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On the Interest Channel and the Global Financial Cycle for Emerging Market Economies

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Motivation

- There is a lively debate on the **Global Financial Cycle (GFCy)**. Some scholars have examined its economic implications (e.g., Forbes and Warnock, 2012; and Jordà et al. 2018).
- In particular, it might affect the **traction of local monetary policies within small open economies** (Rey, 2015).
- In contrast, others have expressed doubts on its bearing (e.g., Cerutti, Claessens, and Rose, 2017).

Objective I

- Our aim is to examine the extent to which the **global financial cycle** (GFCy) could be affecting the **interest rate channel of emerging market economies (EMEs).**
- **Specifically**, we **explore** how changes in the **term structure of interest rates** due to **inflation shocks** measured up against variations in the **term structure** due to joint **shocks** on **inflation and the VIX**. Thus, we use the VIX as a proxy to the GFCy.
- Consequently, we examine whether the VIX index could be hampering the response of the term structure of interest rates to inflation shocks.

Summary of Key Results

- We document two possible distortions implied by the presence of shocks on the VIX (GFCy).
  - In terms of **the short-term interest rate ('monetary rule').** Intuitively, for some EMEs, shocks on the VIX might point to a interest rate shift in the opposite direction to what the inflation dynamics might be indicating.
  - In several cases, the presence of shocks on the VIX along with inflationary shocks could **be amplifying the long-term interest rate responses**, compared to having only inflationary shocks.

Methodology

- To than end, we estimate **affine interest rates models** for a set of eight EMEs: **Chile, Czech Republic, India, Indonesia, Mexico, Poland, Russia and South Korea.**
- As observable risk factors, we use **inflation** and the **VIX index** and, as unobservable ones, the **principal components** of the interest rates. For the estimation, we follow Adrian et al. (2013).
- Also, we interpret the linear models of the short-term interest rates, which are part of the affine interest rate model, as **monetary rules.**

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An Abriged Literature Review

- **Global Financial Cycle** (GFCy).
  - ✓Passari and Rey, 2015; Bruno and Shin, 2015.
  - ✓Baskaya et al., 2017; Reinhart et al., 2017.

  On the other hand,
  - ✓Cerutti et al. (2017); Jordà et al. (2017).
- **Term Structure Models of Interest Rate and Term Premia**.
  - ✓Piazzesi (2010).
  - ✓Adrian et al. (2013).
  - ✓Blake et al. (2015).
  - ✓Wright (2011); Ceballos and Romero (2016); Wright (2011).
  - ✓Albagli et al. (2018).
- **Monetary policy transmission channels.** Mishkin (1996, 2001).

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Data

- Nominal **zero-coupon interest rates** associated with one-, three-, six-, 12-, 60-, 108- or 120-, and 240-month maturities. To obtain interest rates across all maturities, we use **cubic interpolation** based on the referred maturities.
- We estimate the affine models with the **end-of-the month data for interest rates and VIX time series**. In addition, we use monthly year-to-year inflation rates.
- Our initial data set had 13 economies. If for an economy, we were unable to obtain a reasonable fit, we did not estimate an affine interest rate models using our macroeconomic variables. We end up using macroeconomic variables for **Chile, Czech Republic, India, Indonesia, Mexico, Poland, Russia, and South Korea**.
- We did not use macroeconomic variables for **Brazil, Colombia, Hungary, South Africa, and Turkey**. One can conjecture reasons beyond econometric ones why we were not able to obtain a reasonable fit.

Data and Basic Stats

	Start	End	Mean			Standard Deviation			Skewness			Excess Kurtosis		
			1y	*5y*	*9 or 10y*	*1y*	*5y*	*9 or 10y*	*1y*	*5y*	*9 or 10y*	*1y*	*5y*	*9 or 10y*
Brazil	27-Mar-07	3-Jul-18	10.95	12.23	12.46	2.35	2.02	1.89	-0.12	0.37	0.59	-0.67	0.47	0.79
Chile	29-Sep-05	3-Jul-18	4.44	5.25	5.60	1.59	1.05	0.92	0.12	0.25	0.24	-0.18	-0.54	-0.73
Colombia	28-Apr-06	3-Jul-18	6.04	7.55	8.22	2.06	1.92	1.72	1.00	0.87	0.74	-0.32	-0.01	0.20
Czech Republic	2-Jan-04	3-Jul-18	1.34	2.31	3.12	1.38	1.55	1.59	0.35	-0.21	-0.33	-0.95	-1.43	-1.15
Hungary	5-Jan-04	3-Jul-18	5.45	6.00	6.25	3.45	2.67	2.11	-0.11	-0.30	-0.36	-1.02	-0.91	-0.80
India	2-Jan-04	3-Jul-18	7.03	7.64	7.85	1.36	0.95	0.90	-0.40	-0.66	-0.77	-0.67	0.41	0.84
Indonesia	2-Jan-08	3-Jul-18	7.61	8.89	9.50	2.37	2.60	2.71	1.21	0.67	0.87	1.76	0.09	2.21
Mexico	2-Jan-04	3-Jul-18	5.76	6.72	7.35	1.80	1.41	1.32	0.19	0.23	0.49	-1.29	-0.94	-0.23
Poland	2-Jan-04	3-Jul-18	3.81	4.50	4.89	1.70	1.53	1.32	0.04	-0.16	-0.30	-0.99	-1.12	-1.17
Russia	4-Jan-07	3-Jul-18	7.41	8.35	8.66	2.19	2.08	2.18	1.10	1.47	1.78	0.85	1.68	3.19
South Africa	2-Jan-04	3-Jul-18	7.31	8.07	8.68	1.37	0.90	0.78	0.51	0.09	0.32	0.57	0.91	0.38
South Korea	26-Jul-04	3-Jul-18	3.24	3.90	4.08	1.25	1.48	1.33	0.22	0.58	-0.26	-1.03	-0.14	-1.27
Turkey	1-Jan-10	3-Jul-18	9.41	9.58	9.67	2.02	1.51	1.29	0.80	0.44	0.32	1.99	2.45	2.62

Notes: Original data have a daily frequency. The means and standard deviations are in percentages. In a few cases, such as Chile, we substituted data points that were clearly outliers with the last available data points. **Source:** Bloomberg.

Preliminaries

	Exchange Rate Arrangement	Financial Openness Chinn-Ito	Monetary Policy Framework
Chile	Free Floating	0.69	IT
Czech Republic	Stabilized arrangement	1.00	IT
India	Floating	0.17	IT
Indonesia	Floating	0.42	IT
Mexico	Free Floating	0.70	IT
Poland	Free Floating	0.69	IT
Russia	Free Floating	0.71	IT
South Korea	Floating	0.71	IT

Notes: Chinn-Ito indices correspond to 2016. IT stands for inflation targeting.
Source: IMF (2016), Chinn-Ito (2008) and central banks' webpages.

Preliminaries

	Lvau (Garriga)	Lvaw (Garriga)	CEO (Cuk)	Obj (Cuk)	Pol (Cuk)	Limlen (Cuk)	Average
Chile	0.73	0.82	0.58	0.60	0.75	1.00	0.75
Czech Republic	0.75	0.83	0.64	0.60	0.75	1.00	0.76
India	0.26	0.29	0.31	0.40	0.00	0.34	0.27
Indonesia	0.83	0.85	0.64	1.00	0.75	0.91	0.83
Mexico	0.67	0.64	0.77	0.60	0.75	0.56	0.67
Poland	0.83	0.88	0.77	0.60	1.00	0.96	0.84
Russia	0.64	0.70	0.64	0.60	0.53	0.80	0.65
South Korea	0.44	0.41	0.58	0.60	0.27	0.33	0.44

(*De jure*) Measures of Central Bank Independence 2012
Source: Garriga (2016)

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Chile	6	6	6	6	6	6	6	6	6	6	7	7	7	7	7	7	8	7
Czech Republic	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	3	4	5
India	1	1	1	1	1	1	1	2	2	2	2	3	3	3	3	4	4	4
Indonesia	0	0	0	0	0	1	1	1	1	1	1	1	2	2	3	3	4	4
Mexico	0	2	2	2	2	2	2	2	2	2	2	2	2	3	3	4	4	4
Poland	1	1	1	1	1	1	1	1	1	1	2	2	2	2	3	3	4	6
Russia	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	4
South Korea	0	0	1	1	1	2	2	3	3	3	3	4	4	4	4	4	5	5

Measure of Macroprudential Policy Stance.
Source: Cerutti et al. (2017b).

Obtaining and Modelling the Risk Factors

- Orthogonalize the interest rates with respect to inflation and VIX. Analytically, run:

  $y_t^{(n)} = \beta_{0,n} + \beta_{1,n}\pi_t + \beta_{2,n}\sigma_t + \epsilon_{t,n}$ *for n=1,2, …, N.*
- Calculate the principal components of $\boldsymbol{\epsilon}_{\mathbf{t},}$.
- Stack $\boldsymbol{F_t} = [\pi_t \; \sigma_t \; \boldsymbol{z_t}]$.
- We then have the observable *($\pi_t \; \sigma_t$)* and unobservable *($\boldsymbol{z_t}$)* risk factors.
- Model risk factors with a VAR(1).

  $\boldsymbol{F_{t+1}} = \boldsymbol{\theta} + \boldsymbol{\Phi F_t} + \boldsymbol{v_{t+1}}$ where $\boldsymbol{v_{t+1}} \sim N(0,\boldsymbol{\Sigma})$

The Affine Interest Rate Model I

- Bond Pricing
  - By definition $P_t^{(n)} = \exp\left(-n \cdot y_t^{(n)}\right)$.
  - Affine model means: $y_t^{(n)} = A_n + \boldsymbol{B}_{\boldsymbol{n}}' \boldsymbol{F}_{\boldsymbol{t}}$
  - No arbitrage implies that there exists a Stochastic Discount Factor (SDF), $\boldsymbol{M}_{\boldsymbol{t+1}}$ that prices all financial assets. The literature has used the following functional form:

$$\boldsymbol{M}_{\boldsymbol{t+1}} = \exp\left(-y_t^{(1)} - \frac{\boldsymbol{\lambda}_{\boldsymbol{t}}' \boldsymbol{\lambda}_{\boldsymbol{t}}}{2} - \boldsymbol{\lambda}_{\boldsymbol{t}}' \boldsymbol{\Sigma}^{-1/2} \boldsymbol{v}_{\boldsymbol{t+1}}\right)$$

  - Market prices of risk $\boldsymbol{\lambda}_{\boldsymbol{t}} = \boldsymbol{\Sigma}^{-1/2}(\boldsymbol{\lambda}_{\boldsymbol{0}} + \boldsymbol{\lambda}_{\boldsymbol{1}} \boldsymbol{F}_{\boldsymbol{t}})$ capture how shocks ($\boldsymbol{v}_{\boldsymbol{t+1}}$) affect the SDF.
- Model estimation. To estimate $\boldsymbol{\lambda}_{\boldsymbol{0}}$ and $\boldsymbol{\lambda}_{\boldsymbol{1}}$, we follow Adrian et al. (2013).

The Affine Interest Rate Model II

- The SDF prices all financial assets in the economy; in particular, nominal bonds:
  - $P_t^{(n)} = \mathbb{E}_t\left[\boldsymbol{M_{t+1}P_{t+1}^{(n-1)}}\right]$
  - $\boldsymbol{M_{t+1}} = \exp\left(-y_t^{(1)} - \frac{\boldsymbol{\lambda_t'\lambda_t}}{2} - \boldsymbol{\lambda_t'\Sigma^{-1/2}v_{t+1}}\right)$
  - $P_t^{(n)} = \exp\left(-n \cdot y_t^{(n)}\right)$
  - $y_t^{(n)} = A_n + \boldsymbol{B_n'F_t}$
- These lead to cross-sectional restrictions for the coefficients A_n and $\boldsymbol{B_n}$.

Risk-Neutral Bond Pricing

- **Ordinary** Bond Pricing
  - $P_t^{(n)} = \exp\left(-n \cdot y_t^{(n)}\right)$
  - $y_t^{(n)} = A_n + \boldsymbol{B_n' F_t} = A_n + B_{n,1}' \pi_t + B_{n,2}' \sigma_t + \ldots + B_{n,k}' F_{t,k}$
- **Risk-Neutral** Bond Pricing
  - $P_t^{(n,*)} = \exp\left(-n \cdot y_t^{(n,*)}\right)$
  - $y_t^{(n,*)} = A_n^* + (\boldsymbol{B_n^*})' \boldsymbol{F_t} = A_n^* + (B_{n,1}^*)' \pi_t + (B_{n,2}^*)' \sigma_t + \ldots + (B_n^*)' F_{t,k}$
  - These are obtained by letting market price of risks be zero, λ_t=0.
  - These are interest rates that would prevail for risk-neutral agents.

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The Term Premium

- **Ordinary** Bond Pricing
  - $y_t^{(n)} \;=\; A_n + \boldsymbol{B_n'F_t} \quad = A_n + B_{n,1}'\pi_t + B_{n,2}'\sigma_t + \ldots + B_{n,k}'F_{t,k}$
- **Risk-Neutral** Bond Pricing
  - $y_t^{(n,*)} = A_n^* + (\boldsymbol{B_n^*})'\boldsymbol{F_t} = A_n^* + (B_{n,1}^*)'\pi_t + (B_{n,2}^*)'\sigma_t + \ldots + (B_n^*)'F_{t,k}$
- **The Term Premium**
  - $y_t^{(n)} \;= \mathbb{E}_t\left[y_t^{(1)} + y_{t+1}^{(1)} + \cdots y_{t+n-1}^{(1)}\right]n^{-1} + TP_t^{(n)}$
- Moreover, $y_t^{(n,*)} = \mathbb{E}_t\left[y_t^{(1)} + y_{t+1}^{(1)} + \cdots y_{t+n-1}^{(1)}\right]n^{-1}$
- Hence, $TP_t^{(n)} = y_t^{(n)} - \; y_t^{(n,*)}$ (Adrian et al. 2013).
- $TP_t^{(n)} = A_n - A_n^* + (\boldsymbol{B_n} - \boldsymbol{B_n^*})'\boldsymbol{F_t}$

Estimation Results

	Mean Absolute Errors (basis points)					
	Horizon					
	1y	*2y*	*4y*	*6y*	*8y*	*10y*
Chile	2.1	0.5	0.8	0.7	1.3	1.1
Czech Republic	10.3	2.4	5.3	0.6	2.1	2.1
India	1.6	0.5	0.7	0.8	1.2	3.2
Indonesia	2.7	2.2	1.8	2.7	1.3	3.0
Mexico	1.6	1.5	3.6	9.7	8.5	17.9
Poland	0.9	2.3	1.6	2.1	1.7	2.2
Russia	4.8	1.2	4.9	3.0	4.1	2.7
South Korea	3.5	0.9	2.1	1.6	0.8	3.5

Notes: Each datum is the mean absolute error $T^{-1}\sum \left| y_{t,data}^{(n)} - y_{t,model}^{(n)} \right|$, for each economy (row) and maturity (column), units are basis points.

Estimation Results

$$y_t^{(n)} = A_n + B'_{n,1}\ \pi_t + B'_{n,2}\ \sigma_t\ + \ldots + B'_{n,k}F_{t,k}$$
$$y_t^{(n,*)} = A_n^* + (B_{n,1}^*)'\pi_t + (B_{n,2}^*)'\sigma_t + \ldots + (B_n^*)'F_{t,k}$$
$$y_t^{(n)} = y_t^{(n,*)} + TP_t^{(n)}$$

- A rise in inflation affects the risk-neutral interest rates positively, and the effect diminishes as the maturity increases. Changes in inflation affect the expected short-term interest rates as monetary authorities react to changes in inflation or are expected to do so.
- A change in the **VIX** affects the risk-neutral interest rates quantitatively much less than inflation does. Intuitively, risk-neutral investors are not compensated for risks, including those risks associated with the VIX.
- A rise in **inflation** or in the **VIX** increases the **term premium**. This holds true in general except for the short-end in some economies. In effect, the term premium compensates for risks in general, including inflation risk.
- A rise in inflation tends to affect interest rates positively across all maturities. The effect on the interest rates of a change in the **VIX** is less direct.

Estimation Results II

$$y_t^{(n)} = A_n + B'_{n,1} \pi_t + B'_{n,2} \sigma_t + \ldots + B'_{n,k} F_{t,k}$$

	Affine Model Maturity	π	VIX	PC's
Chile	1-month (Monetary Rule)	0.57	-0.02	...
	10-year	0.04	0.03	...
Czech Republic	1-month (Monetary Rule)	0.47	0.03	...
	10-year	0.38	0.06	...
India	1-month (Monetary Rule)	0.19	-0.02	...
	10-year	0.21	-0.04	...
Indonesia	1-month (Monetary Rule)	0.34	0.02	...
	10-year	0.21	-0.04	...
Mexico	1-month (Monetary Rule)	0.92	-0.03	...
	10-year	0.45	-0.002	...
Poland	1-month (Monetary Rule)	0.65	-0.001	...
	10-year	0.57	0.01	...
Russia	1-month (Monetary Rule)	0.39	-0.01	...
	10-year	0.24	0.03	...
South Korea	1-month (Monetary Rule)	0.68	-0.02	...
	10-year	0.70	0.02	...

Remarks on the IRFs, Benchmark Identification

- **Benchmark identification**, **uncorrelated shocks**.

$$\sigma_t \ or \ \pi_t \rightarrow y_t^{(10)}, TP_t^{(10)}$$

- Long-term interest rates and term premiums' responses to the VIX's shocks are, in general, positive. Those responses of the term premium tend to be large. To be sure, as risk appetite decreases, investors reduce their demand for risky assets, including EMEs' nominal bonds.
- Long-term interest rates and term premiums' responses to inflationary shocks are, in general, positive. Those of the long-term interest rates are greater. Inflation shocks should affect the $y_t^{(10,*)}$ via the expected short-term interest rates, and the term premium $TP_t^{(10)}$ via the inflation risk premium.
- Several of the responses of risk-neutral interest rates $y_t^{(10,*)}$ tend to be small or short lived. This is intuitive in the case of the VIX. Risk-neutral agents are not compensated for risks.

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Recursive Identification Schemes

- We focus on **two (recursive) identification schemes**.
- Both schemes have in common:
  - Shocks, on any variable, do not affect inflation contemporaneously (e.g., due to price rigidities).
  - For the principal components, shocks on one component contemporaneously affect the next component, and so on.
- **Their key difference** is the relative order of the VIX index and the principal components (PCs).
  - In the **second** scheme, we assume that the **VIX index contemporaneously responds to shocks to all PCs**, akin to Rey's (2015) identification.
  - In the **third** scheme, we assume that the **PCs can contemporaneously respond to shocks on the VIX index, more of a SOE interpretation.**

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Remarks on the IRFs I

$$\sigma_t \; and \; \pi_t \rightarrow y_t^{(10)}$$

- **Chile, Poland, and Russia** can be grouped. In effect, they have similar exchange rate regimes, central bank independence and financial openness. Chile, Poland, and Russia's are similar in the response from their long-term interest rate, although Russia's is notably greater; in particular, in the second identification scheme.
- **Indonesia** is relatively more financially closed than the previous three economies. Its long-term interest rate's response to a shock on the VIX is not statistically significant for the third identification, although it is for the second.
- **Czech Republic is** financially open, independent central bank and stabilized arrangement regime. **India** is financially more closed, the central bank is the least independent among those in our database, and has a floating exchange rate regime. Under a joint shock, the **Czech** long-term interest rates response is positive and statistically significant. **India's** interest rate response is small and not statistically significant.

Remarks on the IRFs II

$$\sigma_t \; and \; \pi_t \rightarrow y_t^{(10)}$$

- **Chile and Russia** are relatively similar except for their macroprudential policy stance. Chile has been more active. Statistical significant response to joint shocks in both economies. For Russia, it is quantitatively more important.
- **Chile and Mexico** are similar except for how active they have been in implementing macroprudential policies. Again, Chile has been more active. Interest rate of Mexico responds (little) to shocks on the VIX (inflation). Interest rate of Chile responds (little) to shocks on inflation (the VIX). Their interest rate responses to joint shocks are quantitatively similar.
- While **South Korea** differs from **Chile, Mexico, and Russia** in that its central bank is not as independent, this does not seem to make a difference when it comes to the interest rates' response to joint shocks.

Remarks on the IRFs III

- **Some of our results might be also determined by economic features beyond those we have considered.**
- **In general, shocks on the VIX** are mostly taken by the **term premium** component of the long-term interest rate. **Shocks on inflation** are mostly absorbed by the **risk-neutral interest rate**. How the response of the long term interest rate plays out is country dependent.
- Several EMEs' central banks might be facing difficulties regarding the **determination of their long-term interest rate under shocks to the VIX,** and their interest rate channel transmissions might be hampered in the process.

Final Remarks

- In the context of the model, analytically, we have documented two possible distortions implied by the presence of shocks on the VIX (GFCy).
- In terms of **the short-term rates (‘monetary rules’)**

$$y_t^{(1)} = A_1 + \boldsymbol{B'_{1,1}}\ \pi_t + \boldsymbol{B'_{1,2}}\ \sigma_t \ + \ldots + B'_{1,k} F_{t,k}$$

- In terms of the **risk factors dynamics ($\boldsymbol{F_t}$) and the long-term rates**

$$y_t^{(n)} = A_n + \boldsymbol{B'_{n,1}}\ \pi_t + \boldsymbol{B'_{n,2}}\ \sigma_t \ + \ldots + B'_{n,k} F_{t,k}$$

As the presence of shocks on the VIX **tend to amplify the long-term interest rate responses**, compared to having only shocks on inflation.

Final Remarks II

- We have considered common shocks (i.e., one std). Under financial stress episodes, the shocks would be larger and the responses would become more of a concern. Thus, those that were not statistically significant in our estimation might become so.
- An EME would be in a better position to face the GFCy if it could reduce risks, reducing the market prices of risks and, accordingly, reducing the term premium of the long-term interest rate.
- In doing so, authorities should focus on those risks in which they have some control. Some factors affecting risks might be of a more longstanding nature, such as the development of financial markets.

Some References

- **Adrian, T., R. K. Crump, and E. Moench. 2013.** "Pricing the Term Structure with Linear Regressions." *Journal of Financial Economics* 110(1): 110–38.
- **Albagli, E., L. Ceballos, S. Claro, and D. Romero (2018).** "Channels of US monetary policy spillovers to international bond markets." BIS Working Papers No 719.
- **Avdjiev, S., Gambacorta, L., Goldberg, L., and Schiaffi, S. (2016).** The shifting drivers of international capital flows. Unpublished manuscript.
- **Baskaya, Y. S., Giovanni, J. D., Kalemli-Ozcan, S., and Ulu, M. F. (2017).** "International spillovers and local credit cycles (No. w23149)." National Bureau of Economic Research.
- **Blake, A. P., G. R. Rule, and O. J. Rummel. 2015.** "Inflation Targeting and Term Premia Estimates for Latin America." *Latin American Economic Review* 24(1): 1–21.
- **Borio, C. (2014),** "The financial cycle and macroeconomics: What have we learnt?", *Journal of Banking and Finance* 45(395): 182–98.
- **Bruno, V. and H. S. Shin (2015),** "Cross-Border Banking and Global Liquidity", *Review of Economic Studies* 82, 535-564.
- **Ceballos, L., A. Naudon, and D. Romero. 2015.** "Nominal Term Structure and Term Premia: Evidence from Chile." Working Paper 752, Central Bank of Chile, Santiago.
- **Cerutti, E., S. Claessens and A. K. Rose (2017),** "How Important is the Global Financial Cycle? Evidence from Capital Flows", CEPR discussion paper 12075.
- **Cerutti, E., Claessens, S., and Laeven, L. (2017b).** "The use and effectiveness of macroprudential policies: New evidence." *Journal of Financial Stability*, Vol. 28, 203-224.
- **Chinn, M. D., and Ito, H. (2008).** "A new measure of financial openness." *Journal of Comparative Policy Analysis*, 10(3), 309-322.
- **Forbes, K. J. and F. E. Warnock (2012),** "Capital Flow Waves: Surges, Stops, Flight, and Retrenchment", *Journal of International Economics* 88: 235-251.

References

- **Fratzscher, M. (2012). "**Capital flows, push versus pull factors and the global financial crisis". *Journal of International Economics*, 88(2), 341-356.
- **Garriga, A. C. (2016).** "Central bank independence in the world: a new data set". *International Interactions* 42(5), 849-868.
- **IMF (2016).** "Annual Report on Exchange Arrangements and Exchange Restrictions", IMF.
- **Jordà, O., M. Schularick, A. M. Taylor, and F. Ward. 2018.** "Global financial cycles and risk premiums", CEPR Discussion Paper 12969.
- **Mishkin, F. S. (1996).** "The channels of monetary transmission: lessons for monetary policy (No. w5464)." National Bureau of Economic Research.
- **Mishkin, F. S. (2001).** "The transmission mechanism and the role of asset prices in monetary policy (No. w8617)." National Bureau of Economic Research.
- **Passari, E., and Rey, H. (2015).** Financial flows and the international monetary system. *The Economic Journal*, 125(584), 675-698.
- **Piazzesi, M. (2010).** "Affine term structure models." in Handbook of financial econometrics, 1, 691-766.
- **Reinhart, C., Reinhart, V., and Trebesch, C. (2017).** „Capital Flow Cycles: A Long, Global View." In IMF Jacques Polak Annual Research Conference, November (pp. 2-3).
- **Rey, H. (2015),** "International Channels of Transmission of Monetary Policy and the Mundellian Trilemma", Mundell Fleming lecture*, IMF Economic Review* 64(1): 6–35.
- **Wright, J. H. 2011.** "Term Premia and Inflation Uncertainty: Empirical Evidence from an International Panel Dataset." *American Economic Review* 101(4): 1514–34.