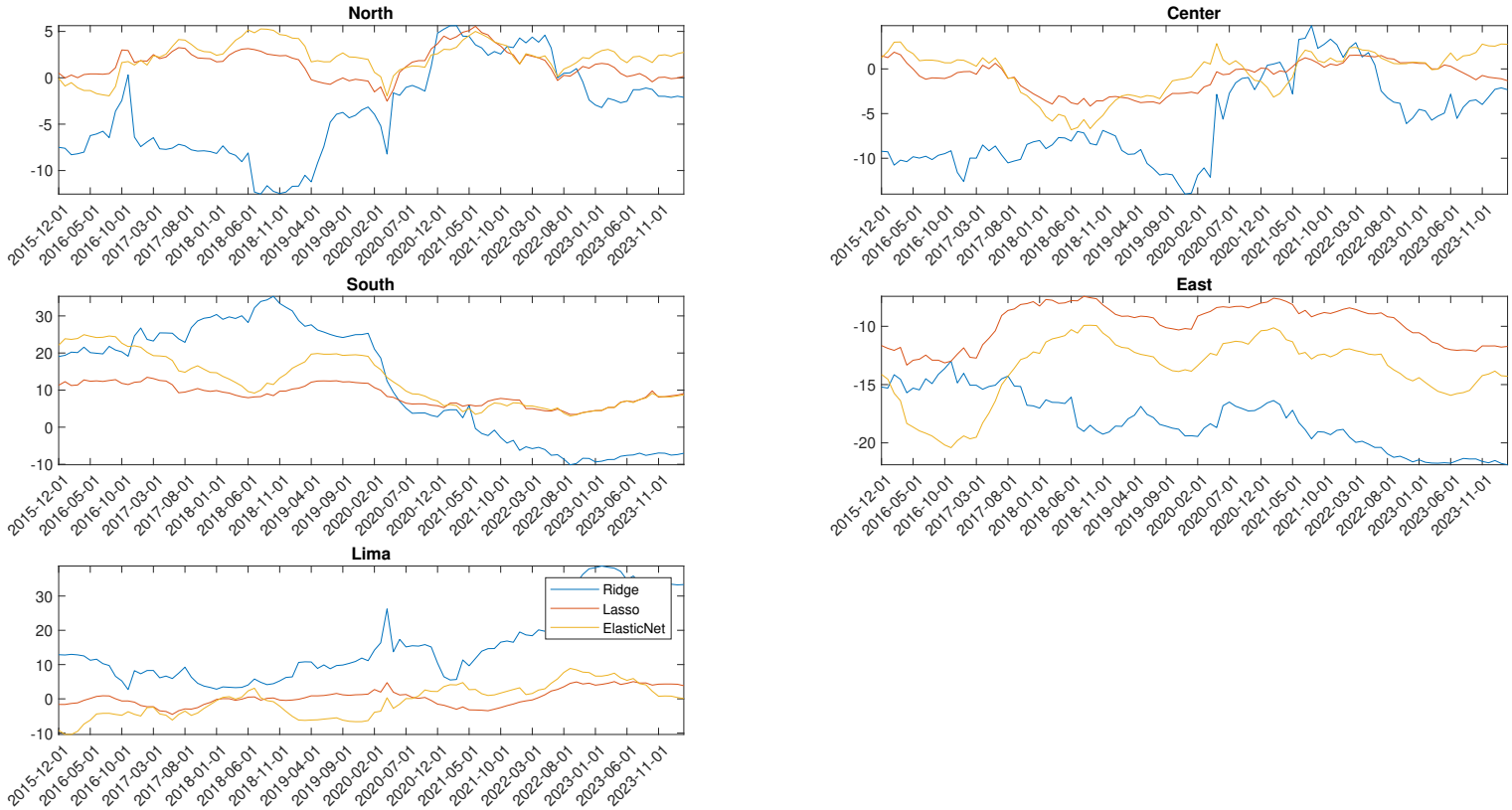


Figure: Net total directional connectedness between macro - regions. Notes: Results are based on all 60-month rolling-window models with a 10-step-ahead forecast horizon.

Table: Determinants of total and net directional spillovers

Variables	GDP	Inflation	Policy rate	Depreciation	Interest differential	Constant	R-squared
TCI	0.134***	0.00685	1.154***	0.400***	3.536***	24.26***	0.634
NET							
Corporatives	-0.105*	0.654	-1.483**	-0.236	0.111	17.61***	0.064
Large firms	-0.0592	0.0575	0.375	-0.248*	-3.799***	16.78***	0.609
Mid size firms	0.163***	0.448***	-1.287***	-0.0240	0.0564	9.065***	0.367
Small firms	0.0511***	-0.0729	1.855***	0.464***	2.863***	-31.85***	0.838
Micro firms	-0.0501***	-1.087***	0.540***	0.0442	0.768***	-11.61***	0.895

Notes: The table reports estimation results from single-equation regressions where the dependent variable is the TCI and NET directional spillovers. Each column represents regressions for series of loan dollarization ratios by types of firms, sectors and regions. The independent variables include GDP growth, inflation, policy rate, depreciation and interest differential. *** Statistically significant at 1%, ** statistically significant at 5%, * statistically significant at 10%. Robust standard errors. Period: 2010:M10-2024:M2 (95 observations).

Table: Determinants of total and net directional spillovers

Variables	GDP	Inflation	Policy rate	Depreciation	Interest differential	Constant	R-squared
TCI	-0.000813	-0.507***	0.380***	0.127***	0.717***	71.22***	0.552
NET							
Agriculture	-0.0312**	-0.639***	1.219***	0.179**	-0.455***	0.875	0.454
Fishing	-0.0707	0.118	-0.0656	-0.0720	-1.306***	11.57***	0.360
Mining	-0.0352**	0.0890	0.224*	0.208***	1.132***	-6.964***	0.438
Manufacturing	0.0256	-0.690***	0.914***	0.0787	1.993***	-12.25***	0.809
Energy	-0.0204	0.693***	-0.911***	-0.150***	-1.381***	10.76***	0.833
Construction	-0.00746	-0.00401	-0.744***	-0.0636	-0.215	2.823**	0.393
Commerce	-0.00477	-0.472***	0.452***	0.122**	1.586***	-11.61***	0.854
Tourism	0.0112	0.448***	0.236	0.228***	1.141***	-11.00***	0.330
Transportation	-0.0431**	0.0748	-1.297***	-0.154	-1.336***	15.65***	0.495
Real Estate	0.0136	0.561***	0.0258	-0.0224	-1.256***	3.139**	0.700
Business	0.0569***	0.951***	-0.559***	-0.110	-1.913***	11.13***	0.744
Education	0.0418**	-0.225*	0.0386	-0.264***	-0.00492	-2.066	0.269
Social Services	0.0637*	-0.906***	0.467**	0.0206	2.016***	-12.05***	0.735

Notes: The table reports estimation results from single-equation regressions where the dependent variable is the TCI. Each column represents regressions for series of loan dollarization ratios by types of firms, sectors and regions. The independent variables include GDP growth, inflation, policy rate, depreciation and interest differential. *** Statistically significant at 1%, ** statistically significant at 5%, * statistically significant at 10%. Robust standard errors. Period: 2010:M10-2024:M2 (95 observations).

Table: Determinants of total and net directional spillovers

Departamento	GDP	Inflation	Policy rate	Depreciation	Interest differential	Constant	R-squared
TCI	0.0363**	0.711***	-1.001***	-0.109**	1.304***	79.03***	0.664
NET							
Amazonas	-0.00844***	-0.106***	0.105***	0.0637***	0.175***	-4.093***	0.620
Ancash	-0.0529***	-0.229***	-0.635***	-0.0391	-0.588***	9.857***	0.654
Apurimac	0.0246***	-0.172***	0.413***	0.182***	1.218***	-10.45***	0.892
Arequipa	-0.00647	0.246***	-0.197***	0.0210	-0.780***	4.913***	0.796
Ayacucho	0.00523	0.269***	0.296***	0.0883***	0.323***	-5.729***	0.668
Cajamarca	-0.00457	-0.194***	0.131***	0.0404***	-0.0680***	0.471*	0.412
Callao	0.0779**	-0.133	-0.766***	-0.0143	0.569***	3.312*	0.471
Cusco	0.00150	-0.261***	0.327***	0.0970***	0.756***	-4.445***	0.900
Huancavelica	0.000315	0.126***	-0.138***	0.0248**	-0.0605***	-1.976***	0.606
Huanuco	-0.0113***	-0.325***	-0.261***	-5.66e-05	0.579***	-0.744	0.821
Ica	0.00151	0.167***	0.274***	0.0171	-0.0353	-3.009***	0.712
Junin	0.00542*	0.0142	0.108***	0.0699***	0.0904**	-2.640***	0.174
La Libertad	0.0290*	-0.350***	0.792***	0.224***	1.262***	-10.47***	0.804
Lambayeque	0.00466	-0.00987	0.271***	0.0338*	-0.118**	-2.487***	0.556
Lima	0.00675	0.0929***	0.227***	0.0431*	-0.0329	-3.447***	0.701
Loreto	0.0312**	-0.326***	0.0395	-0.0761	0.229**	-1.216	0.405
Madre de Dios	0.00424**	-0.0161	0.139***	-0.00641	0.0205	-2.512***	0.505
Moquegua	-0.0369	1.626***	1.090**	-0.609***	-3.796***	25.74***	0.785
Pasco	-0.0109	0.0268	-0.664***	-0.0978***	-0.690***	6.731***	0.756
Piura	0.0124	0.109	-0.527***	0.0266	-0.178**	1.245*	0.549
Puno	-0.00590**	-0.0593**	-0.156***	0.0418**	0.0906***	0.166	0.657
San Martin	-0.00966*	-0.0488	0.0844*	0.0415***	-0.150***	-1.771***	0.239
Tacna	-0.0638***	-0.524***	-0.659**	-0.256**	1.510***	2.021	0.736
Tumbes	-0.00105	0.0187	-0.198***	0.0622**	-0.301***	1.938***	0.519
Ucayali	0.00727**	0.0583	-0.0959*	0.0221	-0.0238	-1.409***	0.153

Notes: The table reports estimation results from single-equation regressions where the dependent variable is the TCI. Each column represents regressions for series of loan dollarization ratios by types of firms, sectors and regions. The independent variables include GDP growth, inflation, policy rate, depreciation and interest differential. *** Statistically significant at 1%, ** statistically significant at 5%, * statistically significant at 10%. Robust standard errors. Period: 2010:M10-2024:M2 (94 obs).

Implications and Conclusions

- Our analysis shows that the dollarization behavior of firms is primarily shaped by shocks related to exchange rates and borrowing costs.
- Divergence by firm size highlights the distinct risk profiles and decision-making processes across firm sizes, emphasizing the need for tailored financial policies and strategies.
- Macroeconomic interconnections affecting dollarization reveals a high degree of interconnectedness, particularly for corporate firms and microenterprises, as indicated by the connectivity index proposed by Diebold and Yilmaz (2012).

Future Research Agenda

- Future work could expand the model to incorporate more financial variables, including exchange rate volatility, external shocks and foreign capital flows.
- Investigate the role of international trade exposure and its interaction with sector-specific vulnerabilities.
- Examine the role of hedging strategies among firms of varying sizes to mitigate currency risks.
- Assess how monetary policies in Peru affect the transmission of international shocks to credit dollarization.