

# COVID-19 in Uruguay: A survey of policy responses and their impact

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# Introduction: A survey

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# Outline

- COVID-19: Immediate impact and policy responses
  - Immediate impact: real-time monitoring and projection
  - Policy responses
- Impact evaluation
  - **Macroeconomic projection model**
  - **Vector Error-Correction Model**
  - Credit register granular data
  - **Firms' financial perspective**

Very preliminary!

# Policy responses: A short overview

- Health measures
  - Reduce mobility and increase capacity of the health system
  - Vaccination
- Social and economic measures
  - Reinforce expenditure in social programs and access to food baskets
  - Flexibility and extension of unemployment insurance
- Financial measures
  - Expansionary monetary policy: low monetary policy rate and reduction on reserve requirements
  - Public guarantee scheme for loans
  - Several regulatory actions to facilitate loan restructuring and bank credit provision

# Macroeconomic projection model

# Theoretical framework: Macroeconomic projection model

## New Keynesian semi-structural model

- Monopolistic competition and sticky-prices
- General equilibrium, stochastic, rational expectations
- Gap model: works with cycles around the long-run trend
- Long-run equilibrium (trend) converge to exogenous steady-state

## Main blocks

- Aggregate demand: IS curve
- Inflation/aggregate supply: Phillips curve
- Formation of expectations of the private sector (professional forecasters): adaptive expectations
- Exchange rate: UIP
- Interest rate policy rule

## References

- Carballo, P.; González, J.; Güenaga, M.; Mourelle, J.; Romaniello, G. (2015): “Un modelo semi estructural de proyecciones macroeconómicas para el Uruguay”, Documento de trabajo Banco Central del Uruguay N° 012-2015.
- Carballo, P., 2021, Política monetaria y formación de expectativas en un modelo neokeynesiano, borrador de documento de trabajo.

# Behavioral equations

**IS curve:**  $\hat{y}_t = \beta_1 \hat{y}_{t-1} + \beta_2 \hat{r}_t + \beta_3 \hat{z}_t + \beta_4 \hat{y}_t^* + \varepsilon_t^{\hat{y}}$

**Private Sector Expectations :**

$$Exp_t = (1 - \gamma)Exp_{t-1} + \gamma[\psi \pi_{t+1}^{ia} + (1 - \psi) \pi_{t+1}^T] + \varepsilon_t^{Exp}$$

**Phillips curves:**

**Non tradables:**

$$\pi_t^{ntx} = \alpha_1 \pi_{t-1}^{ntx} + (1 - \alpha_1) \pi_{t+1}^{e ntx} + \alpha_2 \hat{y}_t + \alpha_3 (\hat{z}_t - \widehat{r\bar{p}}_t^{ntx}) + \varepsilon_t^{\pi^{ntx}}$$

$$\text{where: } \pi_{t+1}^{e ntx} = (\pi_{t+1}^{ntx} + Exp_t + \Delta \widehat{r\bar{p}}_t^{ntx})$$

**Tradables:**

$$\pi_t^{tx} = \alpha_4 \pi_{t-1}^{tx} + (1 - \alpha_4) \pi_{t+1}^{e tx} + \alpha_5 \hat{y}_t + \alpha_6 (\hat{z}_t - \widehat{R\bar{P}}_t^{tx}) + \alpha_7 (\Delta_4 z_t - \Delta_4 \bar{z}_t) + \varepsilon_t^{\pi^{tx}}$$

$$\text{where: } \pi_{t+1}^{e tx} = 0.5 (\pi_{t+1}^{tx} + Exp_t + \Delta \widehat{r\bar{p}}_t^{tx})$$

**UIP:**  $s_t = \theta_1 E_t s_{t+1} + (1 - \theta_1) [s_{t-1} + \frac{2}{4} (\pi_t - \pi_t^* + \Delta \bar{z}_t)] + (i_t^* + \rho_t - i_t)/4 + \varepsilon_t^s$

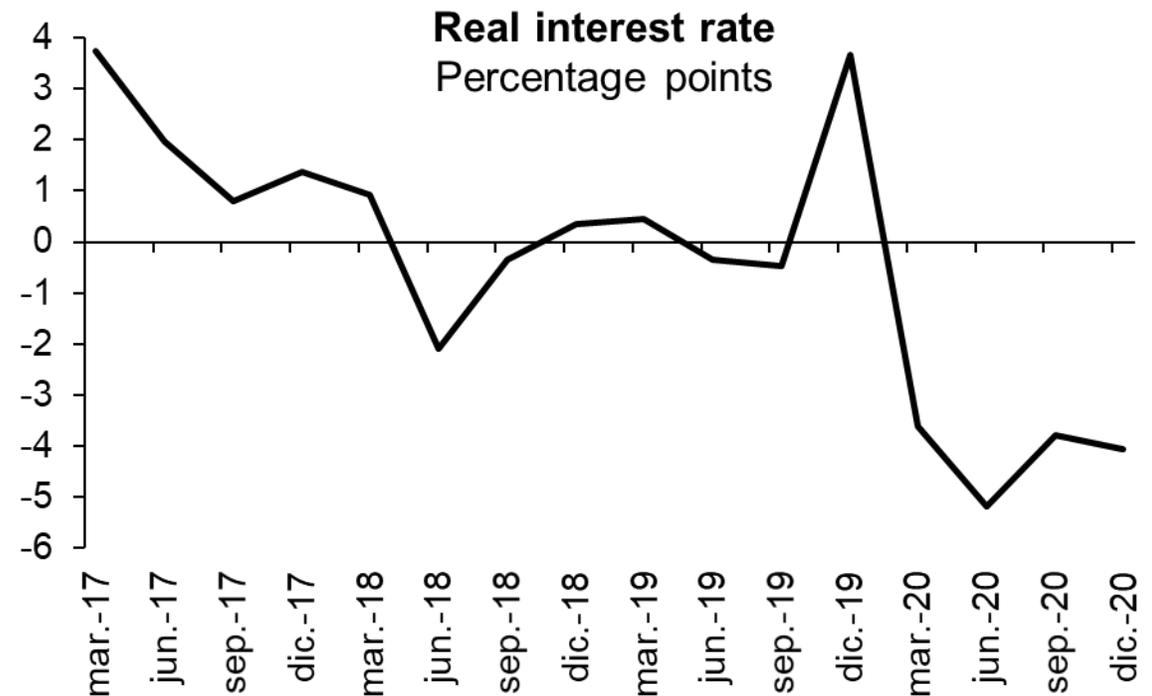
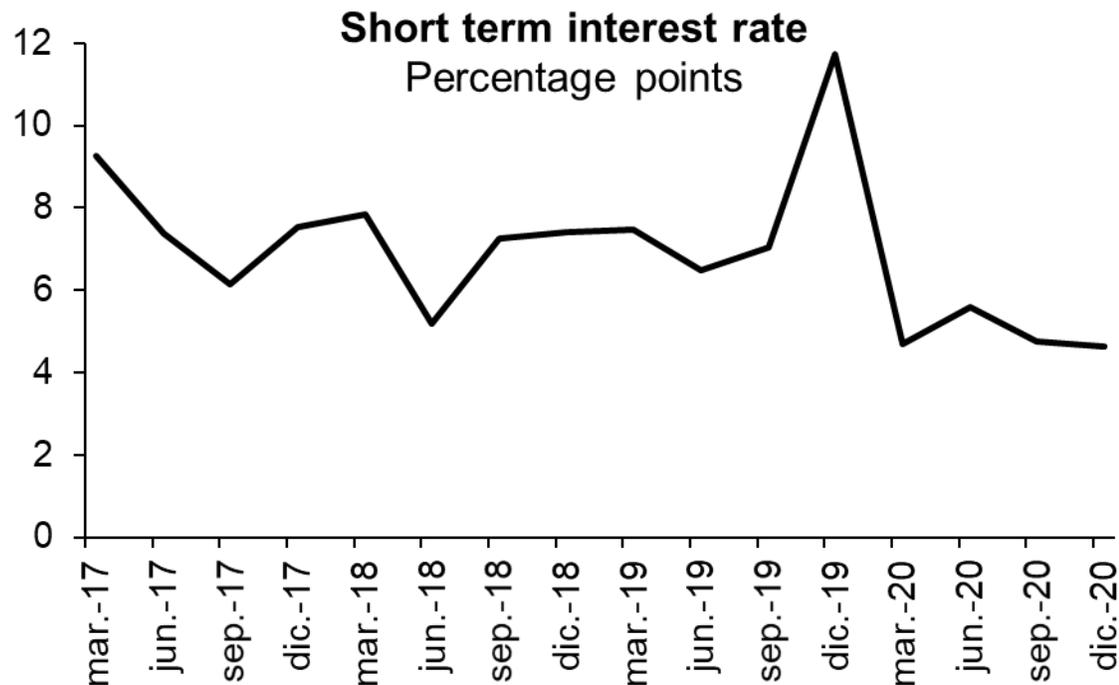
**Monetary Policy Rule:**

$$i_t = \rho_i i_{t-1} + (1 - \rho_i) \left[ \bar{i}_t + \alpha_\pi \left( \frac{(\pi_t - \pi_t^T) + (\pi_{t+1} - \pi_{t+1}^T)}{2} \right) + \alpha_y \hat{y}_t \right] + \varepsilon_t^i$$

where  $\bar{i}_t = \bar{r}_t + \pi_t^T$  and  $\pi_t^T = 0.8 \pi_{t-1}^T + 0.2 \pi_{SS}^T + \varepsilon_t^{\pi^T}$   $\pi_{SS}^T = 4.5$

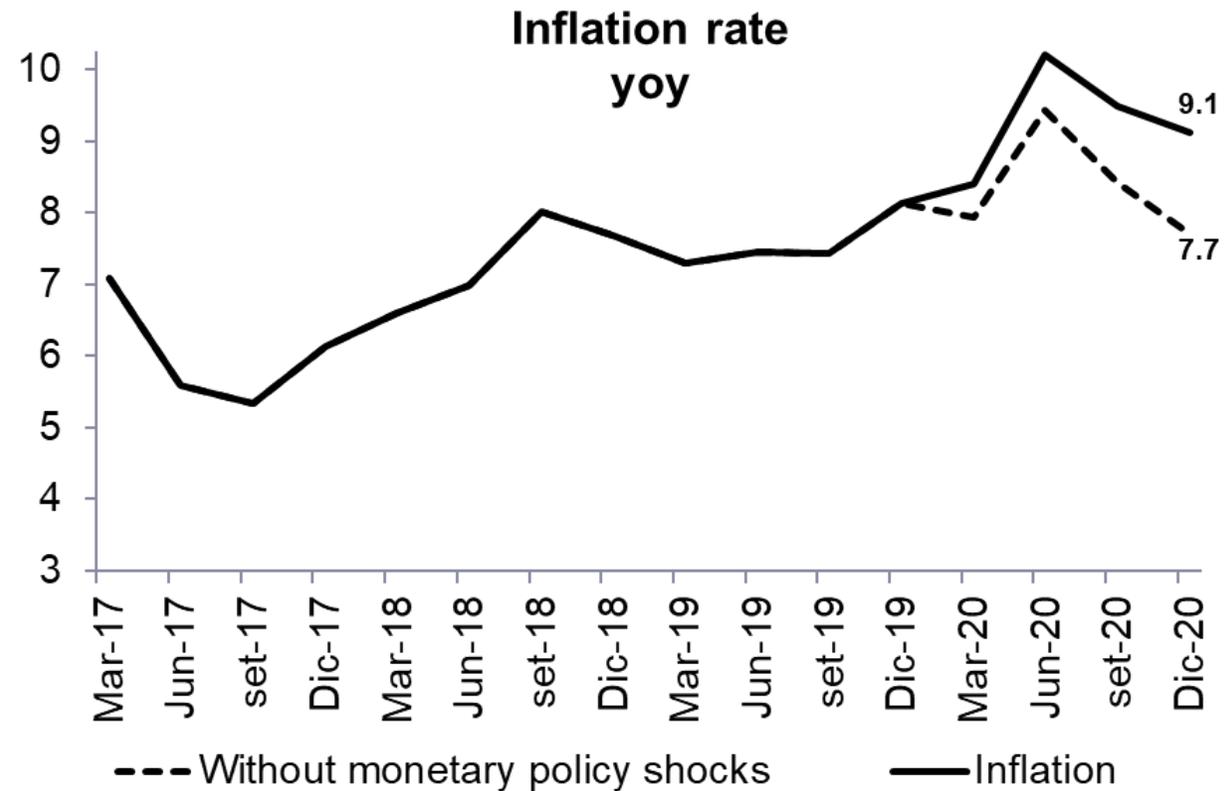
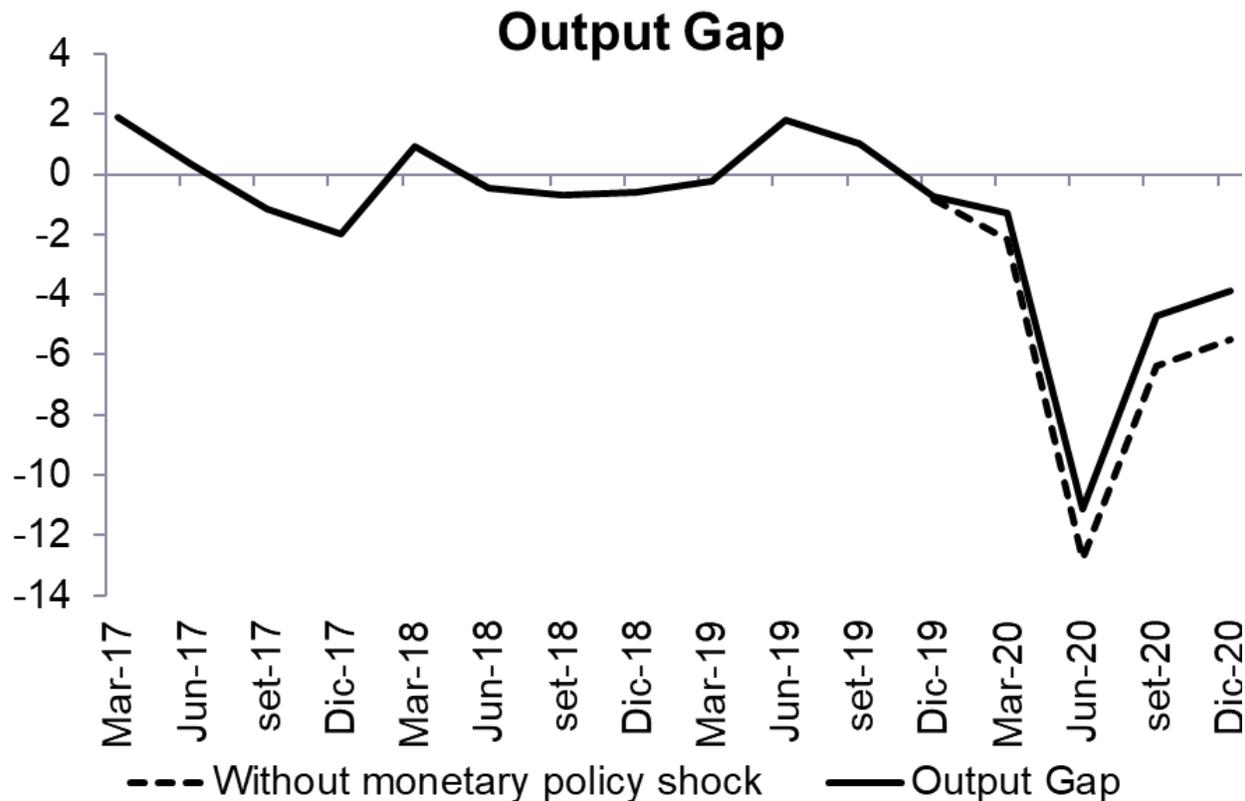
# Monetary policy in Uruguay during 2020

- Expansionary Monetary Policy: focus on monetary conditions that do not imply a restriction for economic activity in the face of the pandemic.
- This implied a sharp fall in real interest rates, which cushioned the fall in economic activity and generated a further increase in inflation.

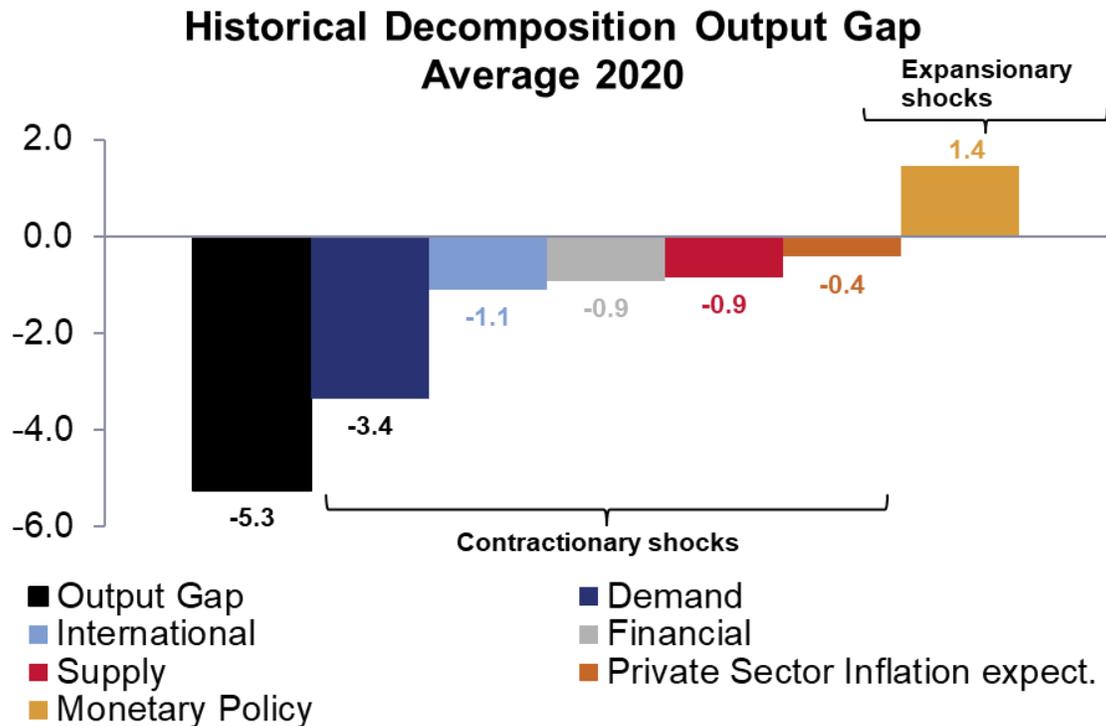


# Impact on output gap and inflation

- We use the historical decomposition to quantify the impact of [monetary policy] shocks on the evolution of variables.

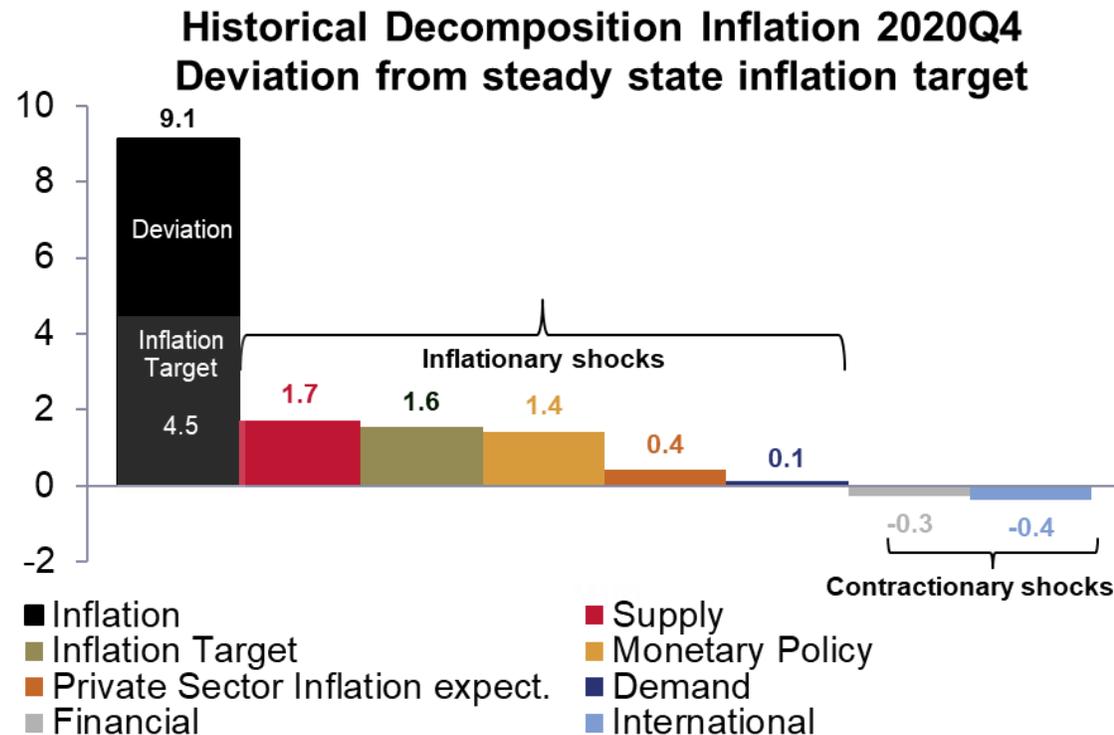


# Impact on the output gap



- On average the impact of monetary policy shocks on economic activity is estimated in 1.4%.
- The remaining shocks were contractionary during 2020, with a greater share of those associated with behavior of aggregate demand.
- International contractionary impulses came from external demand and international deflation.
- Financial variables were contractionary, mainly through shocks on financing premiums.
- Cost-push shocks and private sector inflation expectations shocks affected economic activity in a contractionary manner.

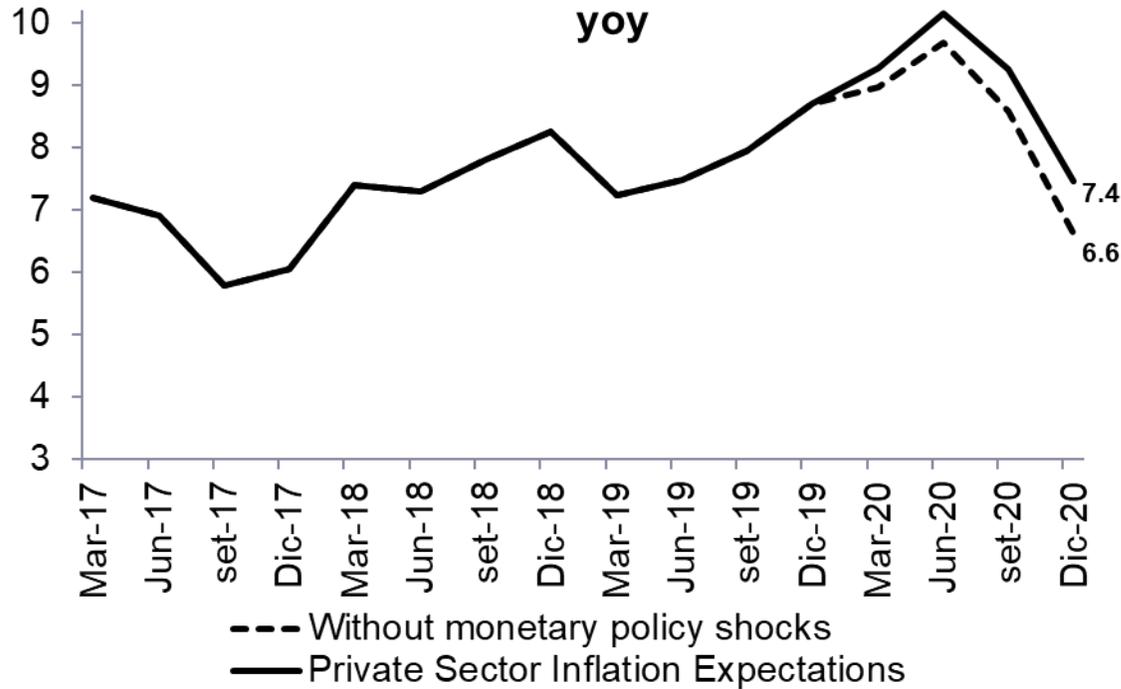
# Impact on inflation



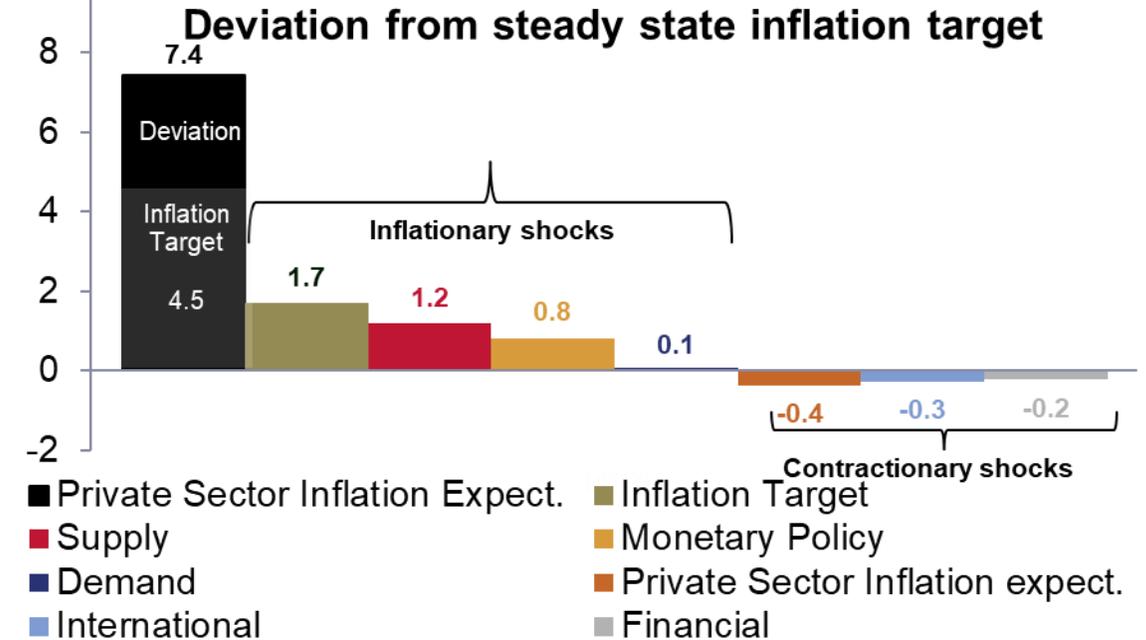
- The model estimates an impact of monetary policy shocks of 1.4% on the year-on-year inflation rate at the end of 2020.
- Shocks to inflation target were also significant as another form of easing monetary conditions.
- The model identifies an inflationary impact of cost-push shocks and private sector inflation expectations disturbances during 2020.
- Disinflationary impulses came from international deflation and exchange rate shocks.

# Impact on inflation expectations

Private sector Inflation expectations  
yoy



Historical Decomposition Inflation expectations 2020Q4



- Almost 2 percentage points are explained by shocks to the inflation target (i.e., gradual convergence to the long-term inflation target) and 1 percentage point by the expansionary monetary policy.
- The inflationary effect of cost-push shocks would be offset by the contractionary effect of shocks from international deflation and the downward adjustment of the nominal exchange rate, country risk premium and expectations after the shock of 2020Q2.

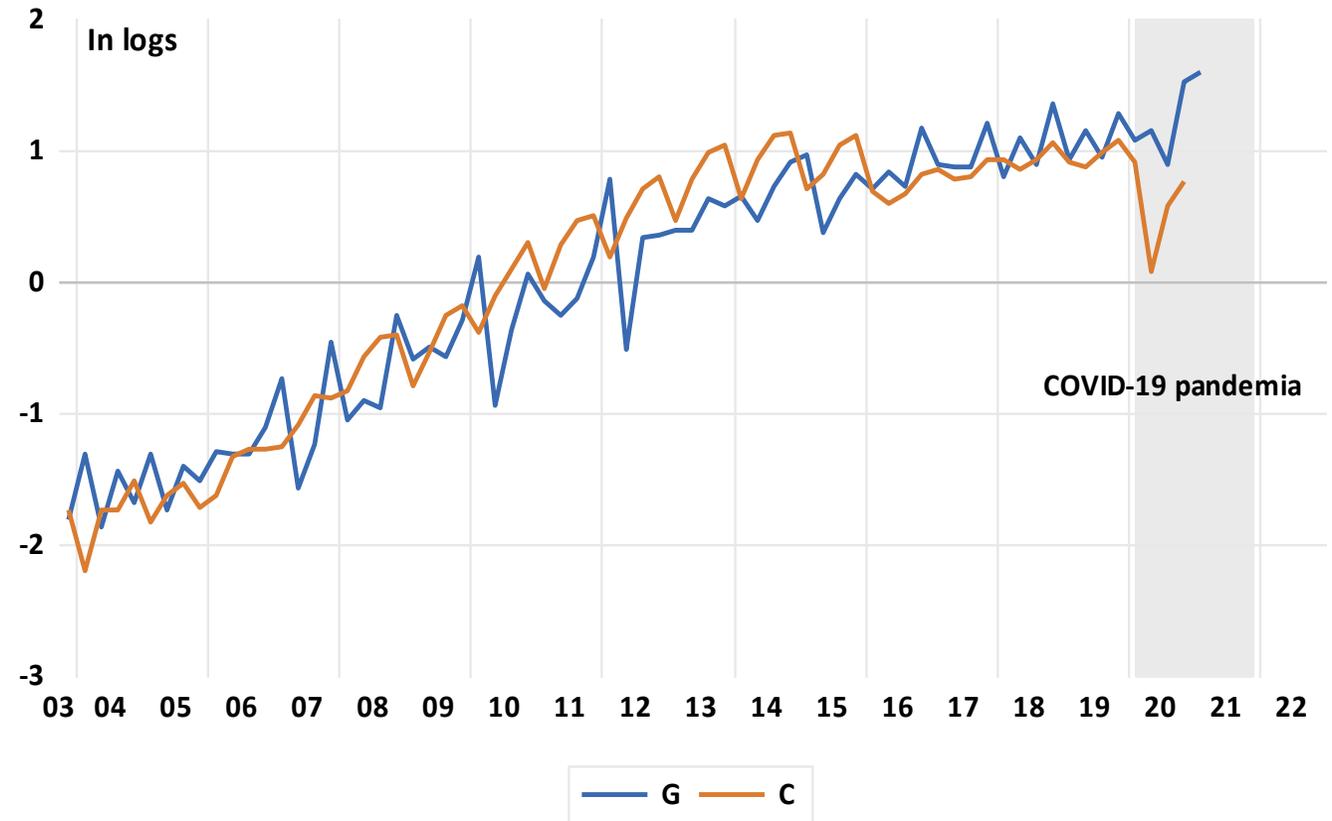
# Vector Error-Correction Model

# VECM approach

- How effective have been the economic and financial measures taken by the Government and the Central Bank in mitigating the economic welfare loss caused by the COVID-19 pandemic?
- In aggregate terms, those measures prevented a higher decrease in per capita Private Consumption, taken as a proxy for individual wellbeing.
- The main reasons for that result are:
  - Public social spending accounts for 73% of total Government spending
  - Government spending is one third of GDP
  - Financial measures modify financial conditions for households and firms:
    - Factor analysis (common variance) indicates that a second factor related to new loans to firms appears when the pandemic is included in the span of analysis

# Consumption and government spending

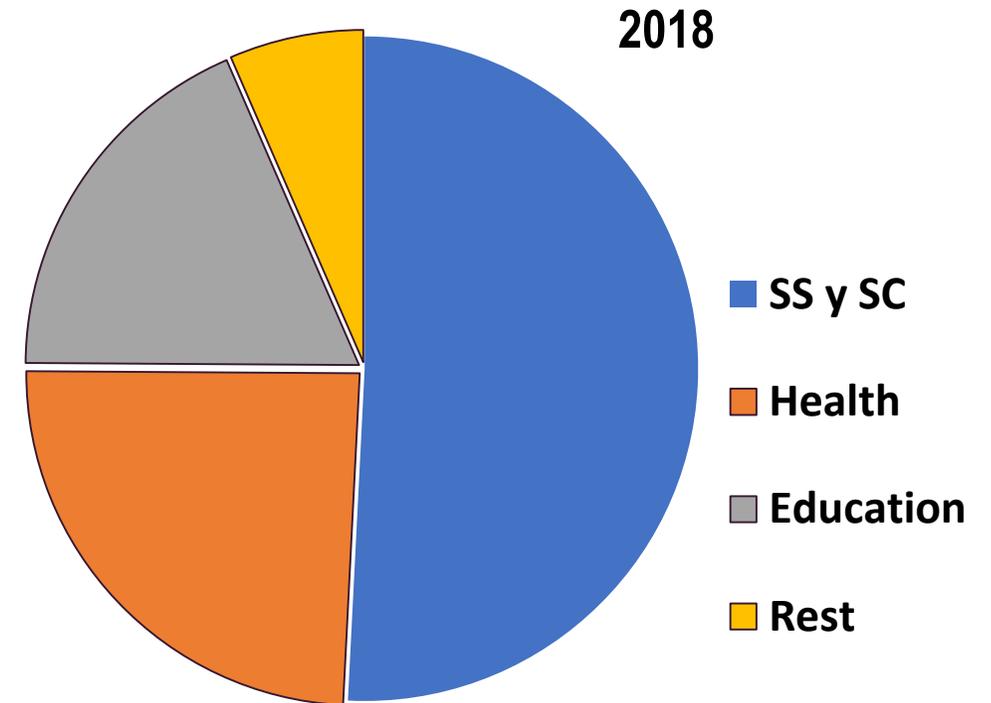
- Correlation: 0.92
- Two-way causation at 5%:
  - Government spending (i.e. salaries, pensions, unemployment compensations, health subsidies) back individuals' expenditure
  - Households' expenditure include taxes



Source: Author's calculations based on MEF and BCU data.

# Uruguay: A solid tradition of welfare state

- Social Public Spending over Total Public Spending ratio
- It shows the fiscal priority of Public Sector Spending
- Over 2005-2018:
  - Steadily around 73%
  - Focused on Social Security and Social Care (38%), Health (17%), and Education (13%)
  - Health and Education have been gradually increasing while Social Security and Social Care have been declining.

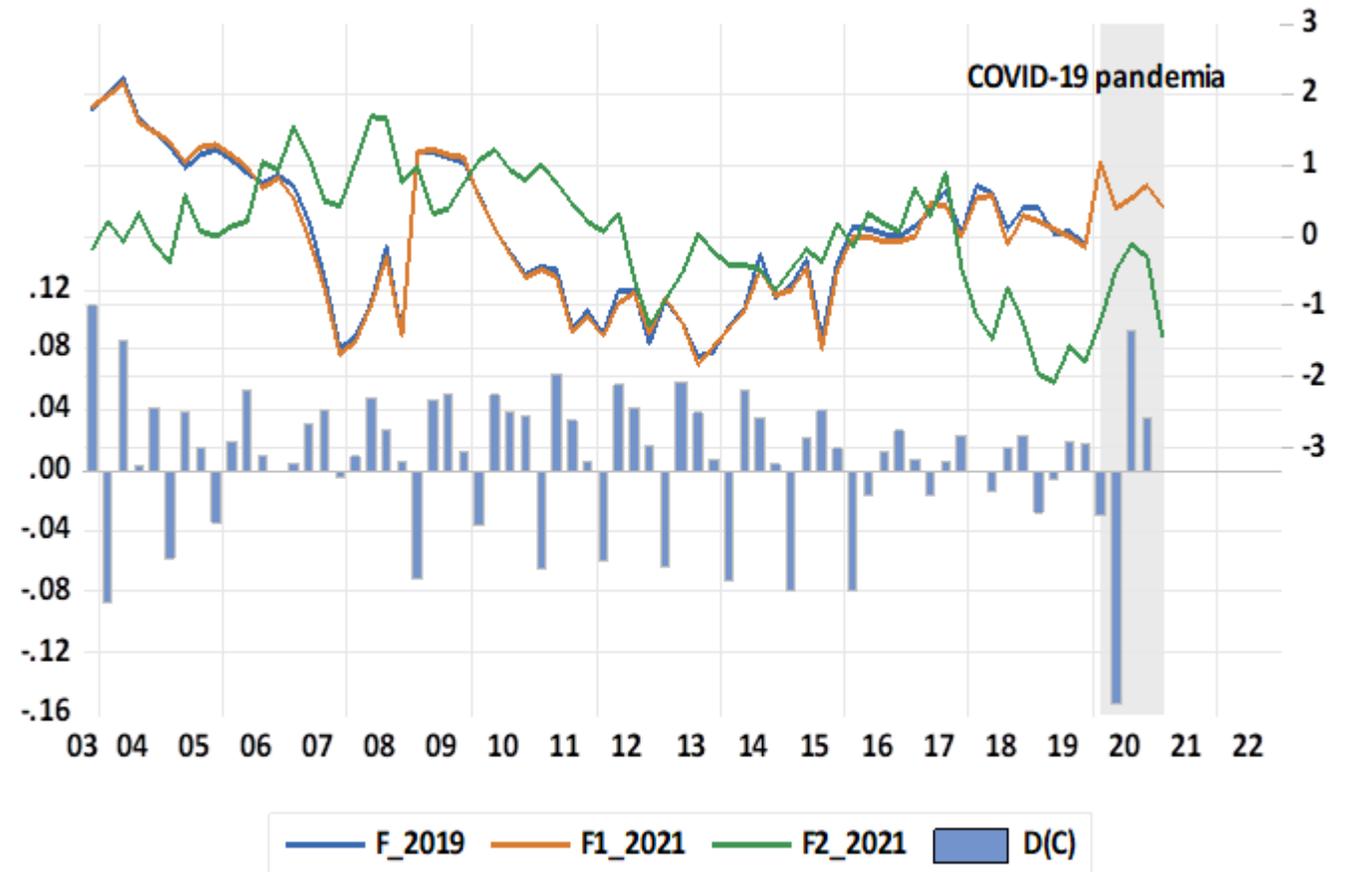


# Financial conditions index

- It summarizes local financial information (both in UY pesos and US dollars) that may affect consumption bundles:
  - financial price measures that influence the user's cost of capital (active interest rates)
  - consumer interest rates that affect the tradeoff between consumption today and consumption tomorrow
  - measures of borrower risk (percentage of nonperforming loans)
  - quantitative indicators (such as the number of transactions)
- Factor analysis (common variance) indicates:
  - One factor for the pre-pandemia period:  $F_{2019}$ ; two factors including the pandemic period:  $F1_{2021}$ ,  $F2_{2021}$
  - $F1_{2021}$  coincides with  $F_{2019}$  and it can be related to prices (interest rates spreads both to firms and families)
  - $F2_{2021}$  is more related to quantities (new loans to firms) although it includes prices as well
- COVID-19 measures seem to have affected the financial framework: the second factor only appears when the pandemic is included in the span of the analysis.

# Econometric strategy

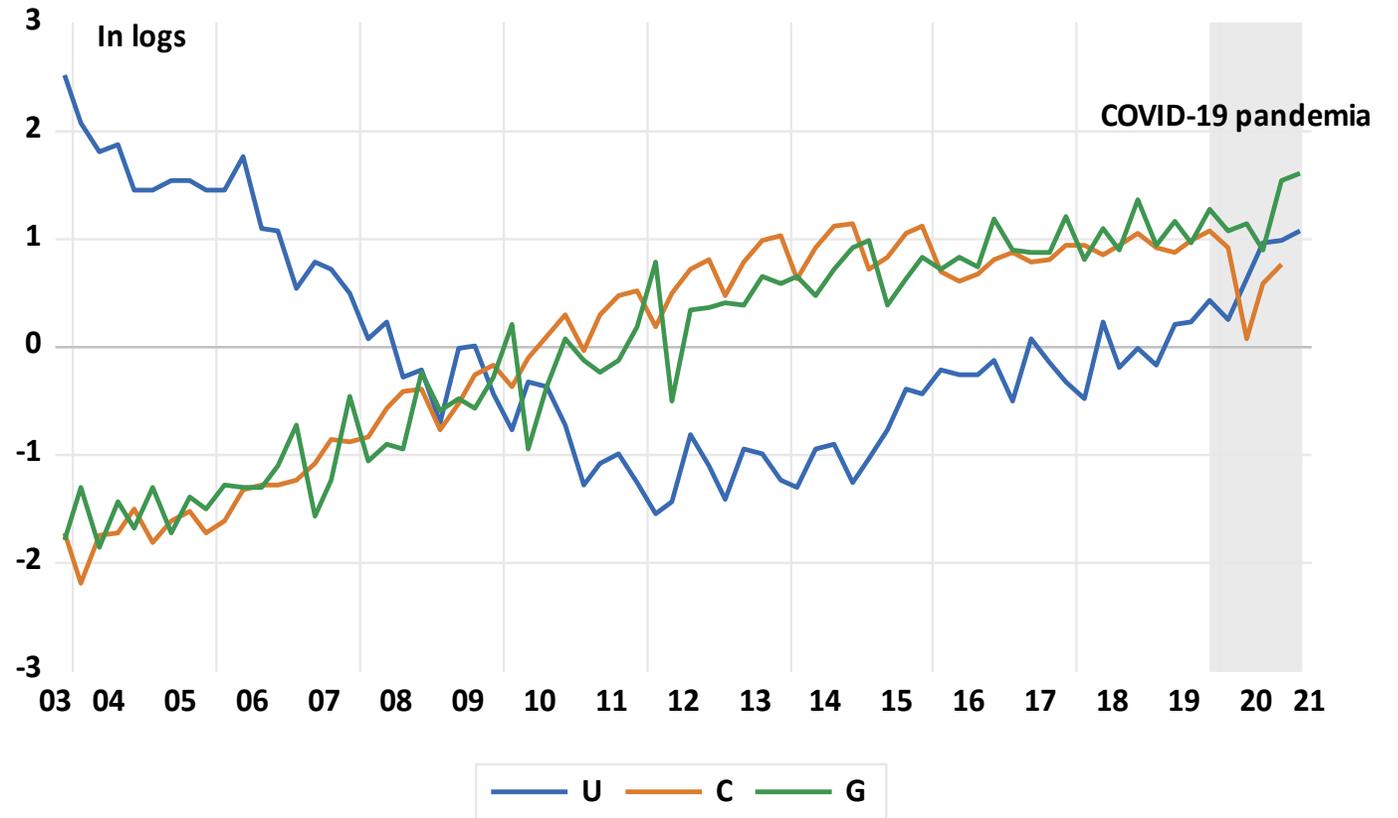
- It summarizes local financial information that affects consumption bundles.
- Only one factor for the pre-pandemia period: **F\_2019**
- Two factors for the post-pandemia period:
  - **F1\_2021**: more related to prices (interest rate spreads both to firms and families). It coincides with the pre-pandemia one.
  - **F2\_2021**: more related to quantities (new loans to firms)



Source: Authors' calculations.

# Econometric strategy (cont.)

- VECM approach:
  - A priori, all variables are endogenous
  - A stable long-run relationship
  - Variables: U (unemployment rate), C (per capita consumption), G (per capita Government spending, Covid-19 Fund), Financial index
- Sample: 2003Q4-2019Q4
- Forecast: 2020Q1-2021Q2
  - w/o policy measures: C\_w/o CF
  - w/ policy measures: C\_w CF

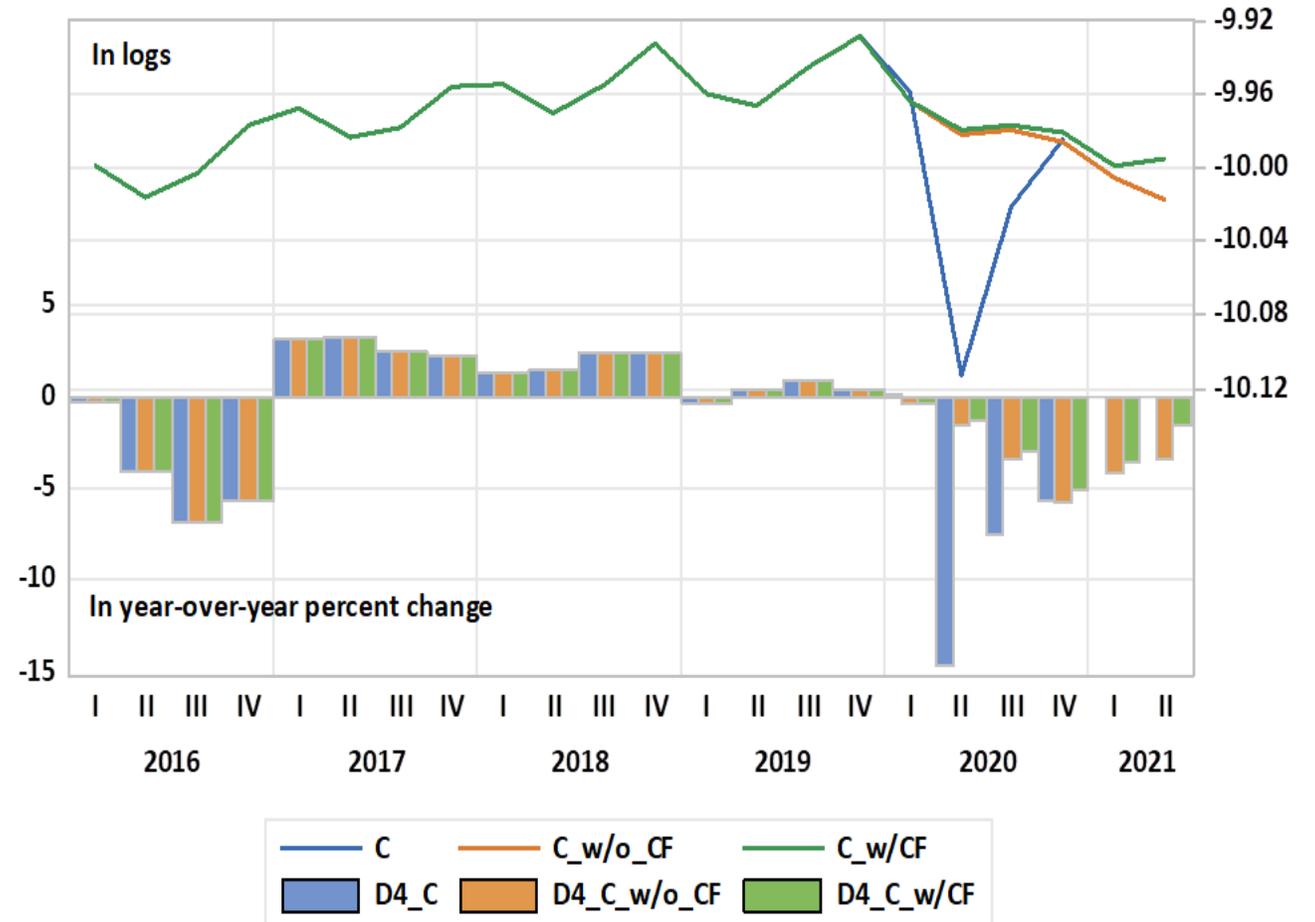


Source: Authors' calculations based on BCU and INE data.

# Preliminary results

- Although the model is unable to capture the dip in per capita Consumption in 2020Q2-Q3, the difference disappears in 2020Q4.
- Monetary and fiscal measures (COVID-19 Fund, CF) seem to reduce the fall in per capita Consumption (year-over-year percent change):

	C_w/o CF	C w/ CF	Impact
2021Q1	-4.2	-3.5	0.7
2021Q2	-3.5	-1.6	1.9

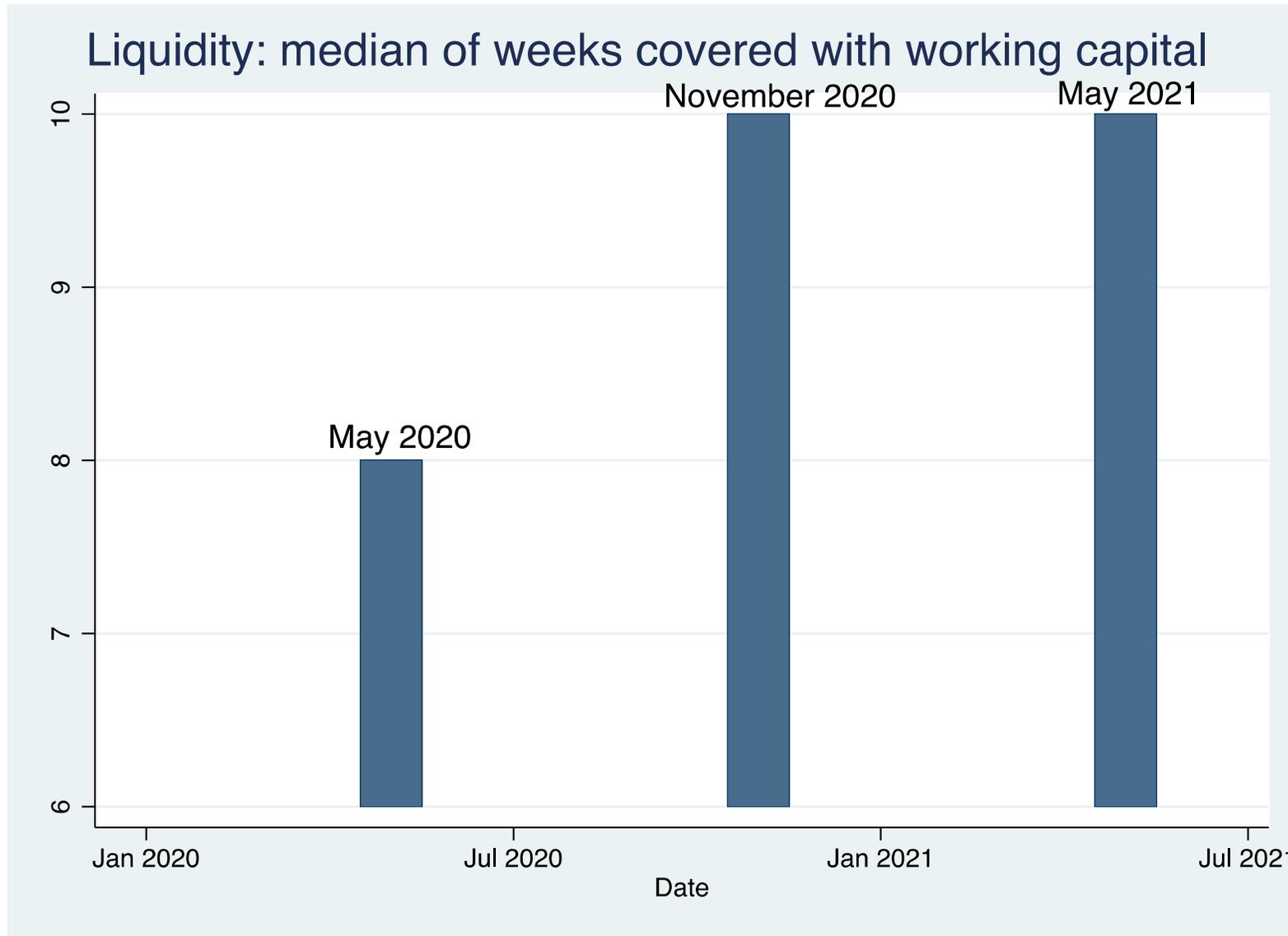


# Firms' financial perspective

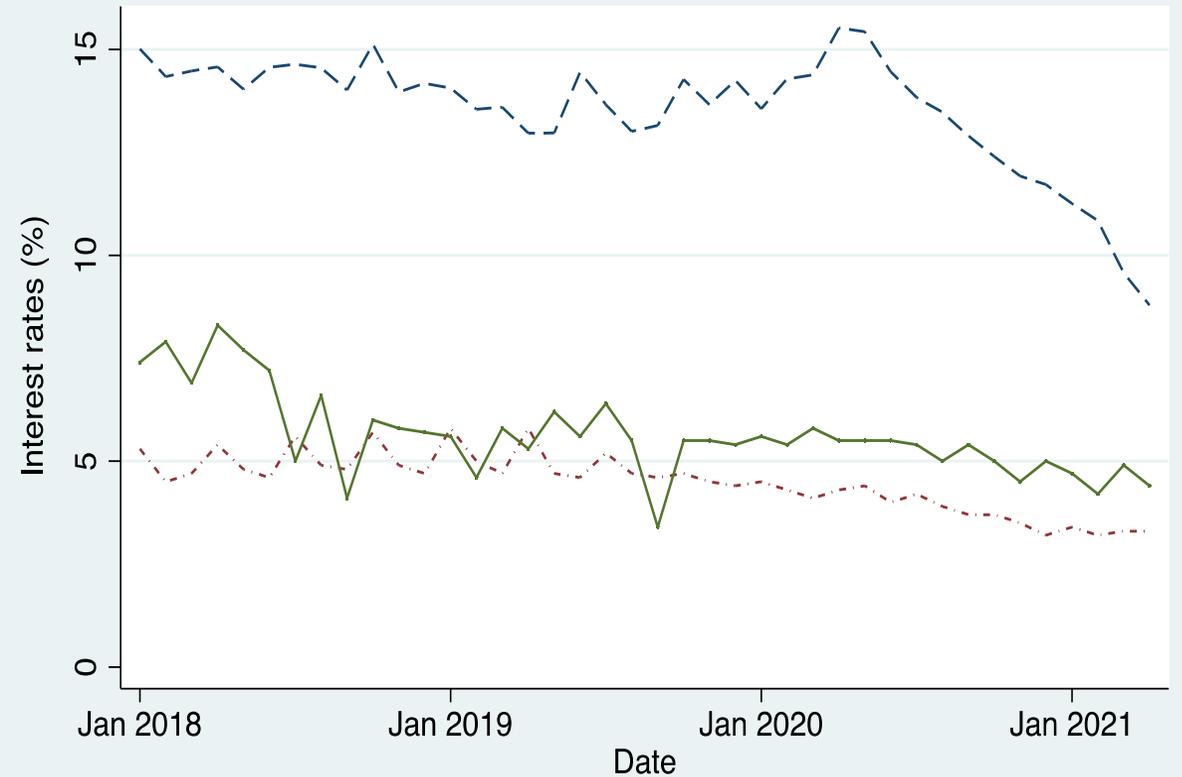
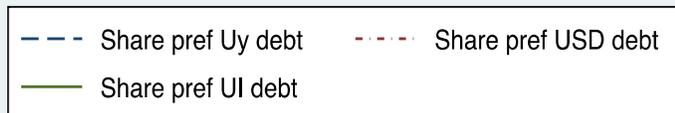
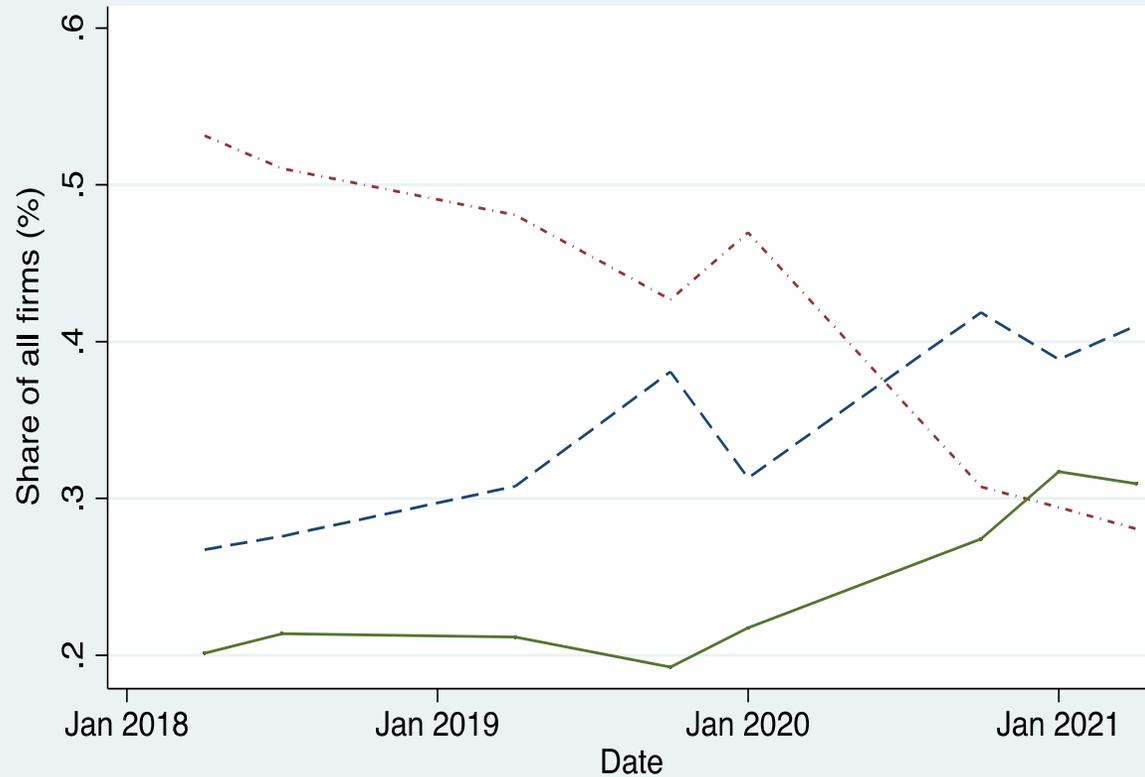
# Firms' survey data

- During 2020 and 2021, the Banco Central del Uruguay included some questions in the Inflationary Expectations Survey (IES).
- The IES is representative of all Uruguayan firms with more than 50 employees, excluding banks and agriculture firms.
- Regular questions:
  - Inflation expectations in three horizons: year, 12m and 24m.
  - Expected firm's costs variation in the same three horizons.
- Three additional questions:
  - Liquidity: May and Nov 2020, and May 2021.
  - Credit access perception: Apr and Oct 2019, Jan and Oct 2020, and Jan 2021 Apr 2021.
  - Currency preference of credit: Apr and Oct 2019, Jan and Oct 2020, and Jan 2021 Apr 2021.

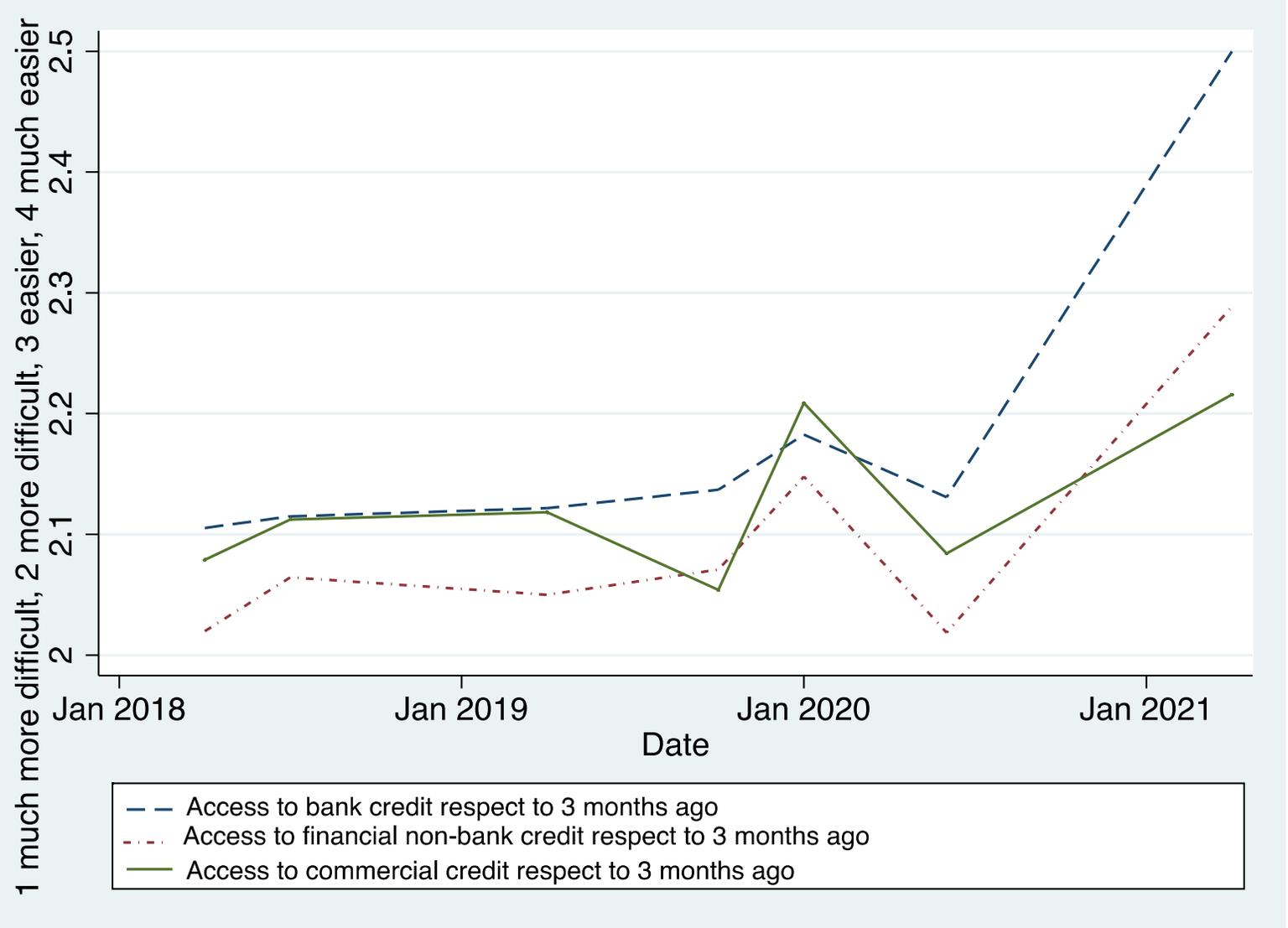
# Firms' liquidity: *“How many weeks can you keep on working without appealing to external financing?”*



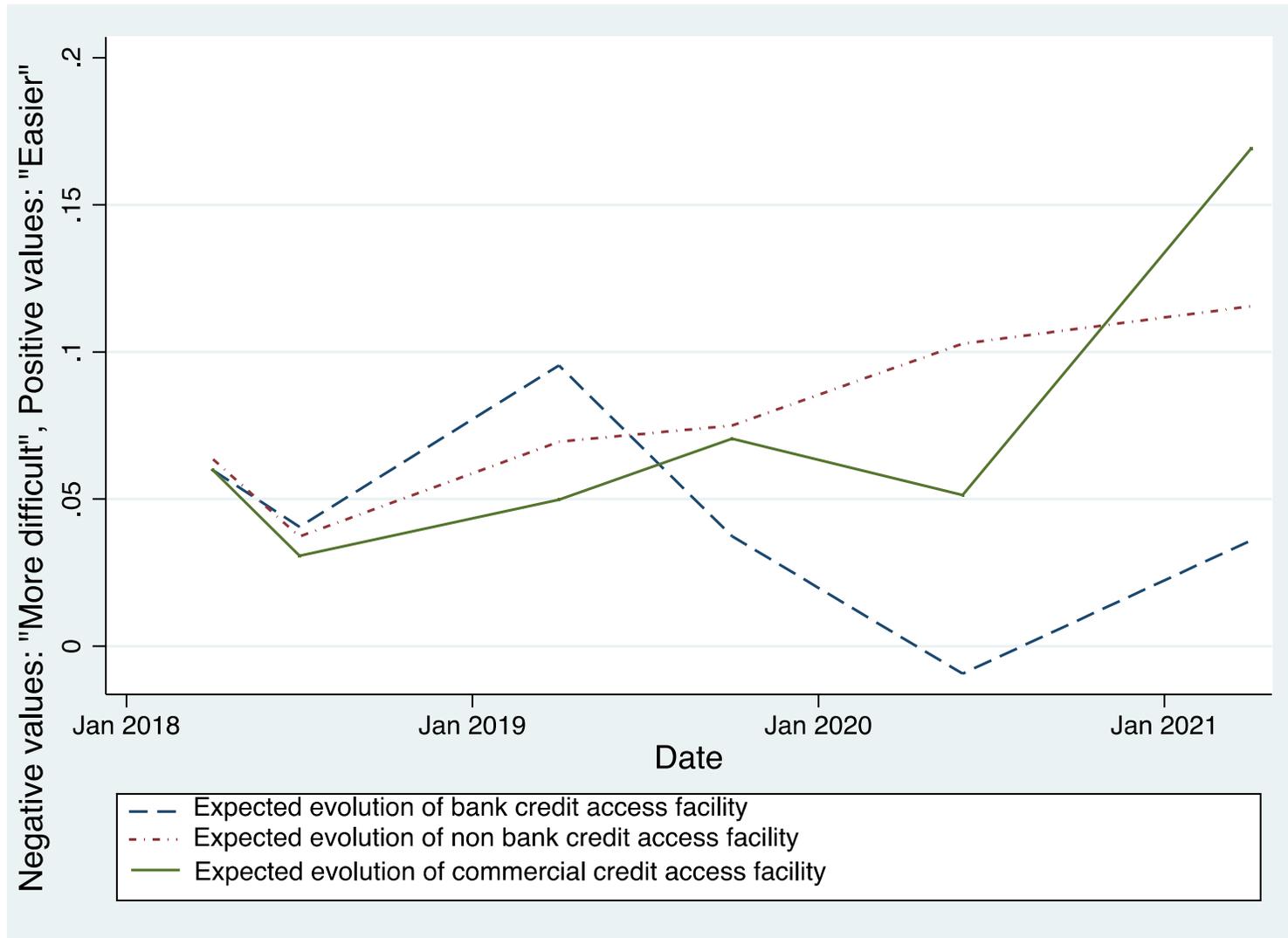
# Significant change in preferences towards UYU related to interest rate



# There is a perception of ease in credit access



# Expectations respect credit access



# Liquidity and currency preference

	Liquidity	Currency
$E(\Pi_{it}^H)$		-0.223 (0.440)
$E(C_{it}^{12})$	3.054 (1.925)	0.395 (0.246)
$i_t^{UYU}$	-0.168** (0.080)	-0.088*** (0.028)
$Size_{it}$	0.053 (0.328)	-0.063 (0.132)
Obs	316	767
N-Groups	292	
R2_W	0.232	
N-Clust		485
Pseudo_R2		0.060
Estimation	Fixed Effects	Ordered Logit

\* p<0.10, \*\* p<0.05, \*\*\* p<0.01

# Perceived access to credit respect 3 months ago

	Bank credit	Financial non-bank credit	Commercial credit
$E(\Pi_{it}^H)$	-0.767*	-0.447	-0.423
	(0.392)	(0.439)	(0.422)
$E(C_{it}^{12})$	-0.004	-0.178	-0.687**
	(0.231)	(0.301)	(0.312)
$i_t^{UYU}$	-0.193***	-0.097***	-0.006
	(0.036)	(0.033)	(0.032)
$Size_{it}$	-0.048	-0.067	-0.054
	(0.109)	(0.092)	(0.095)
Obs	719	718	719
N-Clust	466	465	466
Pseudo_R2	0.039	0.013	0.010
Estimation	Ordered Logit	Ordered Logit	Ordered Logit

\* p<0.10, \*\* p<0.05, \*\*\* p<0.01

Thank you!

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# Appendix

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	2018			2019			S1 2020			S2 2020			2021 (Jan-Apr)		
	Obs.	Mean	Std.Dev	Obs.	Mean	Std.Dev	Obs.	Mean	Std.Dev	Obs.	Mean	Std.Dev	Obs.	Mean	Std.Dev
Access to bank credit respect 3m ago (1 difficult, 4 easy)	600	2.110	0.580	504	2.124	0.565	444	2.158	0.607	nd	nd	nd	278	2.500	0.744
Access to financial non-banking ago respect 3m ago	598	2.042	0.582	500	2.060	0.591	444	2.086	0.614	nd	nd	nd	277	2.289	0.814
Access to commercial credit respect 3m ago	598	2.095	0.617	503	2.087	0.622	444	2.149	0.645	nd	nd	nd	278	2.216	0.813
Access to bank credit next 3m	597	2.159	0.605	503	2.195	0.597	444	2.216	0.636	nd	nd	nd	278	2.536	0.739
Access to financial non-banking ago next 3m	594	2.093	0.598	500	2.128	0.604	444	2.149	0.638	nd	nd	nd	277	2.404	0.800
Access to commercial credit next 3m	594	2.140	0.654	502	2.147	0.667	444	2.185	0.680	nd	nd	nd	278	2.385	0.788
Expected evolution of access to bank credit	597	0.050	0.482	503	0.068	0.488	444	0.059	0.530	nd	nd	nd	278	0.036	0.745
Expected evolution of access to financial non-bank credit	594	0.051	0.416	499	0.072	0.490	444	0.063	0.480	nd	nd	nd	277	0.116	0.826
Expected evolution of access to commercial credit	594	0.045	0.506	502	0.060	0.510	444	0.036	0.536	nd	nd	nd	278	0.169	0.817
Preference \$U (%)	615	0.272	0.004	512	0.342	0.037	230	0.313	0	270	0.419	0	544	0.400	0.011
Preference USD (%)	615	0.521	0.011	512	0.455	0.027	230	0.470	0	270	0.307	0	544	0.287	0.007
Preference Uis (%)	615	0.207	0.006	512	0.203	0.010	230	0.217	0	270	0.274	0	544	0.313	0.004
Liquidity (working capital weeks coverage)	nd	nd	nd	nd	nd	nd	112	14.710	21.640	224	38.945	132.662	nd	nd	nd
Liquidity evolution (weeks)	nd	nd	nd	nd	nd	nd	nd	nd	nd	24	8.438	24.816	nd	nd	nd

# Expected access to credit in next 3 months

	Bank credit	Financial non-bank credit	Commercial credit
$E(\Pi_{it}^H)$	-0.565 (0.498)	-0.261 (0.456)	-0.898** (0.446)
$E(C_{it}^{12})$	-0.112 (0.284)	-0.270 (0.301)	-0.175 (0.327)
$i_t^{UYU}$	-0.161*** (0.034)	-0.147*** (0.033)	-0.090*** (0.032)
$Size_{it}$	-0.137 (0.112)	0.087 (0.091)	-0.049 (0.090)
Obs	719	718	719
N-Clust	466	465	466
Pseudo_R2	0.032	0.019	0.017
Estimation	Ordered Logit	Ordered Logit	Ordered Logit

\* p<0.10, \*\* p<0.05, \*\*\* p<0.01

# Classification of shocks - Macroeconomic projection model

Classification /	Shock
Aggregate demand	
Supply	Trend output growth Non tradables inflation Tradables inflation Rest of CPI inflation Price level
International	External demand International inflation International interest rate
Financial	Exchange rate Risk premium Credit premium
Private sector expectations	
Monetary policy	
Inflation target	
Trends	Neutral interest rate Neutral international interest rate Trend real exchange rate Non tradables trend relative prices Tradables trend relative prices