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The global capital flows cycle: structural drivers and transmission channels

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* The views expressed are those of the authors and do not necessarily reflect those of the European Central Bank.

Outline

- The global financial cycle: the debate
- Measuring global risk: the Global Stock Market Factor
- A structural interpretation of global risk
- Drivers of the global capital flows cycle
- The trilemma in the transmission of push factors to global capital flows
- Concluding remarks

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The global financial cycle: definition and policy relevance

Definition

"There is a global financial cycle in capital flows, asset prices and in credit growth. This cycle comoves with the VIX, a measure of uncertainty and risk aversion of the markets"

Hélène Rey: Jackson Hole Symposium, August 2013

Policy relevance

"U.S. monetary policy shocks are transmitted and affect financial conditions even in inflation-targeting economies with large financial markets… flexible exchange rates are not enough to guarantee monetary autonomy in a world of large capital flows"
(dilemma not trilemma)

Hélène Rey: IMF Mundell-Fleming Lecture, November 2014

Global financial cycle: the evidence

- Global *push* factors, especially risk, associated with *waves* of capital flows (Forbes and Warnock, 2012) and "gatekeepers" of surges to EMEs (Ghosh et al. 2014)
- Risky asset prices: one global factor explains co-movement, reflecting risk appetite and realised volatility (Miranda-Agrippino and Rey, 2018)
- US monetary policy, USD and leverage of international banks driving cross-border banking flows (Bruno and Shin, 2015)
- Common fluctuations in prices of risky assets increased beyond real sector integration (Jorda et al. 2017)

Critical views

- Global financial cycle not important; global factor explains at most 25 percent of the variation of capital flows (Cerutti et al., 2017)
- A common component accounts for about 20 to 40 percent of the variation in countries' domestic FCIs (Arregui et al., 2018)

Global financial cycle: the policy dimension

The trilemma

- Floating exchange rates allow for a higher degree of monetary policy autonomy (Obstfeld, Shambaugh and Taylor, 2005); possibly only when Fed tightens monetary policy ("fear of appreciation" of Han and Wei, 2018)
- Transmission of global financial shocks to credit, house prices, leverage and output stronger in EMEs with pegs (Obstfeld, Ostry and Qureshi, 2018)

The dilemma

- Even with a floating exchange rate, a country may lose control of domestic financial conditions (Rey, 2013 and 2016)
- Rigid FX regimes *not* associated with *higher* sensitivity of stock markets or domestic credit to global factors (Passari and Rey, 2015)

Our contribution

On the co-movement of capital flows

Rich interpretation of the **structural drivers of global risk**:

- **financial shocks matter more** than US monetary policy shocks in driving global risk
- **global risk** is **tightly associated with global capital flows**

On the policy dimension

- **A fixed exchange rate** increases the transmission of global risk to capital flows (in particular “other investment”, i.e. bank lending)
- For EMEs with open capital account and an exchange rate target, impact of global risk shocks is **economically meaningful**

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Global Stock Market Factor: our version of the MAR indicator

- Global factor similar to Miranda-Agrippino and Rey (MAR)
- Dataset consists of stock market returns for 60 countries
- Our dataset more "global" than MAR (43% of their series US based)
- Simple dynamic factor model: $s_{i,t}$ is the log-change in stock market index in country"i"

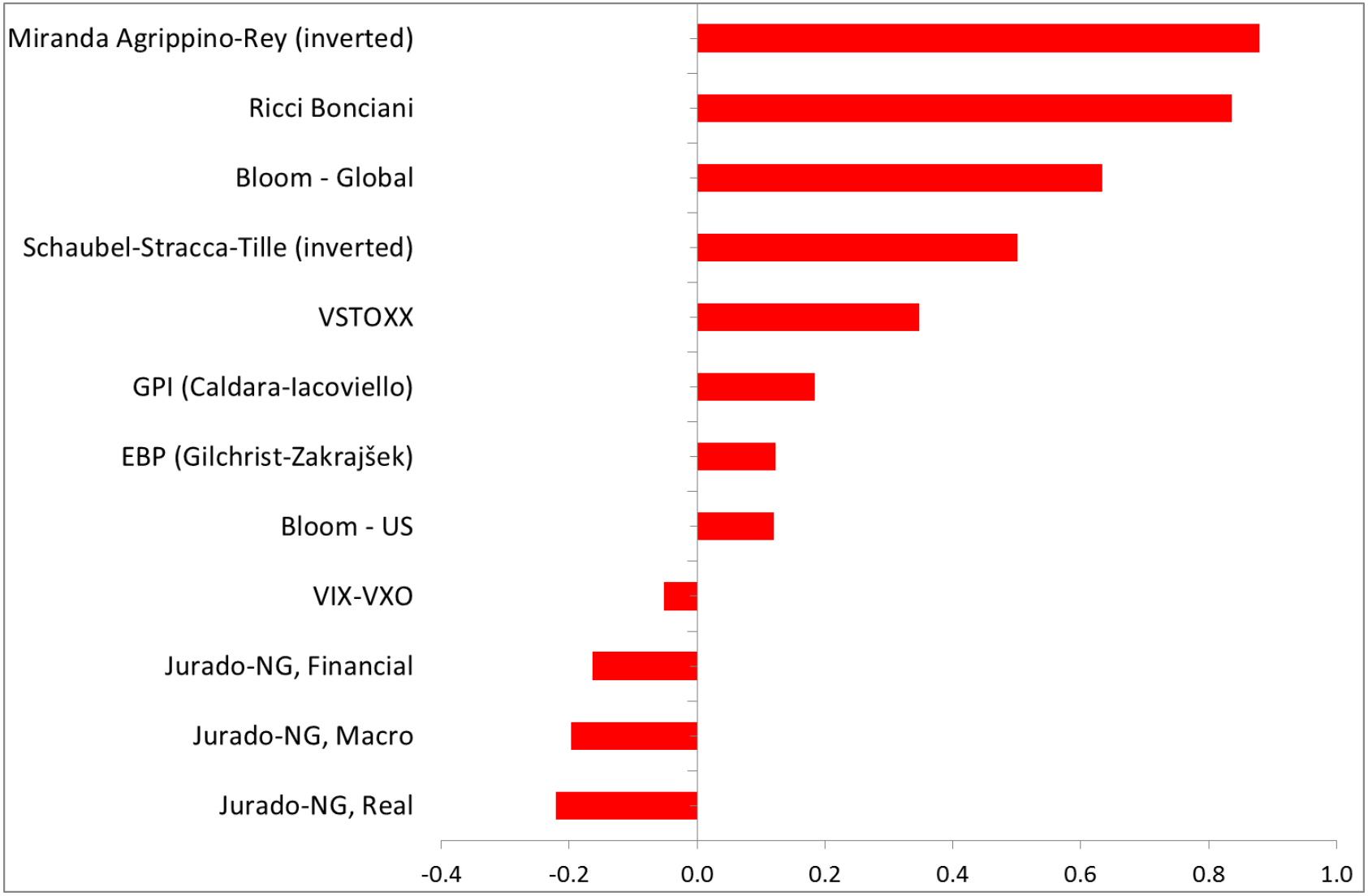
$$s_{i,t} = \beta_g f_{g,t} + \sum_{l=1}^{r} \beta_l f_{l,t} + \varepsilon_{i,t}$$

$$F_t = \mathrm{A(L)}\, F_{t-1} + \epsilon_t,$$

where $F_t = [f_{g,t}, f_{1,t}, \ldots, f_{p,t}]$

- Our Global Stock Market Factor is the cumulated value of $f_{g,t}$

Correlation between our GRA indicator and other indicators



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A structural interpretation of global risk

Factor Augmented Vector Auto Regression (FAVAR) including US and global variables:

1. 1-Year Treasury Constant Maturity Rate
2. S&P 500 Index (log)
3. US Consumer Price Index (log)
4. High-Yield USD Corporate Bond Index (yield)
5. Trade Weighted US Dollar index (log)
6. Oil Price (Brent Quality, log)
7. Global Stock Market Factor

Monthly data, 1990M2 – 2018M5, 6 lags, estimated via Bayesian Methods (Minnesota Priors and conventional prior setting)

The identification scheme

A rich configuration of (four) shocks

- (1) US Monetary Policy shock identified via External Instrument: monetary policy surprises as in Jarocinski and Karadi (2018)
- (2) US Demand, (3) Financial and (4) Geopolitical Uncertainty shocks through Sign Restrictions

Shock	Monetary Policy (signs implied by external instrument)	US Demand	Financial	Geopolitical Uncertainty
US Treasury Rate (one-year)	+	-	-	-
SP500 (log)	-	-	-	-
US Consumer Price Index (log)	-	-	-	+
High Yield USD Corporate Bonds (yield)	+	-	+	
Trade Weighted US Dollar index (log)	+	-	+	+
Oil Price (Brent Quality, log)		-	-	+
Global Stock Market Factor	+	+	+	+

Forecast Error Variance Decomposition: Global Stock Market Factor

Shock	15th percentile	mean	85th percentile
US monetary policy	0.11	0.19	0.28
Financial	0.00	0.23	0.68
Geopolitical uncertainty	0.01	0.07	0.13
US demand	0.01	0.13	0.26

- Significant impact of US monetary policy on global risk appetite
- Yet, overall relevance of “financial shocks” much larger
- Role of US demand shocks negligible

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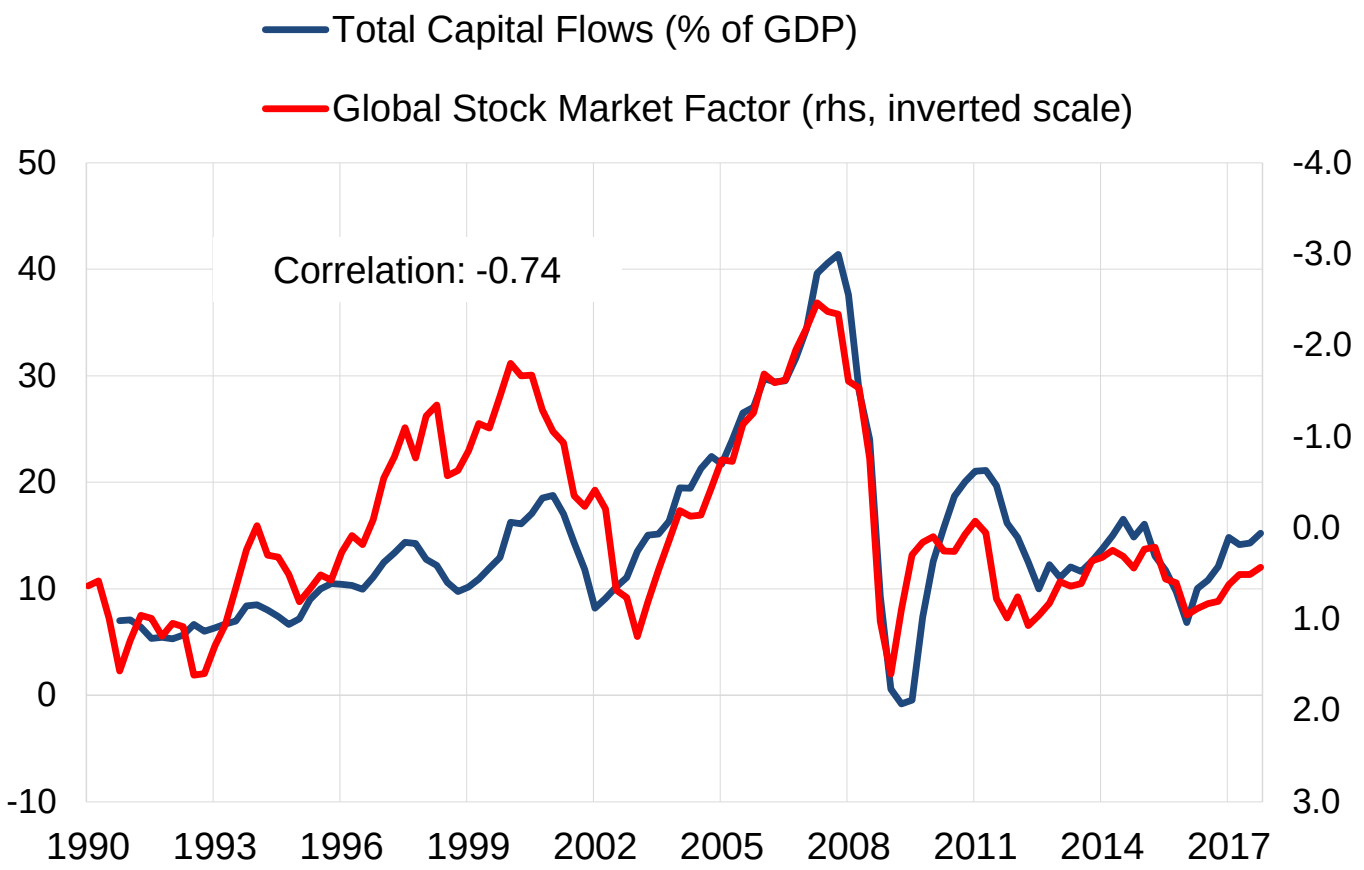
Capital flows significantly correlated with global risk

Capital flows and Global Stock Market Factor since 1990s



Sources: IMF BPS and authors' calculations. *Notes*: Capital flows are total "gross capital inflows" aggregated over 50 economies and reported as a percentage of total GDP (left-hand scale). The Global Stock Market Factor is constructed from a dynamic factor model for stock returns in 63 countries (right-hand scale, inverted).

Push factors and capital flows

Panel regression for 50 advanced and emerging economies (excluding small financial centres) between 1990 and 2017 (quarterly)

$$y_{it} = \alpha_i + \beta(L)y_i + \gamma\bar{x}_{it}^{D} + \delta\bar{x}_{t}^{G} + \varepsilon_{it}$$

$\bar{x}_{it}^{D}$ Pull factors: domestic inflation and real GDP growth

$\bar{x}_{t}^{G}$ Push factors: world GDP growth, **global risk**, **US monetary policy**

Global risk: Global Stock Market Factor (GSMF)

US monetary policy: effective Fed funds rate (level or change), monetary policy surprises (Gertler-Karadi) or monetary policy uncertainty (Bloom)

Data: summary statistics

	Mean	SD	Min	Max	Obs.
Gross capital inflows:					
Direct investment (% of GDP)	3.0	6.2	-52.1	231.3	5,251
Portfolio equity (% of GDP)	0.5	2.0	-26.6	29.3	4,998
Portfolio debt (% of GDP)	1.9	5.2	-47.4	39.6	5,017
Other investment (% of GDP)	2.4	10.9	-124.8	205.5	5,212
Total (% of GDP)	7.8	13.8	-113.6	229.4	5,163
Push factors:					
Global Stock Market Factor	0.0	1.0	-2.5	1.6	5,600
VIX	19.4	7.3	10.3	58.7	5,600
US Fed funds rate & Wu-Xia shadow rate (%)	2.9	3.1	-2.9	9.7	5,800
Bloom US monetary policy uncertainty (index)	88.9	58.0	16.6	407.9	5,750
Gertler-Karadi US monetary policy surprise (%)	0.0	0.5	-1.2	2.0	5,600
World GDP growth, annualised (%)	3.4	1.3	-1.8	5.7	5,800
Policy and control variables:					
Chinn-Ito capital account liberalisation (index)	0.68	0.34	0.00	1.00	5,528
External liabilities (ratio to GDP)	1.14	0.91	0.09	6.69	5,516
US exposure to domestic equity and debt (% of GDP)	32.1	39.0	0.0	263.6	4,690
Strict peg, Obstfeld, Shambaugh and Taylor (dummy)	0.30	0.46	0.00	1.00	5,800
Soft peg, Obstfeld, Shambaugh and Taylor (dummy)	0.30	0.46	0.00	1.00	5,684
Strict peg, Ilzetzki, Reinhart and Rogoff (dummy)	0.30	0.46	0.00	1.00	5,800
Soft peg, Ilzetzki, Reinhart and Rogoff (dummy)	0.56	0.50	0.00	1.00	5,800
Inflation, year-on-year (%)	10.4	33.2	-3.82	495.2	5,325
Domestic GDP growth, year-on-year (%)	3.2	4.8	-19.7	73.0	5,261

Outliers in capital flows → winsorise data (1% cut)

Capital flows and global risk: a robust relationship (1)

Panel: capital flows, Global Stock Market Factor and US monetary policy

Dependent variable	(1) Direct investm.	(2) Portfolio equity	(3) Portfolio debt	(4) Other investm.	(5) Total	(6) Direct investm.	(7) Portfolio equity	(8) Portfolio debt	(9) Other investm.	(10) Total
Inflation	-0.003*	0.001	0.002	0.003	0.003	-0.003**	0.001	0.001	0.007	0.005
	(0.001)	(0.001)	(0.003)	(0.004)	(0.004)	(0.001)	(0.001)	(0.003)	(0.004)	(0.004)
Domestic GDP growth	0.029*	0.009*	0.002	0.117**	0.172**	0.028*	0.009*	0.000	0.122**	0.175**
	(0.015)	(0.005)	(0.020)	(0.048)	(0.066)	(0.015)	(0.005)	(0.021)	(0.050)	(0.068)
World GDP growth	0.078**	-0.030	-0.046	0.605***	0.634**	0.075**	-0.050	-0.033	0.572***	0.574**
	(0.039)	(0.048)	(0.125)	(0.122)	(0.288)	(0.035)	(0.044)	(0.139)	(0.131)	(0.274)
Global Stock Market Factor	**-0.485*** **	**-0.121* **	**-0.342** **	**-0.477** **	**-1.347*** **	**-0.471*** **	**-0.117** **	**-0.271** **	**-0.668*** **	**-1.448*** **
	(0.058)	(0.072)	(0.133)	(0.238)	(0.345)	(0.060)	(0.048)	(0.128)	(0.240)	(0.318)
US policy rate (level)	-0.010	-0.008	-0.046	0.137*	0.063					
	(0.015)	(0.016)	(0.045)	(0.070)	(0.087)					
US policy rate (change)						0.051	0.159	-0.011	-0.017	0.322
						(0.095)	(0.113)	(0.337)	(0.382)	(0.674)
Observations	4,835	4,584	4,595	4,804	4,753	4,835	4,584	4,595	4,804	4,753
Countries	50	49	49	50	50	50	49	49	50	50
R^2	0.182	0.0776	0.116	0.122	0.215	0.182	0.0795	0.116	0.121	0.215

Notes: The model includes country-specific fixed effects and four lags of the dependent variable. Driscoll-Kraay standard errors, accounting for cross-sectional and temporal dependence of the residuals, are reported in parentheses. The asterisks ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Capital flows and global risk: a robust relationship (2)

Panel: capital flows, Global Stock Market Factor and US monetary policy

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dependent variable	Direct investm.	Portfolio equity	Portfolio debt	Other investm.	Total	Direct investm.	Portfolio equity	Portfolio debt	Other investm.	Total
Inflation	-0.003**	0.001	0.001	0.007*	0.005	-0.003**	0.001	0.001	0.007	0.005
	(0.001)	(0.001)	(0.003)	(0.004)	(0.004)	(0.001)	(0.001)	(0.003)	(0.004)	(0.004)
Domestic GDP growth	0.028*	0.010*	0.002	0.123**	0.177**	0.028*	0.010*	0.002	0.121**	0.176**
	(0.015)	(0.005)	(0.021)	(0.051)	(0.068)	(0.015)	(0.005)	(0.021)	(0.050)	(0.069)
World GDP growth	0.081**	-0.031	-0.043	0.566***	0.603**	0.081**	-0.049	-0.066	0.585***	0.582**
	(0.039)	(0.045)	(0.123)	(0.123)	(0.269)	(0.036)	(0.037)	(0.114)	(0.128)	(0.262)
Global Stock Market Factor	**-0.468*** **	**-0.120** **	**-0.296** **	**-0.681*** **	**-1.473*** **	**-0.469*** **	**-0.100***	**-0.257** **	**-0.679*** **	**-1.411*** **
	(0.061)	(0.057)	(0.133)	(0.239)	(0.308)	(0.061)	(0.051)	(0.117)	(0.232)	(0.299)
US monetary policy surprises, Gertler-Karadi	0.031	**-0.195*** **	**-0.494***	-0.257	**-1.126***					
	(0.086)	(0.068)	(0.263)	(0.374)	(0.612)					
US monetary policy uncertainty, Bloom						-0.000	**-0.003*** **	-0.004	0.002	-0.005
						(0.001)	(0.001)	(0.003)	(0.003)	(0.006)
Observations	4,835	4,584	4,595	4,804	4,753	4,835	4,584	4,595	4,804	4,753
Countries	50	49	49	50	50	50	49	49	50	50
R^2	0.182	0.0821	0.119	0.121	0.218	0.182	0.0908	0.119	0.121	0.215

Notes: The model includes country-specific fixed effects and four lags of the dependent variable. Driscoll-Kraay standard errors, accounting for cross-sectional and temporal dependence of the residuals, are reported in parentheses. The asterisks ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Capital flows and global risk: robust to different samples

Advanced vs. emerging economies

Sample	Advanced economies					Emerging economies				
Dependent variable	Direct investm.	Portfolio equity	Portfolio debt	Other investm.	Total	Direct investm.	Portfolio equity	Portfolio debt	Other investm.	Total
Global Stock Market Factor	**-0.610*** **	**-0.195** **	**-0.708*** **	**-1.048*** **	**-2.477*** **	**-0.388*** **	-0.062	0.036	**-0.469* **	**-0.854** **
	(0.101)	(0.095)	(0.230)	(0.337)	(0.461)	(0.066)	(0.044)	(0.102)	(0.250)	(0.338)
US monetary policy surprises	-0.010	**-0.158* **	**-0.696** **	-0.116	-1.281	0.027	**-0.208*** **	-0.386	-0.375	**-0.984** **
	(0.132)	(0.084)	(0.333)	(0.654)	(0.957)	(0.077)	(0.067)	(0.287)	(0.303)	(0.475)
Observations	1,884	1,790	1,842	1,884	1,883	2,951	2,794	2,753	2,920	2,870
Countries	18	18	18	18	18	32	31	31	32	32
R^2	0.117	0.0802	0.174	0.102	0.212	0.242	0.108	0.0509	0.217	0.269

Excluding financial centres and the global financial crisis in 2008-09

Sample	Excluding large financial centres (US, UK, CH)					Excluding global financial crisis (2008-09)				
Dependent variable	Direct investm.	Portfolio equity	Portfolio debt	Other investm.	Total	Direct investm.	Portfolio equity	Portfolio debt	Other investm.	Total
Global Stock Market Factor	**-0.451*** **	**-0.108* **	**-0.284** **	**-0.676*** **	**-1.416*** **	**-0.486*** **	**-0.140*** **	-0.214	**-0.581** **	**-1.312*** **
	(0.056)	(0.064)	(0.127)	(0.247)	(0.308)	(0.064)	(0.034)	(0.130)	(0.239)	(0.276)
US monetary policy surprises	0.014	**-0.216*** **	**-0.511* **	0.051	-0.805	-0.039	**-0.168** **	-0.238	0.135	-0.398
	(0.081)	(0.077)	(0.273)	(0.332)	(0.572)	(0.075)	(0.083)	(0.188)	(0.318)	(0.388)
Observations	4,551	4,300	4,311	4,520	4,469	4,435	4,192	4,207	4,404	4,357
Countries	47	46	46	47	47	50	49	49	50	50
R^2	0.193	0.0882	0.113	0.126	0.234	0.181	0.0818	0.126	0.116	0.224

Notes: The model includes country-specific fixed effects, additional controls and four lags of the dependent variable. The asterisks ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Unpacking the drivers of global risk and capital flows

Panel: capital flows and structural drivers of Global Stock Market Factor

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Driver	Shocks					Contributions				
Dependent variable	Direct investm.	Portfolio equity	Portfolio debt	Other investm.	Total	Direct investm.	Portfolio equity	Portfolio debt	Other investm.	Total
Monetary policy shock	-0.141	**-0.203*** **	**-0.439** **	-0.291	**-1.164*** **	**-0.445** **	-0.043	-0.321	**-0.923** **	**-1.663** **
	(0.105)	(0.066)	(0.168)	(0.360)	(0.387)	(0.206)	(0.168)	(0.325)	(0.463)	(0.711)
Financial shock	-0.198	**-0.308*** **	**-1.200*** **	**-1.081*** **	**-2.810*** **	**-0.632*** **	-0.034	**-0.548** **	**-1.456*** **	**-2.447*** **
	(0.211)	(0.054)	(0.221)	(0.346)	(0.472)	(0.166)	(0.131)	(0.274)	(0.393)	(0.574)
Geopolitical-uncertainty shock	**-0.203***	**-0.336*** **	-0.091	0.742**	0.254	**-0.871** **	**-0.507*** **	-0.584	-0.906	-2.866
	(0.110)	(0.069)	(0.217)	(0.296)	(0.397)	(0.376)	(0.173)	(0.756)	(1.256)	(2.142)
Observations	4,835	4,584	4,595	4,804	4,753	4,835	4,584	4,595	4,804	4,753
Countries	50	49	49	50	50	50	49	49	50	50
R^2	0.169	0.101	0.129	0.120	0.218	0.178	0.0790	0.117	0.122	0.215

Notes: The model includes country-specific fixed effects, four lags of the dependent variable and a vector of domestic (inflation and GDP growth) and global (GDP growth) control variables that can affect capital flows (omitted for space reasons). Driscoll-Kraay standard errors, accounting for cross-sectional and temporal dependence of the residuals, are reported in parentheses. The asterisks ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

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Transmission of risk to capital flows: testing the policy trilemma

Similarly to Passari and Rey (2015) and Obstfeld et al. (2018)

$$y_{it} = \alpha_i + \beta(L)y_i + \gamma\bar{x}_{it}^{D} + \delta\bar{x}_{t}^{G} + \eta\bar{z}_{it} + \theta\bar{p}_t * \bar{z}_{it} + \varepsilon_{it}$$

Policy vector (z): De jure capital account openness index (KO) and dummies for fixed and intermediate exchange rate regime (D)

$$\bar{z}_{it} = \left[KO_{it-4}, D_{it}^{peg}, D_{it}^{softpeg}\right]$$

Push factor vector (p): Global Stock Market Factor (GSMF) and US monetary policy surprises (MPS)

$$\bar{p}_t = [GSMF_t, MPS_t]$$

Excluding currency, banking and sovereign debt crises, when exchange rate regime more likely to change

Trilemma in the transmission of global risk to capital flows

Using *de jure* measure of capital account openness: Chinn-Ito index (KAOPEN)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Exchange rate regime classification	Obstfeld, Shambaugh and Taylor					Ilzetzki, Reinhart and Rogoff				
Dependent variable	Direct investm.	Portfolio equity	Portfolio debt	Other investm.	Total	Direct investm.	Portfolio equity	Portfolio debt	Other investm.	Total
Global Stock Market Factor (GSMF)	-0.124	-0.125	0.076	1.008***	0.841**	0.205	**-0.279****	-0.088	1.369***	1.136***
	(0.111)	(0.094)	(0.166)	(0.263)	(0.326)	(0.133)	(0.134)	(0.197)	(0.328)	(0.423)
GSMF * KAOPEN	**-0.366****	-0.001	**-0.524****	**-1.772*****	**-2.717*****	**-0.480*****	0.055	**-0.409***	**-1.966*****	**-2.765*****
	(0.150)	(0.093)	(0.225)	(0.374)	(0.495)	(0.151)	(0.115)	(0.210)	(0.394)	(0.485)
GSMF * Strict peg	**-0.300*****	-0.072	-0.024	**-1.348*****	**-1.768*****	**-0.482*****	0.018	-0.091	**-1.377*****	**-2.039*****
	(0.096)	(0.047)	(0.265)	(0.320)	(0.391)	(0.131)	(0.076)	(0.326)	(0.482)	(0.547)
GSMF * Soft peg	-0.067	0.024	0.027	-0.357	-0.245	**-0.359*****	0.159*	0.178	**-0.498****	-0.426
	(0.095)	(0.088)	(0.122)	(0.261)	(0.328)	(0.099)	(0.083)	(0.154)	(0.203)	(0.320)
US Monetary Policy Shock (MPS)	-0.017	-0.149	**-0.611***	-0.429	-1.029	-0.095	-0.036	-0.263	-0.967	-1.042
	(0.143)	(0.168)	(0.345)	(0.427)	(0.750)	(0.170)	(0.138)	(0.398)	(0.640)	(0.852)
MPS * KAOPEN	0.089	0.013	-0.428	-0.123	-0.951	0.081	-0.026	-0.329	0.005	-0.711
	(0.274)	(0.166)	(0.375)	(0.643)	(0.839)	(0.277)	(0.168)	(0.383)	(0.693)	(0.890)
MPS * Strict peg	-0.003	**-0.221****	0.858	1.383**	1.860*	0.094	**-0.256****	0.315	1.932**	1.788*
	(0.169)	(0.101)	(0.616)	(0.582)	(0.955)	(0.186)	(0.114)	(0.533)	(0.740)	(0.935)
MPS * Soft peg	-0.046	-0.031	0.503*	0.355	1.073	0.084	-0.143	-0.236	0.639	0.238
	(0.161)	(0.104)	(0.300)	(0.560)	(0.799)	(0.123)	(0.120)	(0.245)	(0.471)	(0.587)
Observations	4,374	4,179	4,187	4,343	4,324	4,374	4,179	4,187	4,343	4,324
Countries	50	49	49	50	50	50	49	49	50	50
R^2	0.167	0.0858	0.118	0.146	0.238	0.168	0.0887	0.118	0.146	0.238

Notes: The model includes country-specific fixed effects, four lags of the dependent variable and a vector of domestic (inflation and GDP growth) and global (GDP growth) control variables that can affect capital flows (omitted for space reasons). Driscoll-Kraay standard errors, accounting for cross-sectional and temporal dependence of the residuals, are reported in parentheses. The asterisks ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

The trilemma in the transmission of global risk to capital flows

Using *de facto* measure of financial openness (FINOPEN): Total external liabilities as a ratio to GDP

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Exchange rate regime classification	Obstfeld, Shambaugh and Taylor					Ilzetzki, Reinhart and Rogoff				
Dependent variable	Direct investm.	Portfolio equity	Portfolio debt	Other investm.	Total	Direct investm.	Portfolio equity	Portfolio debt	Other investm.	Total
US monetary policy surprise	0.023	**-0.195****	**-0.513****	-0.018	-0.795*	0.024	**-0.194****	**-0.503****	-0.021	-0.781*
	(0.093)	(0.076)	(0.235)	(0.287)	(0.441)	(0.093)	(0.076)	(0.236)	(0.289)	(0.441)
Global Stock Market Factor (GSMF)	**-0.175***	**-0.172****	-0.006	0.679	0.280	-0.001	**-0.287*****	-0.189	0.578*	0.030
	(0.089)	(0.076)	(0.193)	(0.415)	(0.465)	(0.095)	(0.086)	(0.191)	(0.337)	(0.448)
GSMF * FINOPEN	**-0.189****	0.049	-0.244	**-0.802****	**-1.214*****	**-0.186****	0.053	-0.239	**-0.820****	**-1.207*****
	(0.091)	(0.039)	(0.190)	(0.371)	(0.427)	(0.093)	(0.042)	(0.187)	(0.387)	(0.444)
GSMF * Strict peg	**-0.312*****	-0.073	-0.062	**-1.414*****	**-1.915*****	**-0.452*****	0.021	-0.027	**-1.150****	**-1.742*****
	(0.110)	(0.057)	(0.240)	(0.317)	(0.388)	(0.141)	(0.082)	(0.287)	(0.515)	(0.538)
GSMF * Soft peg	-0.059	0.017	0.024	-0.323	-0.209	**-0.256*****	0.148**	0.278	-0.074	0.191
	(0.110)	(0.089)	(0.137)	(0.229)	(0.324)	(0.087)	(0.071)	(0.186)	(0.234)	(0.336)
Observations	4,395	4,199	4,207	4,359	4,346	4,395	4,199	4,207	4,359	4,346
Countries	50	49	49	50	50	50	49	49	50	50
R^2	0.173	0.0869	0.118	0.147	0.238	0.174	0.0898	0.119	0.146	0.239

Notes: The model includes country-specific fixed effects, four lags of the dependent variable and a vector of domestic (inflation and GDP growth) and global (GDP growth) control variables that can affect capital flows (omitted for space reasons). Driscoll-Kraay standard errors, accounting for cross-sectional and temporal dependence of the residuals, are reported in parentheses. The asterisks ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Trilemma in the transmission of global risk to capital flows: robustness

Dependent variable: Total capital flows

Policy controls: Chinn-Ito *de jure* index of capital account liberalisation (KAOPEN) and Obstfeld, Shambaugh and Taylor (OST) exchange rate regime classification

	(1) Benchmark	(2) Advanced economies	(3) Emerging economies	(4) Excl. euro area	(5) Excl. financial centres	(6) Excl. global fin. crisis	(7) Including crises	(8) Including time dummies
De jure capital account openness (KAOPEN)	0.799	4.531	0.439	0.280	0.538	-0.205	0.747	0.854
	(0.855)	(3.169)	(0.868)	(0.836)	(0.807)	(0.813)	(0.952)	(0.731)
Strict peg, OST	0.776	0.639	0.933	0.485	0.985*	0.644	1.173**	0.561
	(0.663)	(1.679)	(0.704)	(0.662)	(0.568)	(0.533)	(0.590)	(0.534)
Soft peg, OST	0.056	0.448	0.073	0.108	-0.058	-0.154	0.201	-0.053
	(0.480)	(1.251)	(0.312)	(0.448)	(0.362)	(0.343)	(0.425)	(0.381)
US monetary policy surprise	-0.917*	-0.872	-0.967*	-1.039**	-0.586	-0.332	-1.051*	
	(0.504)	(0.765)	(0.500)	(0.464)	(0.473)	(0.430)	(0.607)	
Global Stock Market Factor (GSMF)	0.846**	3.907	0.491**	0.936***	0.642**	0.824**	0.847***	
	(0.332)	(2.548)	(0.230)	(0.322)	(0.277)	(0.386)	(0.298)	
GSMF * KAOPEN	**-2.667*** **	**-5.472** **	**-2.497*** **	**-2.572*** **	**-2.488*** **	**-2.495*** **	**-2.625*** **	**-2.320*** **
	(0.495)	(2.702)	(0.607)	(0.475)	(0.436)	(0.515)	(0.493)	(0.621)
GSMF * Strict peg, OST	**-1.858*** **	**-1.991** **	**-1.619*** **	**-1.794*** **	**-1.735*** **	**-1.832*** **	**-1.926*** **	**-1.702*** **
	(0.396)	(0.772)	(0.470)	(0.439)	(0.399)	(0.436)	(0.388)	(0.511)
GSMF * Soft peg, OST	-0.283	**-1.724** **	0.358	-0.293	0.061	-0.214	-0.265	-0.243
	(0.324)	(0.729)	(0.288)	(0.335)	(0.256)	(0.335)	(0.325)	(0.381)
Observations	4,324	1,783	2,541	3,696	4,056	4,088	4,696	4,324
Countries	50	18	32	50	47	50	50	50
R^2	0.236	0.206	0.317	0.218	0.259	0.239	0.235	0.292

Notes: The dependent variable is "Total capital inflows"". The model includes country-specific fixed effects, four lags of the dependent variable and a vector of domestic (inflation and GDP growth) and global (GDP growth) control variables that can affect capital flows (omitted for space reasons). The asterisks ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Economic significance of the impact of risk on capital flows

Impact of one standard-deviation change in Global Stock Market Factor on capital flows (absolute value, % of GDP)

		Direct investment	Other investment	**Total**
Full sample	Average impact	0.5	0.7	**1.5**
	Fully open economies*	0.6	1.4	**2.5**
	Open and strict peg	0.7	2.1	**3.7**
	Sample Mean	*3.0*	*2.4*	*7.8*
	Standard Deviation	*(6.2)*	*(10.9)*	*(13.8)*
Advanced economies	Average impact	0.6	1.0	**2.5**
	Fully open economies*	1.4	1.2	**2.8**
	Fully open and strict peg	1.2	1.5	**3.6**
	Sample Mean	*2.4*	*3.4*	*9.6*
	Standard Deviation	*(5.1)*	*(15.0)*	*(17.4)*
Emerging markets	Average impact	0.4	0.5	**0.9**
	Fully open economies*	0.6	1.4	**2.1**
	Fully open and strict peg	0.8	2.5	**3.6**
	Sample Mean	*3.4*	*1.8*	*6.6*
	Standard Deviation	*(6.7)*	*(6.9)*	*(10.6)*

Notes: numbers in italics refer to the sample mean and sample standard deviation. Benchmark model including US monetary policy surprises. Policy controls: Chinn-Ito *de jure* index of capital account liberalisation and Obsfeld, Shambaugh, Taylor (2010) exchange rate regime classification. * Fully open economies correspond to observations for which the (normalised) Chinn-Ito index takes the value of 1.

Outline

- The global financial cycle: the debate
- Measuring global risk: the Global Stock Market Factor
- A structural interpretation of global risk
- Drivers of the global capital flows cycle
- The trilemma in the transmission of push factors to global capital flows
- Concluding remarks

Concluding remarks

The drivers of global risk and capital flows

1. Global *capital flows* cycle is closely connected to global risk
2. In turn, global risk is largely driven by US monetary policy shocks and financial shocks
3. Yet, financial shocks matter more than US monetary policy shocks

The transmission of global risk to capital flows

4. There is a *trilemma* in the global capital flows cycle
5. Strict pegs increase the transmission of global risk to capital flows
6. This is largely driven by “other investment”, i.e. bank lending
7. *Trilemma* is economically relevant for EMEs

Background slides

Data

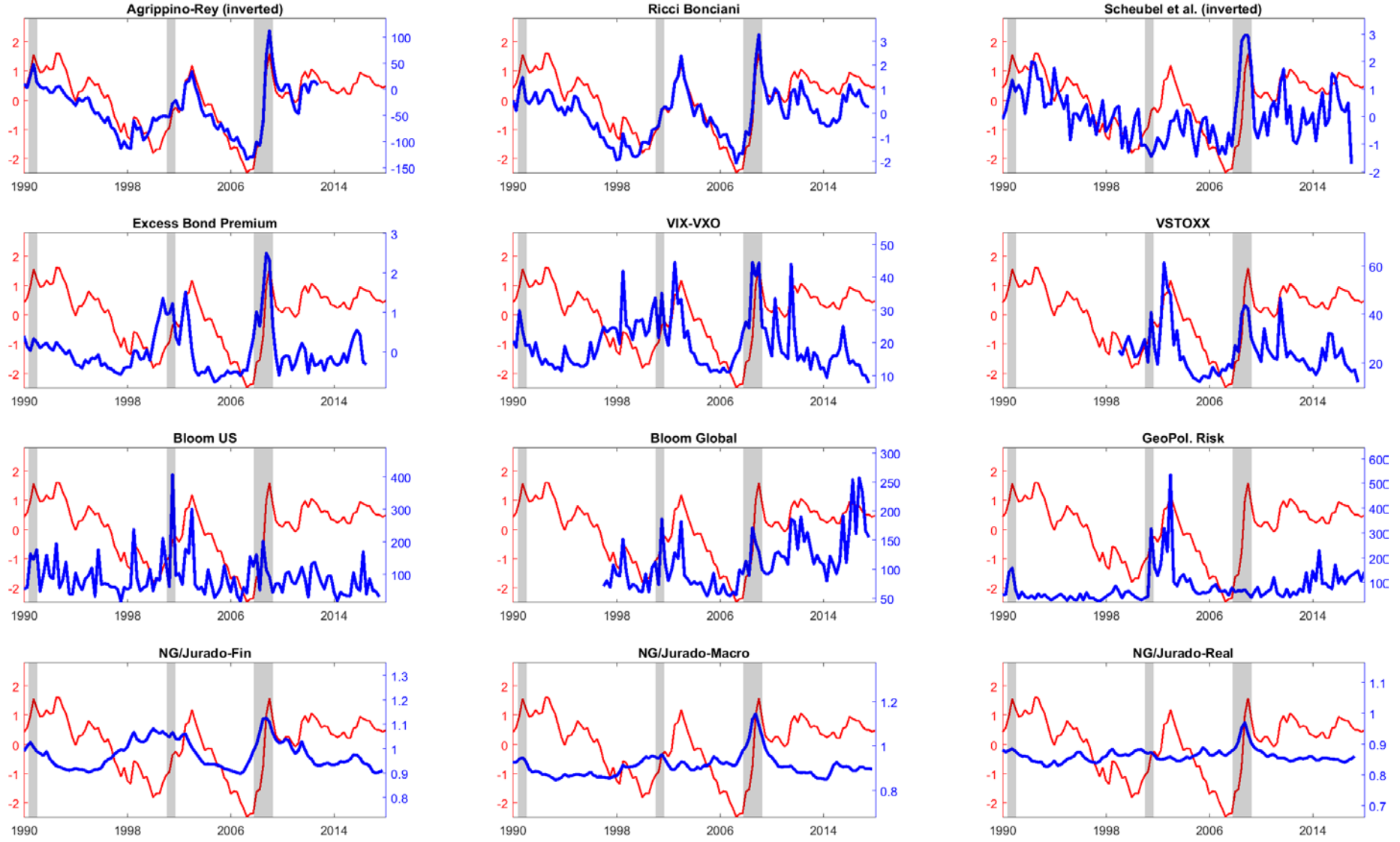
Variable	Source
Gross capital inflows	IMF Balance of Payments Statistics (BPS)
Stock market indices	Global Financial Data
VIX, US effective Fed funds rate, Wu-Xia US shadow rate	Haver
US monetary policy surprises	Gertler and Karadi (2015)
US monetary policy uncertainty	Baker, Bloom and Davis (2016) at www.PolicyUncertainty.com
Inflation and GDP growth	Haver
De jure capital account liberalisation	Chinn and Ito (2006)
External liabilities	External Wealth of Nations Mark II dataset and IMF BPS
Bilateral US portfolio investment	US Treasury International Capital (TIC) System
Exchange rate regime classification	Obstfeld, Shambaugh and Taylor (2010) and Ilzetzki, Reinhart, and Rogoff (2017)

Data: summary statistics, advanced vs. emerging economies

	Advanced economies					Emerging economies				
	Mean	SD	Min	Max	Obs.	Mean	SD	Min	Max	Obs.
Gross capital inflows:										
Direct investment (% of GDP)	2.4	5.1	-31.5	94.5	2,036	3.4	6.7	-52.1	231.3	3,215
Portfolio equity (% of GDP)	0.8	2.5	-17.0	29.3	1,946	0.4	1.5	-26.6	17.2	3,052
Portfolio debt (% of GDP)	3.0	6.5	-47.4	39.6	2,002	1.1	3.8	-23.9	38.5	3,015
Other investment (% of GDP)	3.4	15.0	-124.8	205.5	2,036	1.8	6.9	-47.9	85.9	3,176
Total (% of GDP)	9.6	17.4	-113.6	214.0	2,035	6.6	10.6	-57.1	229.4	3,128
Push factors:										
Global Stock Market Factor	0.0	1.0	-2.5	1.6	2,016	0.0	1.0	-2.5	1.6	3,584
VIX	19.4	7.3	10.3	58.7	2,016	19.4	7.3	10.3	58.7	3,584
US Fed funds rate & Wu-Xia shadow rate (%)	2.9	3.1	-2.9	9.7	2,088	2.9	3.1	-2.9	9.7	3,712
Bloom US monetary policy uncertainty (index)	88.9	58.0	16.6	407.9	2,070	88.9	58.0	16.6	407.9	3,680
Gertler-Karadi US monetary policy surprise (%)	0.0	0.5	-1.2	2.0	2,016	0.0	0.5	-1.2	2.0	3,584
World GDP growth, annualised (%)	3.4	1.3	-1.8	5.7	2,088	3.4	1.3	-1.8	5.7	3,712
Policy and control variables:										
Chinn-Ito capital account liberalisation (index)	0.94	0.15	0.17	1.00	2,060	0.53	0.34	0.00	1.00	3,468
External liabilities (ratio to GDP)	1.71	1.15	0.32	6.69	2,080	0.79	0.45	0.09	3.81	3,436
US exposure to domestic equity and debt (% of GDP)	56.5	51.5	2.3	263.6	1,632	19.2	20.8	0.00	137.1	3,058
Strict peg, Obstfeld, Shambaugh and Taylor (dummy)	0.39	0.49	0.00	1.00	2,088	0.25	0.43	0.00	1.00	3,712
Soft peg, Obstfeld, Shambaugh and Taylor (dummy)	0.28	0.45	0.00	1.00	2,088	0.31	0.46	0.00	1.00	3,596
Strict peg, Ilzetzki, Reinhart and Rogoff (dummy)	0.42	0.49	0.00	1.00	2,088	0.23	0.42	0.00	1.00	3,712
Soft peg, Ilzetzki, Reinhart and Rogoff (dummy)	0.37	0.48	0.00	1.00	2,088	0.66	0.47	0.00	1.00	3,712
Inflation, year-on-year (%)	2.26	2.24	-2.41	21.0	1,944	15.1	41.0	-3.82	495.2	3,381
Domestic GDP growth, year-on-year (%)	1.8	2.4	-10.9	8.7	1,944	4.1	5.6	-19.7	73.0	3,317

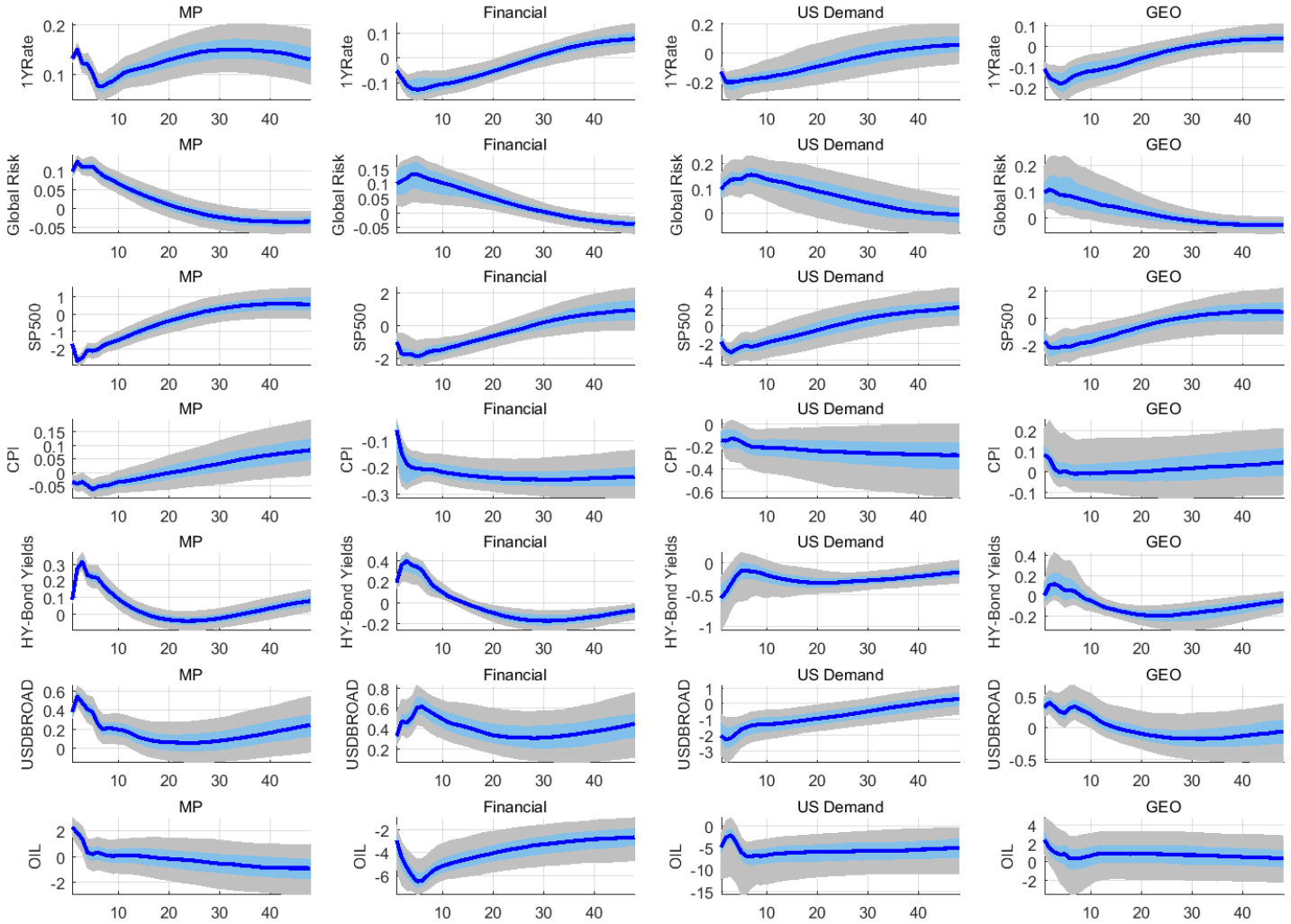
Historical comparison, GSMF vs other indicators

– Global Stock Market Factor (GSMF), lhs **– alternative indicator, rhs**



Notes: grey shaded areas indicate US recessions.

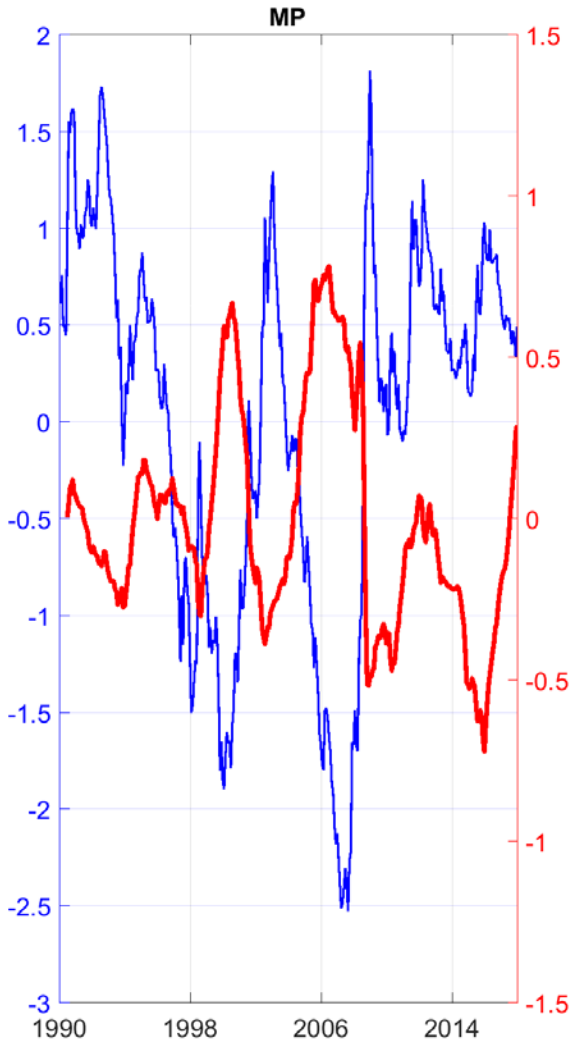
Impulse Response Functions

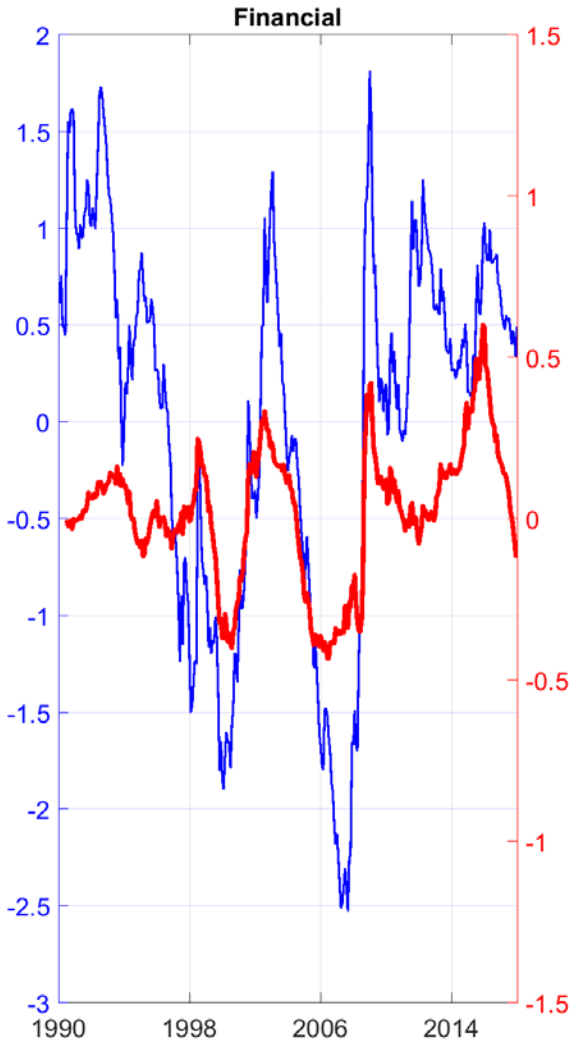


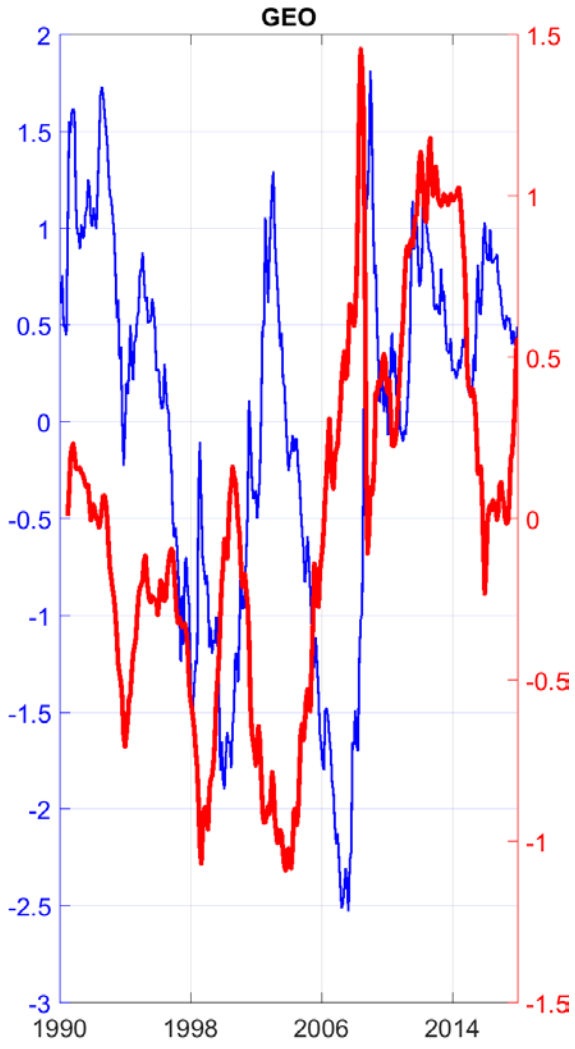
Historical Contributions: Global Stock Market Factor

– Global Stock Market Factor, lhs

– Contribution of shock, rhs







Correlation of capital flows, global risk and US policy rate

Correlation of capital inflows, global risk and US policy rate: 1990 – 2017 (quarterly data)

	Capital flows - Advanced	Capital flows - Emerging	VIX	Global Stock Market Factor	US policy rate
Capital flows - Advanced	1				
Capital flows - Emerging	0.59*	1			
VIX	-0.27*	-0.34*	1		
Global Stock Market Factor	-0.61*	-0.51*	0.09	1	
US policy rate	0.11	-0.15	0.02	-0.35*	1

Sources: IMF, Haver Analytics and authors' calculations.
Notes: Capital flow liabilities as a percentage of GDP. US policy rate refers to the effective federal funds rate extended with the Wu-Xia shadow rate. Nominal USD appreciation is calculated as the log change in the nominal effective exchange rate (NEER). * Asterisk indicates statistical significance at the 5% level.

Capital flows and VIX: less robust relationship

Panel: capital flows, VIX and US monetary policy

Dependent variable	(1) DI	(2) PE	(3) PD	(4) OI	(5) TOT	(6) DI	(7) PE	(8) PD	(9) OI	(10) TOT	11 DI	12 PE	13 PD	14 OI	15 TOT	(16) DI	(17) PE	(18) PD	(19) OI	(20) TOT
VIX	0.013	**-0.019*** **	**-0.055** **	-0.027	**-0.104***	0.016	**-0.018*** **	**-0.062*** **	-0.029	-0.105	0.014	**-0.016** **	**-0.048** **	-0.021	-0.083	0.017	**-0.011** **	**-0.046***	-0.030	-0.089
	(0.011)	(0.005)	(0.024)	(0.034)	(0.058)	(0.012)	(0.006)	(0.023)	(0.042)	(0.064)	(0.013)	(0.006)	(0.024)	(0.037)	(0.059)	(0.011)	(0.006)	(0.024)	(0.038)	(0.065)
US policy rate (level)	0.061**	0.015	0.018	0.210***	0.261***															
	(0.029)	(0.014)	(0.046)	(0.071)	(0.098)															
US policy rate (change)						0.071	0.051	-0.348	-0.253	-0.286										
						(0.128)	(0.115)	(0.295)	(0.471)	(0.608)										
US monetary policy surprises, GK											0.030	**-0.120***	-0.288	-0.101	-0.751					
											(0.102)	(0.067)	(0.207)	(0.330)	(0.515)					
US monetary policy uncertainty, Bloom																-0.001	**-0.003*** **	-0.003	0.002	-0.004
																(0.001)	(0.001)	(0.002)	(0.003)	(0.005)
Observations	4,835	4,584	4,595	4,804	4,753	4,835	4,584	4,595	4,804	4,753	4,835	4,584	4,595	4,804	4,753	4,835	4,584	4,595	4,804	4,753
Countries	50	49	49	50	50	50	49	49	50	50	50	49	49	50	50	50	49	49	50	50
R^2	0.171	0.0804	0.119	0.121	0.210	0.168	0.0798	0.120	0.116	0.205	0.168	0.0813	0.120	0.116	0.207	0.168	0.0895	0.120	0.116	0.206

Notes: The model includes country-specific fixed effects, four lags of the dependent variable and a vector of domestic (inflation and GDP growth) and global (GDP growth) control variables that can affect capital flows (omitted for space reasons). Driscoll-Kraay standard errors, accounting for cross-sectional and temporal dependence of the residuals, are reported in parentheses. The asterisks ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Trilemma in the transmission of global risk to capital flows: robustness

Dependent variable: Total capital flows

Policy controls: Chinn-Ito *de jure* index of capital account liberalisation (KAOPEN) and Ilzetzki, Reinhart and Rogoff (IRR) exchange rate regime classification

	(1) Benchmark	(2) Advanced economies	(3) Emerging economies	(4) Excl. euro area	(5) Excl. financial centres	(6) Excl. global fin. crisis	(7) Including crises	(8) Including time dummies
De jure capital account openness (KAOPEN)	0.544	6.214*	0.091	-0.349	0.354	-0.413	0.595	0.521
	(0.893)	(3.514)	(0.831)	(0.842)	(0.822)	(0.821)	(0.973)	(0.784)
Strict peg, IRR	3.407***	3.714**	3.371***	5.089***	2.317***	3.191***	3.309***	3.528**
	(0.957)	(1.664)	(1.149)	(1.367)	(0.876)	(1.005)	(0.732)	(1.643)
Soft peg, IRR	2.698***	5.523**	1.581**	3.830***	1.131	2.702**	2.493***	2.565*
	(0.975)	(2.283)	(0.697)	(1.147)	(0.688)	(1.040)	(0.865)	(1.440)
US monetary policy surprise	-0.917*	-0.886	-0.946*	-1.011**	-0.589	-0.330	-1.077*	
	(0.507)	(0.760)	(0.502)	(0.465)	(0.471)	(0.426)	(0.611)	
Global Stock Market Factor (GSMF)	1.124**	3.966	0.180	1.302***	1.138***	1.196**	1.105**	
	(0.430)	(2.554)	(0.629)	(0.384)	(0.352)	(0.486)	(0.430)	
GSMF * KAOPEN	**-2.688*** **	**-5.609** **	**-2.437*** **	**-2.789*** **	**-2.389*** **	**-2.544*** **	**-2.629*** **	**-2.197*** **
	(0.481)	(2.652)	(0.554)	(0.466)	(0.391)	(0.516)	(0.479)	(0.647)
GSMF * Strict peg, IRR	**-2.140*** **	**-2.156** **	-1.355	**-2.034*** **	**-2.282*** **	**-2.213*** **	**-2.187*** **	**-1.798** **
	(0.564)	(0.852)	(0.894)	(0.623)	(0.581)	(0.634)	(0.522)	(0.686)
GSMF * Soft peg, IRR	-0.438	-0.735	0.353	-0.473	**-0.630***	-0.493	-0.432	-0.070
	(0.324)	(0.499)	(0.718)	(0.325)	(0.330)	(0.361)	(0.347)	(0.598)
Observations	4,324	1,783	2,541	3,696	4,056	4,088	4,696	4,324
Countries	50	18	32	50	47	50	50	50
R^2	0.237	0.209	0.316	0.220	0.259	0.240	0.236	0.293

Notes: The dependent variable is "Total capital inflows"". The model includes country-specific fixed effects, four lags of the dependent variable and a vector of domestic (inflation and GDP growth) and global (GDP growth) control variables that can affect capital flows (omitted for space reasons). The asterisks ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

The trilemma in the transmission of global risk to "other investment"

Dependent variable: Other investment

Policy controls: Chinn-Ito *de jure* index of capital account liberalisation (KAOPEN) and Obstfeld, Shambaugh and Taylor (OST) exchange rate regime classification

	(1) Benchmark	(2) Advanced economies	(3) Emerging economies	(4) Excl. euro area	(5) Excl. financial centres	(6) Excl. global fin. crisis	(7) Including crises	(8) Including time dummies
De jure capital account openness (KAOPEN)	-0.076	3.948	-0.032	-0.386	-0.203	-0.718	-0.108	0.162
	(0.667)	(3.073)	(0.539)	(0.662)	(0.612)	(0.598)	(0.701)	(0.568)
Strict peg, OST	0.569	1.738	0.512	0.475	0.621	0.596	0.767*	0.653
	(0.514)	(1.522)	(0.438)	(0.490)	(0.419)	(0.509)	(0.448)	(0.514)
Soft peg, OST	0.321	1.186	0.141	0.367	0.179	0.156	0.270	0.444
	(0.351)	(1.166)	(0.200)	(0.332)	(0.220)	(0.290)	(0.318)	(0.281)
US monetary policy surprise	-0.080	0.166	-0.402	-0.173	0.235	0.205	-0.234	
	(0.336)	(0.533)	(0.309)	(0.302)	(0.295)	(0.345)	(0.376)	
Global Stock Market Factor (GSMF)	1.021***	3.488*	0.675***	1.079***	0.871***	0.987***	0.989***	
	(0.276)	(2.024)	(0.141)	(0.247)	(0.253)	(0.320)	(0.263)	
GSMF * KAOPEN	**-1.751*** **	**-3.814***	**-1.891*** **	**-1.844*** **	**-1.669*** **	**-1.574*** **	**-1.725*** **	**-1.514*** **
	(0.375)	(2.224)	(0.347)	(0.362)	(0.339)	(0.419)	(0.358)	(0.374)
GSMF * Strict peg, OST	**-1.415*** **	**-1.188***	**-1.260*** **	**-1.503*** **	**-1.331*** **	**-1.401*** **	**-1.462*** **	**-1.489*** **
	(0.329)	(0.667)	(0.281)	(0.341)	(0.329)	(0.400)	(0.395)	(0.393)
GSMF * Soft peg, OST	-0.367	**-1.390** **	0.035	-0.275	-0.139	-0.432	-0.339	-0.419
	(0.266)	(0.646)	(0.175)	(0.260)	(0.192)	(0.307)	(0.300)	(0.253)
Observations	4,343	1,784	2,559	3,715	4,075	4,107	4,727	4,343
Countries	50	18	32	50	47	50	50	50
R^2	0.144	0.102	0.306	0.154	0.158	0.133	0.137	0.190

Notes: The dependent variable is "Other investment". The model includes country-specific fixed effects, four lags of the dependent variable and a vector of domestic (inflation and GDP growth) and global (GDP growth) control variables that can affect capital flows (omitted for space reasons). The asterisks ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

The trilemma in the transmission of global risk to "other investment"

Dependent variable: Other investment

Policy controls: Chinn-Ito *de jure* index of capital account liberalisation (KAOPEN) and Ilzetzki, Reinhart and Rogoff (IRR) exchange rate regime classification

	(1) Benchmark	(2) Advanced economies	(3) Emerging economies	(4) Excl. euro area	(5) Excl. financial centres	(6) Excl. global fin. crisis	(7) Including crises	(8) Including time dummies
De jure capital account openness (KAOPEN)	-0.227	6.318**	-0.297	-0.894	-0.246	-0.763	-0.203	0.040
	(0.643)	(3.140)	(0.491)	(0.654)	(0.588)	(0.580)	(0.672)	(0.651)
Strict peg, IRR	2.356***	4.282***	2.017**	3.801***	1.182*	2.272***	2.053***	2.685*
	(0.660)	(1.438)	(0.778)	(0.887)	(0.603)	(0.721)	(0.620)	(1.518)
Soft peg, IRR	2.314***	6.137***	1.163**	3.165***	0.845**	2.331***	1.785**	2.411*
	(0.741)	(2.159)	(0.510)	(0.781)	(0.371)	(0.837)	(0.751)	(1.314)
US monetary policy surprise	-0.091	0.130	-0.389	-0.163	0.229	0.211	-0.258	
	(0.340)	(0.539)	(0.308)	(0.308)	(0.292)	(0.345)	(0.381)	
Global Stock Market Factor (GSMF)	1.413***	3.303*	0.868*	1.568***	1.404***	1.398***	1.187***	
	(0.360)	(1.834)	(0.509)	(0.348)	(0.311)	(0.430)	(0.342)	
GSMF * KAOPEN	**-1.939*** **	**-3.723***	**-1.846*** **	**-2.079*** **	**-1.767*** **	**-1.840*** **	**-1.835*** **	**-1.614*** **
	(0.397)	(2.034)	(0.279)	(0.396)	(0.320)	(0.447)	(0.374)	(0.403)
GSMF * Strict peg, IRR	**-1.486*** **	-0.975	**-1.461****	**-1.768*** **	**-1.609*** **	**-1.394****	**-1.429****	**-1.302****
	(0.502)	(0.685)	(0.687)	(0.609)	(0.473)	(0.608)	(0.554)	(0.597)
GSMF * Soft peg, IRR	**-0.542****	-0.749	-0.271	**-0.576****	**-0.690*** **	**-0.579****	-0.356	-0.247
	(0.226)	(0.545)	(0.524)	(0.249)	(0.227)	(0.257)	(0.268)	(0.468)
Observations	4,343	1,784	2,559	3,715	4,075	4,107	4,727	4,343
Countries	50	18	32	50	47	50	50	50
R^2	0.144	0.105	0.305	0.156	0.157	0.133	0.137	0.190

Notes: The dependent variable is "Other investment". The model includes country-specific fixed effects, four lags of the dependent variable and a vector of domestic (inflation and GDP growth) and global (GDP growth) control variables that can affect capital flows (omitted for space reasons). The asterisks ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.