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The effects of Monetary Policy on Capital Flows A Meta-Analysis

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The effects of Monetary Policy on Capital Flows
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Abstract

We investigate whether central banks are able to attract or redirect capital flows, by bringing together the entire empirical literature into the first quantitative meta-analysis on the subject. We dissect policy effects by the type of flow and by the origin of the monetary shock. Further, we assess whether policy effects depend on factors that drive investors to either search for yields or fly to safety. Our findings indicate a mean effect size of inflows in the amount of 0.09% of quarterly GDP in response to either a 100 basis point (bp) increase in the domestic policy rate or a 100bp reduction in the external rate. However, the effect size under a random effect specification is much lower (0.01%). Factors that significantly attract inflows include foreign exchange reserves, output growth, and financial openness, while factors that deter flows include foreign debt, capital controls, and departures from the uncovered interest rate parity. Also, both local and global risks matter (global risks exerting a larger pressure). Finally, we shed light on differences across the different types of flows: banking flows being the most responsive to monetary policy, while foreign direct investment being the least responsive.

JEL Classification: C83, E58, F21, F31, F32

Keywords: Meta-Analysis, Capital Flows, Monetary Policy

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Los Efectos de la Política Monetaria sobre los Flujos de Capital
Un Meta-Análisis

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Resumen

Este trabajo representa el primer metanálisis cuantitativo sobre si los bancos centrales son capaces de atraer o redirigir los flujos de capital. Se analizan los efectos por tipo de flujo y por el origen del choque monetario. Además, se evalúa si los efectos de las políticas dependen de factores que impulsan a que inversionistas extranjeros busquen rendimientos o, por el contrario, busquen refugio. Nuestros hallazgos indican que, en promedio, el tamaño de las entradas de capital es de 0,09% del PIB trimestral en respuesta a un choque de 100 puntos básicos, ya sea en aumentos de la tasa de política doméstica o en reducciones de la tasa de política externa. Sin embargo, bajo una especificación de efectos aleatorios el tamaño del efecto es mucho menor (0,01%). Los factores que atraen significativamente flujos de capital incluyen el nivel de reservas internacionales, el crecimiento de la producción y el grado de apertura financiera, mientras que los factores que disuaden los flujos incluyen la deuda fiscal, controles de capital y desviaciones de la paridad descubierta de la tasa de interés. También, tanto los riesgos locales como los globales importan (aunque los riesgos globales ejercen una mayor presión). Finalmente, brindamos luces sobre las diferencias entre los tipos de flujos: los flujos bancarios siendo los más reactivos a la política monetaria, y los de inversión extranjera directa los menos reactivos.

Clasificación JEL: C83, E58, F21, F31, F32

Palabras Clave: Meta-Análisis, Flujos de Capital, Política Monetaria

"*The typical emerging market economy (EME) receiving higher capital inflows will grow 0.3 percentage points (pp) faster... But the typical EME with higher capital flow volatility will grow 0.7 pp slower.*" Carney (2019)

1 Introduction

There is major divide in the literature on whether –and to what degree– monetary policy can affect the tides and ebbs of capital flows (Ghosh et al., 2018). More broadly, a perennial challenge for policymakers has been to identify which tools can potentially offset the negative effects (and enhance the benefits) of cross-border investment in domestic markets. According to the BIS (2021), richer data available today, as opposed to a decade ago, delineate clearer benefits (as well as risks) pertaining to a capital account liberalization.

For example, a part of the literature argues that increased foreign participation in local markets is associated with increased sensitivity of overall portfolio flows to global financial conditions and increased volatility of yields. Examples of this are found in Calvo and Mendoza (1996); Calvo and Talvi (2005); Forbes and Warnock (2012); Obstfeld (2012); Ebeke and Lu (2015); Ebeke and Kyobe (2015); Cerutti et al. (2019), who show that foreign participation in emerging markets can have negative effects when hit by a sudden drying-up of capital flows resulting from an increase in risk aversion. Also, Miyajima and Shim (2014) state that foreign investment may destabilize emerging markets' asset markets, accentuating booms and busts.

On the flip side, advocates argue that foreign participation can instead dampen volatility in bond yields, especially in emerging markets (Prasad and Rajan, 2008; Peiris, 2010). The reasoning is that foreign investors act as catalysts for the development of local bond markets by diversifying the institutional investor base and creating greater demand (and liquidity) for local debt securities. Burger and Warnock (2004) and Ocampo et al. (2020) state that foreign participation may stabilize markets by reducing currency mismatches and serving as an alternative source of funding. According to Calvo et al. (1996), capital flows can even increase welfare by enabling households to increase and smooth out their consumption.

The debate poses the following question: Can central banks attract –or alternatively redirect– flows in order to capitulate on these market gains? Our investigation sheds light on this question by bringing together the entire literature that empirically evaluates the effect of monetary policy on capital flows. Our study is the first and only quantitative meta-analysis

conducted on the subject, covering 330 estimated effects from 50 distinct studies. It covers 7 decades (1960s - 2020s) and an average of 34 emerging markets per study when using panel data, in addition to 14 individual countries when the study provides a specific case study (99% of our survey focuses on emerging markets). It involved a web-scrapping search among the largest economic repositories and manually checking over 1,300 papers to select those that conducted an empirical estimation of monetary policy on capital flows.

We recognize the ample literature that exists on the drivers of capital flows, which ultimately focus on *pull* and *push* factors (Calvo et al., 1993; Fernandez-Arias, 1996).[1] According to Koepke (2015), *push* factors such as global risk aversion and external interest rates matter most for portfolio debt and equity flows (less for banking flows), while *pull* factors such as domestic output, asset returns, and country risk matter for all types of flows (but mostly for banking). Among flows, foreign direct investments (FDIs) seem to be the least affected by global cyclical developments. To some degree, there is a consensus that *push* factors largely explain the synchronicity of capital flows towards and out of emerging markets while *pull* factors explain the extensive heterogeneity across recipient countries (Fratzscher, 2012; Cerutti et al., 2019).

We put these notions to the test by dissecting policy effects by the type of flow and by the origin of the monetary shock (i.e. if triggered by domestic or external policy rates). Further, we assess whether policy effects vary depending on factors that drive investors to either search for yields or fly to safety. Regarding the former (*search for yields*), we consider country-specific variables such as output, FX reserves, sovereign debt, and financial openness. Regarding the latter (*flight to safety*), we consider various types of risks, among them: (i) global risks, e.g. VIX, (ii) domestic risks, e.g. capital controls, credit default swaps, etc., and (iii) exchange rate risks, i.e. departures from interest rate parities, exchange rate volatility, and monetary trilemma measures; all of which reflect uncertainty in currency markets.

To our advantage, our outcomes of interest (and impulses) are measured in the same informative unit. Domestic (external) policy rates are scaled to a 100 basis point increase (reduction), implying a higher yield differential in favor of the domestic country. Additionally, inflows to the domestic country are denoted in percentage changes relative to each country's quarterly GDP. Thus, apart from the statistical inference we gain an economic interpretation of the effect sizes and standard errors; this contrasts with most of the meta-analysis literature

[1]For a review of the different mechanisms, such as the credit and risk-taking channels, we refer readers to the works of Bruno and Shin (2015); Baskaya et al. (2017); Hofmann et al. (2019).

that standardizes effects into a scale-free metric (Stanley and Doucouliagos, 2012).

In the related literature, our paper is most similar to those that qualitatively survey *push* and *pull* drivers of capital flows, such as the works of Koepke (2015) and Koepke and Paetzold (2020). In contrast, our analysis is quantitative: (i) we estimate full pooling least squares meta-regressions, where effect sizes are weighted by their inverse variance, (ii) we produce forest plots of fixed and random effects, and (iii) we statistically check for publication bias with the use of precision-effect tests (i.e. funnel plot asymmetry tests). Perhaps more notably, our focus is limited to the effect of monetary policy on flows, which is one of the many determinants of capital flows. Within this focus, we nonetheless depart from studies that use, as impulse, non-conventional policies such as quantitative easing, tapering news, and exogenous innovations to central banks' balance sheets (Aizenman et al., 2014; Anaya et al., 2017; Temesvary et al., 2018).

Our findings indicate a mean effect size of capital inflows in the amount of 0.09% of quarterly GDP in response to either a 100 basis point (bp) increase in the domestic policy rate or a 100bp reduction in the external rate, which refers to the US Federal Funds Rate. Studies that already control for risk variables report a higher effect size (0.16%) and also those that base the origination of the shock in the domestic policy rate (0.52%). However, the unconditional effect size, under a random effect specification is much lower, of close to 0.01%.

We also assess whether policy effects vary depending on country-specific factors. Among factors that significantly attract inflows are higher foreign exchange reserves, output growth, and financial openness. This is in line with Alberola et al. (2016) and Mohan (2009), which advocate the role of international reserves as flow stabilizers and which confirm that the structure of flows is heavily conditioned by the state of local financial markets, respectively. Alternatively, factors that deter flows include: capital controls, the country's level of external debt, and departures from the uncovered interest rate parity (UIP) condition. Additionally, we find that both domestic and global risks significantly restrain inflows, with global risks exerting a larger pressure.

Further, we assess whether policy effects vary depending on the origin of the monetary shock: domestic versus external. We highlight a higher sensitivity of flows in response to an external monetary policy in several fronts, including: higher restrictions on inflows, higher departures from the UIP condition, higher output growth, and a higher level of financial openness. We find that flows are more sensitive to domestic monetary policy when dealing

with local risks, and more sensitive to external monetary policy when dealing with global risks. In essence, our results are consistent with the fact that, as a country opens itself financially (with a likely higher participation of non-residents in its investor base) global shocks become more relevant (Schoenmaker, 2013; Rey, 2015; Kalemli-Ozcan, 2019)

Finally, we evaluate effects by the type of flow. In line with the bulk of the literature, we find that banking flows (with an average effects size of 0.23%) is the most responsive to monetary policy shocks, while FDIs seems to be the least responsive (with an average effects size of 0.05%). Moreover, we find that the retrenchment of portfolio flows is more reactive to a country's level of external debt and also if the country enacts capital restrictions on outflows. Conversely, FDIs are more reactive (to monetary policy) for higher levels of output growth and financial openness. In terms of risk variables, portfolio flows are more sensitive to local risks, while FDIs are more reactive to global risks.

For robustness, we explore whether there is evidence of publication bias and whether results vary based on the methodology or publication type (working paper versus published article). We show that the estimated effect size is nearly identical to the bias-corrected effect, so while there is evidence of a publication bias, it is sufficiently small as to not alter the estimates that follow from meta-regressions.

Due to data limitation, we omit a key topic concerning differences in the residency of investor. Essentially, we observe 284 observations pertaining to non-residents, 9 to domestic residents, 31 to both, and 6 are unspecified. In the balance of payments terminology, net capital flows mirror the current account balance while gross capital flows mirror changes in assets and liabilities in the financial account i.e., by separately recording investments by residents and non-residents (Obstfeld, 2012; Aldasoro et al., 2020). Hence, the external validity of our results carry over almost exclusively to non-resident operations, which fortunately for emerging markets, constitute the greater part of flows (Broner et al., 2013).

2 Constructing the Meta-Analysis

2.1 Web-Search

We carried out a web-scrapping search among the largest economic repositories including Repec, Scopus, Mendeley, central banks, and NBER. We searched for studies containing the terms: [*"capital flows"* or *"capital inflows"* or *"capital outflows"*] and [*"monetary policy"* or *"policy rate"* or *"policy shock"*] (in any order, joint or separate) either in the title or abstract. Our last web search was conducted on December 31^{st} 2021, producing over 1,300 findings. From there we manually discarded 291 duplicate studies, in those cases keeping the most updated or published version. Next we eliminated studies that fell under any of the following criteria: (i) written in any language other than English, (ii) without the effects of monetary policy, (iii) without an empirical evaluation, and (iv) those in which the United States was the only case study.[2] These criteria reduced the sample to 330 separate findings (covering a total of 884,711 observations) stemming from 50 studies, which vary depending on the type of capital flow, sample period, country, and the origination of the monetary shock policy, among others.

For comparability purposes, the impulse and response of each finding were standardized to a common scale that facilitates the interpretation of the results. Specifically, changes in the policy rate denote a positive (or negative) shock of 100bp in the domestic rate (or external, which refers to the US Fed Funds rate). Similarly, all studies that used the rate differential subtracted the foreign policy rate from the domestic policy rate, so that positive changes (scaled to 100bp) imply a higher yield differential in favor of the domestic country. Our outcome variable, capital flows, is expressed in percentage changes relative to each country's quarterly GDP, the predominant frequency in the literature.

We faced several challenges. Among them was the extraction of results when a particular study covered multiple types of capital flows. We proceeded by recording each type of capital flow as a separate observation, and in some tests we assigned a relative weight to that observation as the inverse of findings per study, i.e. if a study reports 5 findings, each finding weighs 20%. On average, we record 6.6 findings per study, with a standard deviation of 7.2 findings. Another challenge dealt with insufficient information (from the primary source)

[2]The Unites States is intentionally excluded from our analysis since all external policy rates are in reference to it, i.e. for each country we record changes in capital flows in response to either its domestic monetary policy or the external monetary policy (i.e. the U.S. Federal Reserve).

in order to scale the effects of capital flows as a share of quarterly GDP (e.g. when the study reported effects in dollar amount or in percentage changes relative to previous flow amounts). In these cases, we gathered official flow and output data from each country (during the specified periods), and scaled each effect as a share of the country's quarterly GDP.

In some cases, the standard errors of estimates were not reported. When t-statistics were documented, we simply divided the effect size by the reported statistic. When only the p-value was reported, we followed the procedure in Vooren et al. (2019) to convert p-values as follows: p-values below and up to 0.01 were assigned t-statistics of 2.58, p-values between 0.01 and 0.05 were assigned t-statistics of 1.96, p-values between 0.05 and 0.10 were assigned t-statistics of 1.65, and p-values above 0.10 were assigned t-statistics of 0.99.

2.2 Data Sources

In addition to the primary source (information contained in each study including: reported effects, type of flow, methodology, data frequency, origin of the monetary shock, etc.), we gathered country-year specific information in order to characterize monetary policy effectiveness as a function of macroeconomic and financial fundamentals. For instance, policy rate hikes alone need not necessarily attract investment opportunities; they may be reflecting higher risk.

As such, we consider two sets of variables: one relating to the country's macroeconomic stability and standing (including variables such as output, FX reserves, sovereign debt, and financial openness) and the other relating to global and domestic risks (including variables such as the VIX, capital controls, and credit default swaps). Finally, to assess exchange rate risks, we considered variables such as departures from interest rate parities, exchange rate volatility, and monetary trilemma measures.

Our data sources include:

- Trilemma measures: index of Financial Openness was used (*source:* Aizenman et al., 2008).
- Coarse exchange rate regimes: four regime categories that matched our country-year sample were used: Currency Board, Pre-announced Crawling Peg, Crawling Band, and Freely Falling (*source:* Ilzetzki et al., 2019).
- Capital Controls: Three indices were used: Overall Restrictions Index, Overall Inflow Restrictions Index, and Overall Outflow Restrictions Index (*source:* Fernández et al., 2016).

- GDP classification: two income groups were used: Lower-Middle and Upper-Middle income (*source:* IMF FMEconGroup).
- Financial Deepening: measured as domestic credit to the private sector, as a share of GDP (*source:* World Development Indicators).
- Publication Information: publication (working paper or published article), impact factor, and number of citations were recorded as of December 31, 2021 (*source:* RePEc).
- Other macroeconomic include: Credit Default Swaps, FX Volatility, Overnight Yield Spread Volatility, Emerging Market Risk Index, US Treasury Volatility, VIX Index, Implicit Oil Volatility, and departures from the uncovered interest rate parity. Also, Sovereign Debt and international reserves as a share of GDP (*source:* World Development Indicators).

In the supplementary appendix we provide a detailed description of each study, including the country, origin of the shock, time period, direction and type of flow, investor type, whether the study already controls for risk variables, methodology and main findings (both original and rescaled effects).

2.3 Methodology

Meta-analysis is a useful quantitative method that systematically reviews and synthesizes the empirical evidence of multiple studies focused on the same research question; in our case the effects of monetary policy on capital flows. In the economic literature, meta-analysis has positioned itself as a widely accepted tool that collects related treatment effects and thus increases the overall sample size (granting more statistical power). In part, its acceptance is due to the fact that this method provides a replicable statistical framework for summarizing and interpreting the wide range of scientific evidence. In essence, it clarifies the feasibility that the results reported between similar studies are significantly different from zero, and to explain the possible heterogeneity within and between studies.

Intuitively, the meta-regression analysis performs a multiple regression analysis (Stanley and Jarrell, 1989; Jarrell and Stanley, 1990). The design consists of a dependent variable that represents the estimation on a given effect, while control variables embody the characteristics of each study in a way that it allows to specify the magnitude in which the methods, design, and data used by the authors contribute to the variation between reported results (Stanley, 2001).

To perform meta-analysis, many studies standardize individual effects into a common

scale-free metric (an adjusted t-statistic), since outcomes and treatments are either different or measured differently across studies. In those cases, the effect size is generally defined as the mean difference in outcomes between treatment and control groups, as a share of the pooled standard deviation of the dependent variable. To our advantage, our outcomes of interest (and impulses) are measured in the same informative unit. Thus, we gain a direct interpretation of the results by using economic and statistical effect sizes, as opposed to only statistical effect sizes.

We consider two types of effect heterogeneity: individual variation and in between-study variation, which translate into fixed and random effect estimates under different distributional assumptions. First, a fixed effects (FE) model assumes that effect sizes are distributed around a global parameter and that individual deviations from it arise due to measurement error. Alternatively, the random effects (RE) model assumes that deviations not only emerge from measurement error, but that there are different parameters around which certain studies are grouped together, thus increasing the reliability of the exercise (Sánchez-Meca and Marín-Martínez, 2010). In the economic literature, FE models are frequently used as a tool for research synthesis, while much other disciplines use RE (Stanley and Doucouliagos, 2012). Given the heterogeneity in our data set we believe that RE estimates are preferable, as this approach considers an additional error term that allows for the variation in settings and countries across studies.

Formally, we estimate a full pooling least squares meta-regression, where the inverse variance is used for the weighting coefficients. Note that depending on the assumption of a RE or FE model, the calculation of the variance differs. This multivariate approach allows for dummy variables for different subgroups to be incorporated into the meta-regression model and to control for macroeconomic characteristics, which exposes subgroup disparities when heterogeneity across studies is present (Vooren et al., 2019). This model is exemplified as follows:

$$ES_i = \beta + \alpha SE_i^2 + \sum_j \gamma_j X_{ji} + \nu_i \tag{1}$$

where ES_i denotes the study-level effect size, SE_i is the reported standard error, and X_i corresponds to the vector of country-year covariates that relate to the way monetary policies were conducted as well as other *pull* and *push* factors, where the goal of incorporating explanatory variables is to accommodate *"true"* variation among the effect sizes. We estimate equation 1 by clustering standard errors at the study level.

Anticipating possible variations in results, determined by country-specific factors, we include estimates for various specifications. These contemplate aspects that drive investors to either *search for yields* or *fly to safety*. Regarding the former (search for yields), we consider country-specific variables such as income, FX reserves, sovereign debt, and financial openness. Regarding the latter (flight to safety), we consider various types of risks, among them: (i) global risks, e.g. VIX, (ii) domestic risks, e.g. capital controls, credit default swaps, etc., and (iii) exchange rate risks, i.e. departures from interest rate parities, exchange rate volatility, and monetary trilemma measures; all of which reflect uncertainty in currency markets.

Finally, given the numerous primary documents (and sources), we examine whether there is evidence of publication bias, which would indicate an inclination or preference to report results with a statistical significance that coincide with the dominant theories. With the use of a funnel plot it is possible to have a visual approach to potential bias, since it plots the effect sizes against the estimate precision, the latter expressed through the inverse of the standard error. In practical terms, studies with high precision will have a uniform distribution around the mean effect size, representing the absence of publication bias, while a skewed funnel appearance would suggest the presence of publication bias (Gechert, 2022). To formally corroborate this, we estimate a joint test between the funnel asymmetry test and the precision effect test, better known as the FAT-PET test, based on the following weighted least squares (WLS) meta-regression:

$$ES_i = \alpha_0 + \beta_0 SE_i + \nu_i \tag{2}$$

where the weights correspond to $1/SE_i^2$. A statistically significant β_0 coefficient indicates publication bias, while α_0 corresponds to the genuine empirical effect. According to Stanley and Doucouliagos (2017)), this version of (WLS) presented in equation 2 is more efficient than random effects regression or simple OLS in simulations. In order to deal with the possible biased results of the FAT-PET test, Stanley and Doucouliagos (2014) propose a quadratic version of this test to estimate the effect of precision with standard error (PEESE), applying the following WLS regression:

$$ES_i = \beta_0 + \alpha_0 SE_i^2 + \nu_i \tag{3}$$

where the weights also correspond to $1/SE_i^2$ and β_0 is consistent with the magnitude of the empirical effect in the absence of publication bias.

3 Descriptive Statistics

This section provides descriptive statistics for the 330 reported results that in total cover shy of one million observations (884,711). Table 1 shows the geographical and time distribution of the data (observations are counted more than once if the study covers more than one decade). As observed, most observations belong to studies using panel data, each covering an average of 34 emerging market economies. For individual case studies, Indonesia and Brazil take the lead in the number of observations (56 and 32, respectively). The only advanced economy in our sample is Japan with 4 observations. Recall that the Unites States is excluded from our analysis since all external policy rates are in reference to it, i.e. for each country we record changes in capital flows in response to either its domestic monetary policy or the external monetary policy (U.S. Federal Funds Rate).

Table 2 shows observations categorized by the type of flow: *portfolio equity*, *portfolio bonds* (sovereign debt), *banking*, and *foreign direct investment* (FDI). According to Koepke (2015), *push* factors such as global risk aversion and external interest rates matter most for portfolio debt and equity flows (less for banking flows), while *pull* factors such as domestic output, asset returns, and country risk matter for all types of flows (but mostly for banking). Among flows, FDIs seem to be the least affected by global cyclical developments.[3] Additionally, the table breaks down flows by residency of investor. We observe 284 observations pertaining to non-residents, 9 to domestic residents, 31 to both, and 6 are unspecified. In the balance of payments terminology, net capital flows mirror the current account balance while gross capital flows mirror changes in assets and liabilities in the financial account i.e., by separately recording investments by residents and non-residents (Obstfeld, 2012; Aldasoro et al., 2020).

We next explore whether effect sizes have changed through time, according to: (i) the year of publication of each study, and (ii) the sample date of analysis. Regarding the former, it is plausible that new trends in methodologies (see Table A1 in the Appendix) or novel data yield new and different findings. Regarding the latter, capital flow patterns may have also changed. On the one hand, greater financial integration nowadays complicates the management of domestic financial conditions for an emerging country. Put differently, policymakers may need to take external factors into consideration when pursuing domestic

[3]As acknowledged recently by Lane and Milesi-Ferretti (2017); Erten et al. (2020); Gelos et al. (2020), there has been a declining role of banks as vehicles for flows and a surge in market-based funding (non-bank intermediaries). Since only about 1% of our sample takes place after 2020, the bulk of our results do not incorporate this shift in funding composition and will be especially relevant for future research.

objectives (Rey, 2015). On the other hand, the last few decades have witnessed major stressful episodes, including the East Asia crisis (1990's), the Global Financial Crisis (2008-09), the taper tantrum (2013), recent oil crises (2014, 2020), and the Great Lock-down (2020-21).[4]

However, Figure 1 shows a non-significant time trend for both effect sizes (panel a) and standard errors (panel b). On the other hand, the average effect size (intercept coefficients) are 0.14% and 0.11% of quarterly GDP, respectively for year of publication and year of study, in response to a 100bp increase (decrease) in the domestic (external) policy rate. As will be addressed in the next section, these numbers are similar to the unconditional mean (0.09%) of all effect sizes.

Next we explore whether countries' policy rates move in synchronous motion to the US Federal Funds rate. This is in part motivated by Kalemli-Ozcan (2019) who evaluates risk spillovers from divergence in monetary policy vis-a-vis the United States. In essence, capital flows might initially react to global (U.S.) rates, but then be –at least partially– compensated by policy changes in the domestic country. According to Kalemli-Ozcan, in response to an exogenous increase in the U.S. policy rate, emerging countries raise interest rates more than one for one, resulting in larger rate differentials.

Figure 2 confirms this, by plotting the change in the domestic policy rate (x-axis) against the change in US policy (y-axis) for every sample period of our 50 surveyed studies. As shown, the association is positive, where most observations lie in the lower-left (expansionary) quadrant. Note that the slope of the fitted line is less steep than the 45° one-to-one line which suggests a monetary policy overcompensation by emerging markets. In the next section we nonetheless compare studies in which the origin of the monetary shock is either domestic or external (separately) with studies in which the shock follows from the rate differential.

Finally, a key issue for policymakers is the duration of effects. Unfortunately, most studies only evaluate a contemporaneous effect on capital flows. In total, we only observe 33 impulse response functions across different time horizons. Among these, the mean and median horizon is 9.2 and 9.5 quarters, respectively, with a standard deviation of 4 quarters. Also, the data frequency distribution is: quarterly (68%), weekly (10%), monthly (12%), and yearly (10%).

[4]As an example, the taper tantrum of 2013 saw a sharp retrenchment in foreign capital flows, resulting from a higher risk aversion that prompted investors to unwind their investments in emerging markets (Milesi-Ferretti and Tille, 2011).

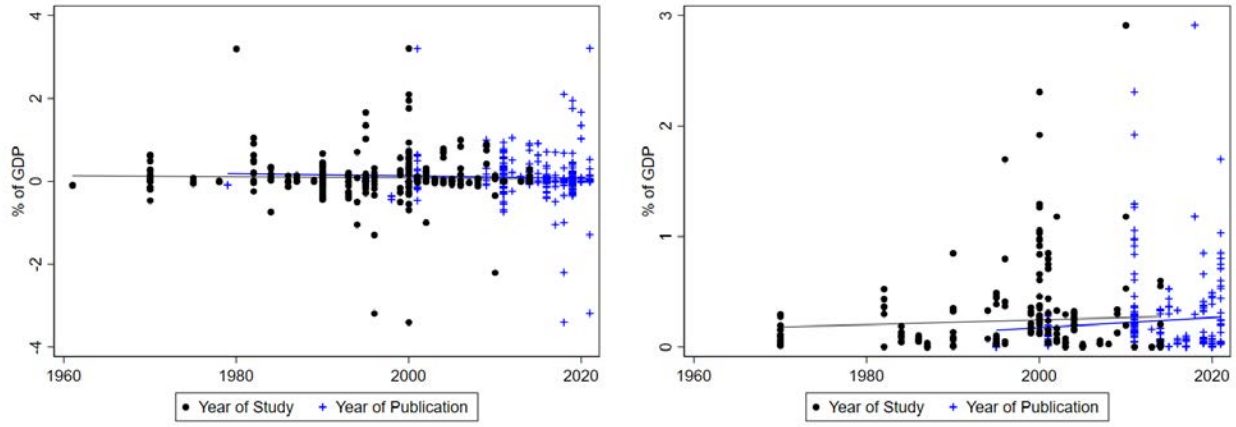
Table 1: Observations by country and decade

Country	**1960**	**1970**	**1980**	**1990**	**2000**	**2010**	**2020**	**TOTAL**
Brazil	0	0	0	8	16	8	0	32
Colombia	0	0	1	3	16	0	0	20
India	0	0	0	4	4	4	0	12
Indonesia	0	0	8	24	16	8	0	56
Japan	2	2	0	0	0	0	0	4
Korea	0	0	4	4	12	0	0	20
Mexico	0	0	0	4	4	4	0	12
Nigeria	0	0	0	2	2	2	0	6
Peru	0	0	0	4	4	4	0	12
Philippines	0	0	0	8	8	8	0	24
Russia	0	0	0	4	4	4	0	12
South Africa	0	0	0	8	8	8	0	24
Thailand	0	0	0	4	12	4	0	20
Turkey	0	0	0	4	4	4	0	12
Panel data	0	26	48	90	154	153	10	481
Total	2	28	61	171	264	211	10	**747**

Table 2: Observations by flow type and residency

	Non Residents	**Residents**	**Both**	**Not specified**	**Total**
Portfolio (Aggregate)	73	2	9	2	**86**
Portfolio Bonds	36	0	7	2	**45**
Portfolio Equity	14	6	7	2	**29**
Banking	35	0	2	0	**37**
Foreign Direct Investment	39	0	0	0	**39**
Aggregate Flows	87	1	6	0	**94**
Total	**284**	**9**	**31**	**6**	**330**

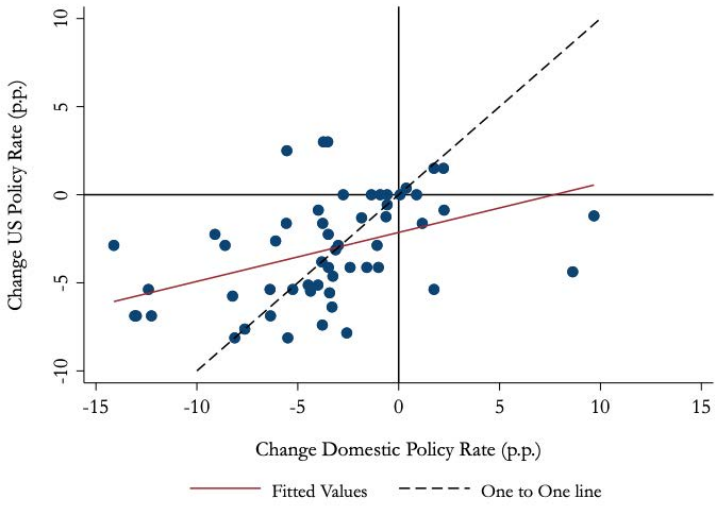
Figure 1: Effects sizes through time



(a) Effect Sizes (b) Standard Errors

Note: The Figure shows a non-significant time trend for all cases. Effect sizes and standard errors are measured as capital flows to the domestic country (% of quarterly GDP) in response to a 100bp increase (decrease) in the domestic (external) policy rate.

Figure 2: (Non)-divergence in monetary policy vis-a-vis the United States



Note: The Figure show the change in the domestic policy rate (x-axis) against the change in US policy (y-axis) for every sample period of our 50 surveyed studies. Fitted values coefficient $\hat{\beta}_1 = 0.278$ and standard error $\hat{\sigma}_{\beta_1} = 0.079$.

4 Results

Our main results are presented in this section. We conduct standard meta-analysis techniques, following the works of Stanley and Jarrell (1989); Lipsey and Wilson (2001); Stanley (2001); Knapp and Hartung (2003); Stanley and Doucouliagos (2012). We present estimates of forest-plots and full-pooling meta-regressions where effect sizes are weighted by their inverse variance and with standard errors clustered at the study-level. We also check for publication bias with precision-effect tests.

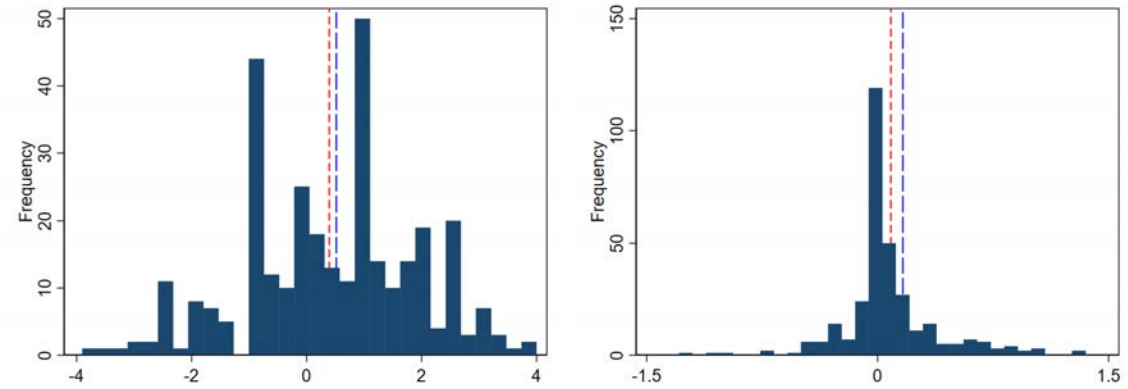
4.1 Unconditional Effects

We first present the unconditional effects of policy on capital flows. We compare the entire sample with studies that explicitly control for risk factors, global and/or country-specific, and refer to them henceforth as “risk-adjusted". Recall that impulses are scaled to a 100bp increase (decrease) in the domestic (external) policy rate; hence, all shocks imply a higher yield differential in favor of the domestic country. Also, our outcome variable (capital flows) is denoted in percentage changes relative to each country's quarterly GDP.

In total, 105 effects are statistically significant (at the 10% significance level). Of these, 69% are positive, suggesting an overall search for yields, while the remaining (negative) 31% suggest a retrenchment in flows in spite of higher yields. However, when excluding studies that do not explicitly control for risk variables, only 13 effects are statistically significant, of which 85% are positive. We interpret the increase in positivity of the effects as a clear indication of latent global and domestic risk variables. And, while in this subsection we take the authors' specification at face value, in Section 4.2 we propose (and evaluate) our own set of risk measures.

In Figure 3 we report histograms for t-statistics (panel a) and effect sizes (panel b). Regarding the latter, the mean effect size (red short-dashed line) is 0.09% while the study's risk-adjusted effect size (blue long-dashed line) is 0.16%. Notice that effects also vary depending on the origin of the shock, as seen in Figure 4 for t-statistics and Figure 5 for effects sizes. The largest effect originates from the domestic policy rate, where the risk-adjusted mean is 0.52% (inflows in the amount of half a percentage point of quarterly GDP).

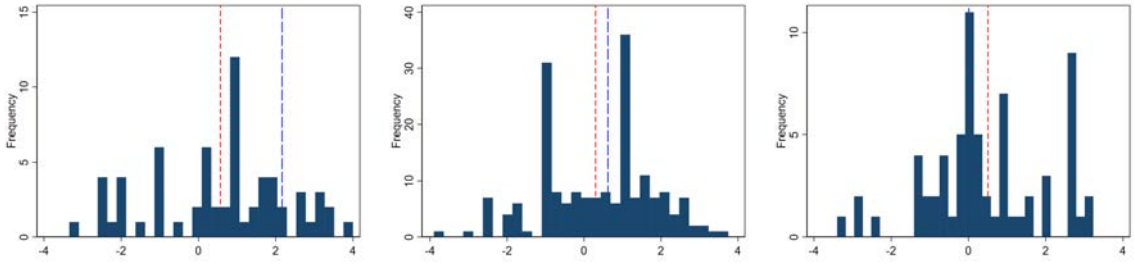
Figure 3: Histograms of all results: T-statistics and Effect Sizes



(a) T-statistics (b) Effect Sizes

Note: The figure shows histograms for all T-statistics and Effect Sizes (in % of quarterly GDP). The red short-dash line denotes the mean while the blue long-dashed line denotes the risk-adjusted mean (i.e. excluding studies that do not explicitly control for risk variables.)

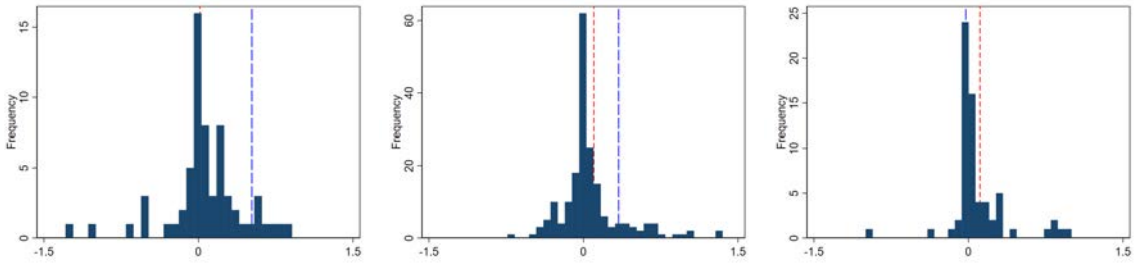
Figure 4: Histograms of T-statistics by origin of monetary shock



(a) Domestic policy rate (b) External (US) policy rate (c) Policy rate differential

Note: The figure shows histograms for T-statistics. The red short-dash line denotes the mean while the blue long-dashed line denotes the risk-adjusted mean (i.e. excluding studies that do not explicitly control for risk variables.)

Figure 5: Histograms of Effect Sizes by origin of monetary shock



(a) Domestic policy rate (b) External (US) policy rate (c) Policy rate differential

Note: The figure shows histograms for Effect Sizes (in % of quarterly GDP). The red short-dash line denotes the mean while the blue long-dashed line denotes the risk-adjusted mean (i.e. excluding studies that do not explicitly control for risk variables.)

4.2 Conditional Effects

In this section we assess whether policy effects vary depending on country-specific factors that drive investors to either search for yields or fly to safety. In Tables 3 and 4 we present meta-regressions, under a random effects specification, for a selected group of country-year and risk specific variables. [5] For readability purposes, all explanatory country variables are normalized to a one standard deviation increase ($1sd^{+}$). Hence, to assess the economic impact of the effects, in Tables B1 and B2 of the Appendix we report descriptive statistics before the normalization. For example, notice that GDP growth varies from -4.2%-7.4% with a standard deviation of 2 percentage points (pp). International FX reserves and external debt, both as a share of GDP, vary from 3%-30% and 21%-75%, respectively, with standard deviations of 7pp and 15pp. Lastly, at the bottom of the table we present the number of observations specific to each study's finding as well as the total number of observations that those findings represent (effective observations).

Table 3 shows that a $1sd^{+}$ in foreign exchange reserves amplifies the effects of monetary policy in attracting flows in an amount close to 0.03% of quarterly GDP. This is in line with Alberola et al. (2016), which advocates the role of international reserves as flow stabilizers. So does financial openness and output growth (in roughly 0.01%), which confirms that the structure of flows is heavily conditioned by the state of local financial markets (Mohan, 2009). Regarding the country's exchange rate regime, we find positive effects in those with a crawling peg (in up to 0.04%) and crawling band (in up to 0.09%); other regimes are not significant, in part due due to a smaller number of observations. Thus, we take an agnostic stance as to the effects of FX regime on flows.[6] When grouping countries in either lower or upper middle income brackets, we find a positive effect for upper-middle income countries, of close to 0.11%.

Alternatively, a $1sd^{+}$ in capital controls reduces outflows in up to 0.02% and inflows in up to 0.05%. The literature on this issue is somewhat divided: studies such as Forbes and Warnock (2012) find no evidence that capital controls insulate an economy against capital flows, while studies such as Erten et al. (2020) consider them "as of utmost importance"

[5] Estimates under a fixed effects model yield similar results and are reported in Tables A2 and A3 of the Appendix. Also, to control for studies that report more observations than others, in Tables A4 and A5 we report estimates under a random effects specification but with weights equal to the inverse of findings per study, i.e. if a study reports 5 findings, each finding weighs 20%.

[6] The literature is also mixed. Some studies consider effects in various regimes (Miranda-Agrippino and Rey, 2020) while others argue that capital flow pressures are only reflected in fully flexible regimes (Goldberg and Krogstrup, 2018).

to lean against negative externalities. Ultimately, while we do find that capital controls significantly stem flows, we recognize that they can bring about potentially negative effects on long term investment. Other factors that help explain why flows are redirected away from the domestic country are external debt (which can deter flows in up to 0.3%) and departures from the uncovered interest rate parity (UIP) condition (in up to 0.09%).

Table 3: Meta-regressions conditional on country-specific variables

	Random Effects Meta-Regressions							
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SE^2	0.395***	0.314*	0.348*	0.351*	0.354**	0.377**	0.322	0.300
	(0.123)	(0.178)	(0.179)	(0.179)	(0.179)	(0.179)	(0.237)	(0.238)
Financial Openness		0.012***	0.013***					
		(0.003)	(0.003)					
FX Reserves			0.012	0.030***	0.031***	0.027**		
			(0.010)	(0.012)	(0.012)	(0.011)		
Restrictions on Outflows			-0.007	-0.014***	-0.017***	-0.017***		
			(0.005)	(0.005)	(0.006)	(0.006)		
Restrictions on Inflows							-0.041*	-0.053**
							(0.022)	(0.025)
GDP Growth				0.010***	0.008**			
				(0.002)	(0.004)			
Upper Middle Income						0.021**	0.079	0.109*
						(0.009)	(0.055)	(0.063)
Pre-Announced Crawling Peg					0.015	0.041***		
					(0.017)	(0.012)		
Crawling Band							0.070*	0.091**
							(0.038)	(0.040)
Currency Board								0.080
								(0.092)
Departure from UIP							-0.073**	-0.090**
							(0.033)	(0.038)
External Debt							-0.220	-0.296*
							(0.160)	(0.172)
Resident								-0.153
								(0.117)
Constant	0.007**	0.019***	0.014**	0.001	0.002	0.011***	0.168*	0.219**
	(0.003)	(0.005)	(0.006)	(0.004)	(0.006)	(0.004)	(0.097)	(0.107)
Observations	330	111	101	101	101	97	80	80
Effective Observations	884,711	8,676	7,876	7,876	7,876	7,500	5,824	5,824

Authors' calculations. Estimates are from a full pooling least squares meta-regression, where each effect size is weighted by its inverse variance (see Eq. (1)). Robust standard errors are in parentheses and clustered at study-level. Variables are defined in Section 2.2. Effects are rescaled to a one standard deviation increase. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level respectively.

Table 4 evaluates the incremental effect of policy, but now focusing on risk variables, both local and global. Domestic risks for example, proxied by the five-year Credit Default Swaps (5y-CDS) restrain inflows in amounts up to 0.09% of quarterly GDP. In lesser extent, the Emerging Market Risk Index and volatility in yield differentials also restrict the amount

of inflows. In terms of global risks, proxied by the VIX, the implicit oil volatility, and US Treasury bond volatility, capital flows are largely and negatively affected, by even larger amounts than local risks. For instance, a $1sd^{+}$ in oil volatility redirects flows away from the domestic country in an amount close to 0.2% of quarterly GDP.

Notice that the intercept in the first specification with no covariates (only with SE^2) represents the mean effect of monetary policy on flows under a random effects (RE) model. Recall from Section 4.1 that the unconditional and unweighted mean was 0.09%, much higher than the RE unconditional mean of 0.007%.

Table 4: Meta-regressions conditional on local and global risk variables

	Random Effects Meta-Regressions						
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SE^2	0.367**	0.103	0.093	0.116	0.260	0.245	0.261
	(0.146)	(0.236)	(0.255)	(0.254)	(0.184)	(0.184)	(0.229)
5y-CDS		-0.047**	-0.089***	-0.088***			
		(0.020)	(0.032)	(0.032)			
Exchange Rate Volatility			-0.034	-0.030	-0.030		
			(0.054)	(0.053)	(0.022)		
EME Risk Index (Mxefocxo)			-0.023	-0.027	-0.027**	-0.020*	-0.082
			(0.089)	(0.087)	(0.012)	(0.011)	(0.088)
i-i* Volatility				-0.016*	-0.019**	-0.019**	-0.019*
				(0.010)	(0.009)	(0.009)	(0.010)
US Treasury Volatility (Move)					-0.039***	-0.031**	-0.171***
					(0.015)	(0.013)	(0.066)
VIX					-0.143***	-0.108***	-0.020
					(0.046)	(0.039)	(0.091)
Implicit oil Volatility (Ivolcrud)							-0.228***
							(0.082)
Constant	0.007***	0.002	0.039	0.047	0.001	-0.001	0.007
	(0.003)	(0.012)	(0.165)	(0.162)	(0.005)	(0.004)	(0.105)
Observations	272	66	66	66	89	89	86
Effective Observations	749,056	5,112	5,112	5,112	6,924	6,924	6,672

Authors' calculations. Papers which already control by risk are excluded. Estimates are from a full pooling least squares meta-regression, where each effect size is weighted by its inverse variance (see Eq. (1)). Robust standard errors are in parentheses and clustered at study-level. Variables are defined in Section 2.2. Effects are rescaled to a one standard deviation increase. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level respectively.

4.3 Origin of the Shock

We next assess whether there are systematic differences in policy effects depending on the origin of the monetary shock (i.e. if triggered by domestic or external policy rates). In Section 4.1 we showed that that the risk-adjusted effect from a domestic monetary shock (0.52%) was larger than from an external monetary shock (0.34%). However, our conditional effects from Section 4.2 pooled all studies together (although rescaled to denote an increase in domestic rates or a decrease in external rates –in both cases implying a higher yield differential in favor of the domestic country).

Table 5 sheds light on this origination issue, by interacting the same country-specific factors as those from the previous section with a dummy variable switched on if the origin of the shock is external (US Federal Funds Rate) and switched off if domestic (we omit observations from studies that evaluate interest rate differentials). We highlight a higher sensitivity of flows in response to external monetary policy in several fronts: (i) higher restrictions on inflows (0.16%), (ii) higher departures from the UIP condition (0.09%), (iii) higher output growth (0.35%), and (iv) a higher level of financial openness (0.15%). To see why, notice that the sign of these coefficients matches the sign of the coefficients in Table 3, where we report the overall marginal effect (having the same sign thus amplifies the original effect).

Table 6 interacts the same origination dummy variable but focusing on local and global risk variables. Results show that flows are more sensitive to domestic monetary policy when dealing with local risks (5y-CDS, exchange rate volatility, and EME Risk Index), while flows are more sensitive to external monetary when dealing with global risks (VIX and oil price volatility). In the related literature, García-López and Stracca (2021) document that central banks from both advanced and emerging markets identified the VIX index –a widely used gauge of global risk aversion– as a very relevant push factor, and in some cases a core driver of flow volatility. In essence, our results are consistent with the fact that, as a country opens itself financially (with a likely higher participation of non-residents within in its investor base) global shocks become more prevalent (Schoenmaker, 2013; Rey, 2015; Kalemli-Ozcan, 2019)

Table 5: Effects of shock origination conditional on country-specific variables

	Random Effects Meta-Regressions					
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
SE^2	0.259	0.270	0.287	0.155	0.146	0.237
	(0.238)	(0.238)	(0.238)	(0.245)	(0.248)	(0.256)
Policy Rate Dummy	-0.226***	-0.286***	-0.286***	-0.281***	-0.318***	-0.239**
	(0.087)	(0.093)	(0.092)	(0.085)	(0.094)	(0.097)
GDP Growth	-0.075*	-0.153**	-0.164***	-0.240***	-0.278***	0.022
	(0.045)	(0.061)	(0.061)	(0.061)	(0.087)	(0.141)
Departure from UIP	0.044*	0.070**	0.064**	0.045*	0.045	0.009
	(0.024)	(0.028)	(0.028)	(0.027)	(0.027)	(0.029)
Restrictions on Inflows		0.079*	0.090**	0.155***	0.157***	
		(0.041)	(0.043)	(0.043)	(0.044)	
Restrictions on Outflows						-0.161
						(0.140)
Financial Openness			-0.025	-0.094***	-0.088***	-0.109
			(0.026)	(0.030)	(0.032)	(0.068)
Crawling Band				0.322***	0.359***	-0.037
				(0.085)	(0.103)	(0.266)
Pre-Announced Crawling Peg					0.071	-0.069
					(0.112)	(0.168)
Policy Rate Dummy x GDP Growth	0.130**	0.211***	0.215***	0.285***	0.351***	0.054
	(0.058)	(0.071)	(0.072)	(0.070)	(0.098)	(0.148)
Policy Rate Dummy x Departure from UIP	-0.056*	-0.090**	-0.061	-0.043	-0.037	-0.001
	(0.033)	(0.037)	(0.040)	(0.038)	(0.039)	(0.041)
Policy Rate Dummy x Restrictions on Inflows		-0.092**	-0.097**	-0.159***	-0.150***	
		(0.044)	(0.045)	(0.045)	(0.047)	
Policy Rate Dummy x Restrictions on Outflows						0.166
						(0.142)
Policy Rate Dummy x Financial Openness			0.059*	0.127***	0.121***	0.145**
			(0.034)	(0.036)	(0.038)	(0.073)
Policy Rate Dummy x Crawling Band				-0.309**	-0.371***	-0.025
				(0.122)	(0.137)	(0.276)
Policy Rate Dummy x Pre-Announced Crawling Peg					-0.119	-0.022
					(0.125)	(0.177)
Observations	76	76	76	76	76	76
Effective Observations	5,768	5,768	5,768	5,768	5,768	5,768

Authors' calculations. Estimates are from a full pooling least squares meta-regression, where each effect size is weighted by its inverse variance (see Eq. (1)). Robust standard errors are in parentheses and clustered at study-level. Variables are defined in Section 2.2. Effects are rescaled to a one standard deviation increase. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level respectively.

Table 6: Effects of shock origination conditional on local and global risk variables

	Random Effects Meta-Regressions					
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
SE^2	0.113	0.108	0.206	0.180	0.221	0.105
	(0.234)	(0.236)	(0.216)	(0.219)	(0.224)	(0.221)
Policy Rate Dummy	-0.319***	-0.395***	-0.122**	-0.048	-0.060	-0.094**
	(0.093)	(0.099)	(0.052)	(0.031)	(0.037)	(0.046)
5y-CDS	-0.173***	-0.132***				
	(0.036)	(0.044)				
EME Risk Index (Mxefocxo)	-0.177***	-0.199***	-0.038*			
	(0.033)	(0.037)	(0.023)			
Exchange Rate Volatility		-0.059	-0.041	-0.062**	-0.067**	-0.065**
		(0.040)	(0.027)	(0.030)	(0.031)	(0.032)
i-i* Volatility			-0.255	-0.239	-0.233	-0.222
			(0.156)	(0.148)	(0.151)	(0.158)
VIX				0.082**	0.118	
				(0.035)	(0.081)	
US Treasury Volatility (Move)					0.033	
					(0.069)	
Implicit oil Volatility (Ivolcrud)						0.067**
						(0.030)
Policy Rate Dummy × 5y-CDS	0.124**	0.049				
	(0.060)	(0.068)				
Policy Rate Dummy × EME Risk Index (Mxefocxo)	0.163***	0.205***	0.077**			
	(0.053)	(0.056)	(0.030)			
Policy Rate Dummy × Exchange Rate Volatility		0.134**	0.080*	0.100**	0.114**	0.088*
		(0.060)	(0.048)	(0.050)	(0.051)	(0.051)
Policy Rate Dummy × i-i* Volatility			0.241	0.226	0.217	0.209
			(0.156)	(0.149)	(0.152)	(0.158)
Policy Rate Dummy × VIX				-0.134***	-0.213**	
				(0.045)	(0.088)	
Policy Rate Dummy × US Treasury Volatility (Move)					-0.082	
					(0.072)	
Policy Rate Dummy × Implicit oil Volatility (Ivolcrud)						-0.089**
						(0.038)
Observations	82	82	104	104	104	102
Effective Observations	6,392	6,392	8,096	8,096	8,096	7,952

Authors' calculations. Estimates are from a full pooling least squares meta-regression, where each effect size is weighted by its inverse variance (see Eq. (1)). Robust standard errors are in parentheses and clustered at study-level. Variables are defined in Section 2.2. Effects are rescaled to a one standard deviation increase. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level respectively.

4.4 Flow Type

We recognize that effects most likely vary by the type of flow, in fact, some studies show that investors can be very different even within a particular type (Ocampo et al., 2020, Fang et al., 2022).

Figure 6 shows a forest plot, depicting the effect size and precision bands for the various types of capital flows surveyed in our investigation. In line with the bulk of the literature, banking flows (with an average effects size of 0.23%) is the most responsive to monetary policy shocks, while foreign direct investments (FDIs, with an average effects size of 0.05%) seems to be the least responsive (this result is in line with Koepke, 2015). Portfolio equity and bonds appear to have a small response, although we attribute this to a very low number of individual observations. When aggregated together, and combined with studies that use aggregate portfolio flows, the response increases to 0.17%.

To further evaluate differences according to the type of flow, we interact country-specific factors with a dummy variable switched on if capital belongs to portfolio flows (equity and debt pooled together) and switched off if capital belongs to foreign direct investment (FDI). We omit banking flows given the very few observations obtained.

Table 7 indicates that the retrenchment of portfolio flows is more reactive to a country's external debt level and also if it enacts capital restriction on outflows. Conversely, FDIs are more reactive (to monetary policy) for higher levels of output growth and financial openness. To see this, notice the same negative signs of total debt and outflows restrictions as in Table 3, and the opposite signs for output growth and financial openness.

Finally, Table 8 shows that portfolio flows are more sensitive to local risks (Exchange Rate Volatility and EME Risk Index) while FDI are more reactive to global risks (VIX, Oil price volatility, and US Treasury volatility -Move Index).

Figure 6: Forest Plot by Type of Capital Flow

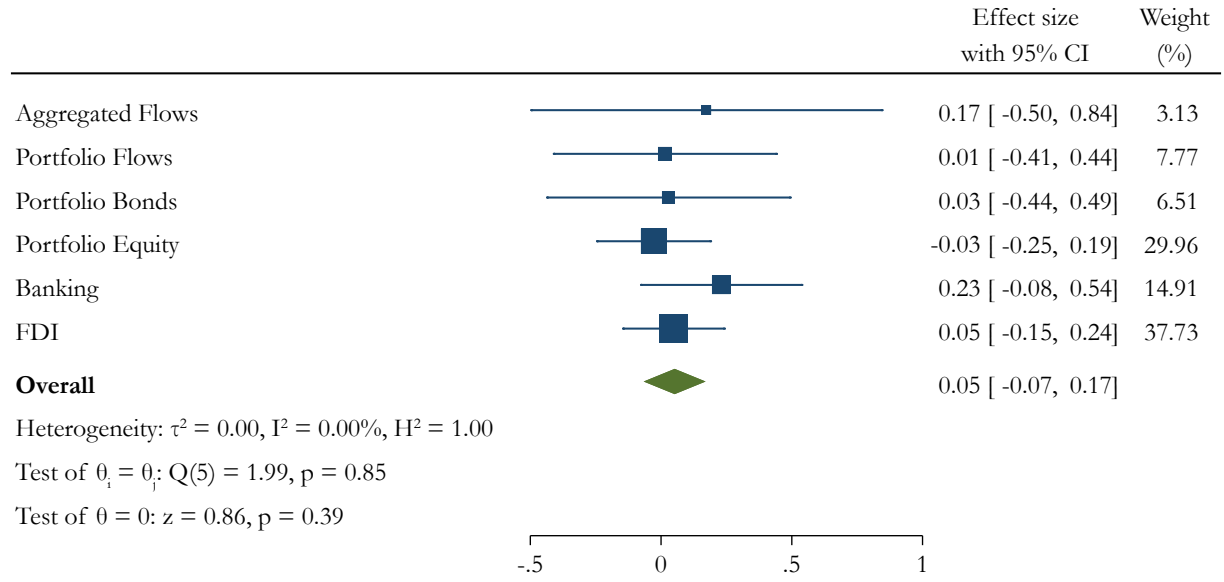


Table 7: Effects of flows type conditional on country-specific variables

	Random Effects Meta-Regressions				
VARIABLES	(1)	(2)	(3)	(4)	(5)
SE^2	1.082	0.945	0.892	0.654	0.562
	(0.939)	(0.959)	(0.948)	(0.859)	(0.847)
Flows Dummy	0.129	0.159*	0.169*	0.293**	0.312**
	(0.082)	(0.089)	(0.087)	(0.133)	(0.126)
GDP Growth	0.068**	0.075**	0.068**	-0.015	
	(0.033)	(0.036)	(0.034)	(0.037)	
FX Reserves	-0.002	-0.013	-0.003		
	(0.031)	(0.036)	(0.036)		
Financial Openness	0.065***	0.070***	0.065**		
	(0.024)	(0.026)	(0.030)		
Restrictions on Inflows		0.011			
		(0.017)			
Restrictions on Outflows			0.001	-0.001	-0.002
			(0.021)	(0.019)	(0.018)
Currency Board				-0.056	-0.041
				(0.108)	(0.100)
Crawling Band	-0.301**	-0.310**	-0.296**	-0.332**	-0.319**
	(0.133)	(0.136)	(0.134)	(0.148)	(0.145)
External Debt				0.390	0.329
				(0.254)	(0.215)
Flows Dummy x GDP Growth	-0.084	-0.097*	-0.087*	0.047	
	(0.051)	(0.054)	(0.052)	(0.055)	
Flows Dummy x FX Reserves	0.035	0.060	0.052		
	(0.052)	(0.058)	(0.055)		
Flows Dummy x Financial Openness	-0.069*	-0.084**	-0.112**		
	(0.035)	(0.039)	(0.047)		
Flows Dummy x Restrictions on Inflows		-0.032			
		(0.032)			
Flows Dummy x Restrictions on Outflows			-0.061	-0.064*	-0.053*
			(0.041)	(0.034)	(0.031)
Flows Dummy x Currency Board				0.132	0.081
				(0.173)	(0.161)
Flows Dummy x Crawling Band	0.260*	0.271*	0.175	0.165	0.161
	(0.140)	(0.144)	(0.150)	(0.163)	(0.160)
Flows Dummy x External Debt				-0.831**	-0.721**
				(0.324)	(0.285)
Observations	52	52	52	58	58
Effective Observations	4,470	4,470	4,470	5,022	5,022

Authors' calculations. Estimates are from a full pooling least squares meta-regression, where each effect size is weighted by its inverse variance (see Eq. (1)). Robust standard errors are in parentheses and clustered at study-level. Variables are defined in Section 2.2. Effects are rescaled to a one standard deviation increase. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level respectively.

Table 8: Effects of flows type conditional on local and global risk variables

	Random Effects Meta-Regressions					
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
SE^2	0.765	1.021	0.801	0.777	0.786	0.672
	(0.857)	(0.863)	(0.618)	(0.609)	(0.617)	(0.616)
Flows Dummy	0.044	0.037	0.529*	0.502**	0.378**	0.403**
	(0.040)	(0.038)	(0.275)	(0.251)	(0.155)	(0.158)
5y-CDS	-0.084**	-0.083**				
	(0.041)	(0.041)				
VIX	-0.050	-0.038	0.009			
	(0.061)	(0.059)	(0.058)			
Exchange Rate Volatility	0.038	0.027	0.106	0.102	0.123	0.140
	(0.056)	(0.054)	(0.090)	(0.086)	(0.092)	(0.094)
i-i* Volatility		-0.017	-0.019	-0.019	-0.018	
		(0.014)	(0.014)	(0.014)	(0.014)	
EME Risk Index (Mxefocxo)			0.247*	0.234*		
			(0.147)	(0.134)		
Implicit oil Volatility (Ivolcrud)					-0.435*	-0.465**
					(0.228)	(0.233)
US Treasury Volatility (Move)					-0.306*	-0.325**
					(0.161)	(0.165)
Flows Dummy x 5y-CDS	-0.001	-0.008				
	(0.071)	(0.070)				
Flows Dummy × VIX	0.121*	0.113*	0.016			
	(0.067)	(0.064)	(0.088)			
Flows Dummy × Exchange Rate Volatility	-0.146*	-0.141*	-0.263***	-0.259***	-0.317***	-0.330***
	(0.078)	(0.077)	(0.101)	(0.097)	(0.116)	(0.118)
Flows Dummy × i-i* Volatility		-0.006	-0.002	-0.003	-0.005	
		(0.021)	(0.021)	(0.020)	(0.021)	
Flows Dummy × EME Risk Index (Mxefocxo)			-0.301*	-0.283**		
			(0.157)	(0.135)		
Flows Dummy × Implicit Oil Volatility (Ivolcrud)					0.645**	0.688***
					(0.261)	(0.267)
Flows Dummy × US Treasury Volatility (Move)					0.453**	0.488**
					(0.190)	(0.194)
Observations	48	48	56	56	56	56
Effective Observations	4,258	4,258	4,810	4,810	4,810	4,810

Authors' calculations. Estimates are from a full pooling least squares meta-regression, where each effect size is weighted by its inverse variance (see Eq. (1)). Robust standard errors are in parentheses and clustered at study-level. Variables are defined in Section 2.2. Effects are rescaled to a one standard deviation increase. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level respectively.

4.5 Publication Bias

We finally examine whether there is evidence of a publication selection bias, which exists when editors, referees, or researchers are inclined towards statistically significant results, often overstating the magnitude of the results. In Figure 7 we depict the funnel plot for the level of portfolio inflows, under the fixed effects assumption. The figure shows that a few observations lie within the shaded region (mostly to the right of the mean) which in principle suggests a positive bias.

We formally test for the existence of a bias and show results in Table 9. Column 1 corresponds to weighted regressions where the constant matches the overall fixed effects. Column 2 reports estimates of the "precision-effect test" known as the Funnel Plot Asymmetry Test (FAT-PET), based on the weighted least squares regression of equation 2. For the level of the inflows (left panel), the test rejects the null of a symmetric funnel (i.e. $\beta_0 = 0$). Nonetheless, column 3 reports the "precision-effect estimate with standard error test" (PEESE), which according to Stanley (2001), corrects for the possible bias in the FAT-PET results (see equation 3). It shows that the estimated effect size is nearly identical to the bias-corrected effect. Consequently, while there is evidence of a publication bias, it is sufficiently small so as not to alter the estimates that follow from meta-regressions.

We corroborate this finding in Table 10 where we show effect sizes broken down by publication type (working paper or published article), impact factor, and number of citations. As shown, the only significant effect under a random effect specification (last column) is ISI (International Scientific Indexing), a category that analyzes academic journal quality using quality weighted citations and which are based on the Thomson Reuters ISI Web of Science database. While the positive effect suggests that ISI published articles report, on average, a higher effect size, the coefficient is extremely low (0.004%) –too low to make any discernible difference.

Figure 7: Funnel plot

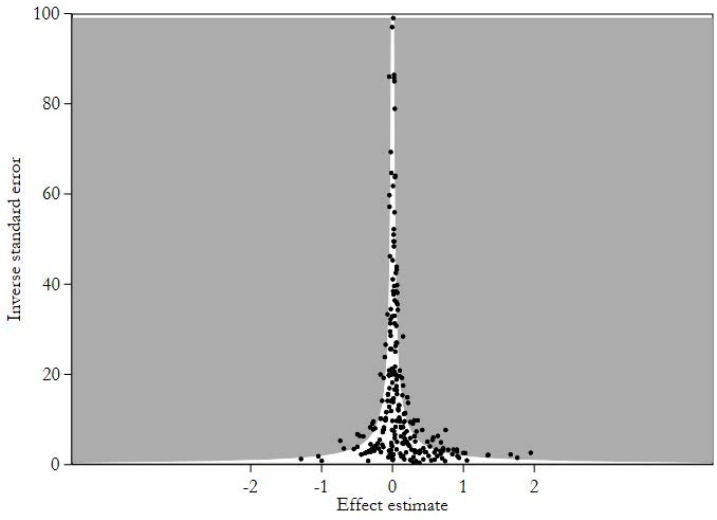


Table 9: Publication Bias

	(1) WLS	(2) FAT-PET	(3) PEESE
SE		0.389***	
		(0.010)	
SE^2			0.428*
			(0.060)
Constant	2.8E-07***	2.1E-07***	2.8E-07***
	(2.3E-09)	(2.7E-08)	(2.3E-09)
Observations	330	330	330
R-squared	0.000	0.030	0.007

Authors' calculations. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level respectively.

Table 10: Study specific variables

	Obs	**Mean**	**FE**	**RE**
Total	330	0.086***	2.8E-7*	1.2E-5
Inflows	303	0.093***	2.8E-7**	1.2E-5
Outflows	27	0.001	-8.8E-4	-0.002
BY PUBLICATION TYPE				
ISI	122	-0.003	-8.3E-4	0.004*
SCOPUS	21	0.321	8.5E-5	1.2E-4
WP	187	0.117***	2.8E-7	4.5E-6
Number of citations > mean	98	0.170***	2.8E-7	9.9E-7
Number of citations < mean	232	0.050	9.5E-5	-1.2E-4
Impact Factor > mean	165	0.151***	4.9E-4	0.001
Impact Factor < mean	147	0.022	2.8E-7	7.9E-6

Authors' calculations. Estimates are from a full pooling least squares meta-regression, where each effect size is weighted by its inverse variance (see Eq. (X)). Robust standard errors are in parentheses and clustered at study-level. Variables are defined in Section X. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level respectively.

5 Conclusion

In this paper we present the first quantitative meta-analysis on the effects of domestic and external monetary policy on capital flows, with 330 reported effects. Further, we gather country-year specific information in order to characterize monetary policy effectiveness as a function of macroeconomic and financial fundamentals.

We recognize the ample literature that exists on the drivers of capital flows, which ultimately focus on *pull* and *push* factors. To some degree, there is a consensus that *push* factors largely explain the synchronicity of capital flows towards and out of emerging markets while *pull* factors explain the extensive heterogeneity across recipient countries. We put these notions to the test by dissecting policy effects by the type of flow and by the origin of the monetary shock (i.e. if triggered by domestic or external policy rates). Further, we assess whether policy effects vary depending on factors that drive investors to either search for yields or fly to safety. Regarding the former (*search for yields*), we consider country-specific variables such as output, FX reserves, sovereign debt, and financial openness. Regarding the latter (*flight to safety*), we consider various types of risks, among them: (i) global risks, e.g. VIX, (ii) domestic risks, e.g. capital controls, credit default swaps, etc., and (iii) exchange rate risks, i.e. departures from interest rate parities, exchange rate volatility, and monetary trilemma measures; all of which reflect uncertainty in currency markets.

Our findings indicate a mean effect size of capital inflows in the amount of 0.09% of quarterly GDP in response to either a 100 basis point (bp) increase in the domestic policy rate or a 100bp reduction in the external rate, which refers to the US Fed Funds rate. However, the effect size under a random effect specification is much lower, of close to 0.01%. Among factors that significantly attract inflows are higher foreign exchange reserves, output growth, and financial openness. Alternatively, factors that deter flows include: capital controls, the country's level of external debt, and departures from the uncovered interest rate parity condition.

In terms of risk variables, we find that flows are more sensitive to domestic monetary policy when dealing with local risks, and more sensitive to external monetary when dealing with global risks. Relatedly, portfolio flows are also more sensitive to local risks, while FDIs are more reactive to global risks.

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Appendix A Robustness Checks

Table A1: Effect Sizes by Methodology and Frequency

	Obs	Mean	FE	RE
Total	330	0.086***	2.8E-7*	1.2E-5
Inflows	303	0.093***	2.8E-7**	1.2E-5
Outflows	27	0.001	-8.8E-4	-0.002
BY METHODOLOGY				
OLS	84	0.060	2.8E-7	8.1E-7
PSM GLS 2SLS	41	0.147***	0.029**	0.029**
Panel	71	0.138*	4.3E-4	8.4E-4
VAR SVAR VEC	77	0.063	-0.004	0.002
Other	57	0.046	8.4E-5	-0.001*
BY FREQUENCY				
Annual	35	-0.039	0.021	0.012
Quarterly	213	0.098**	2.8E-7	1.8E-6
Monthly	50	0.119	9.5E-5	5.8E-4*
Weekly	32	0.092**	-0.004	-0.004

Authors' calculations. Estimates are from a full pooling least squares meta-regression, where each effect size is weighted by its inverse variance (see Eq. (1)). Robust standard errors are in parentheses and clustered at study-level. Variables are defined in Section 2.2. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level respectively.

Table A2: Fixed Effects Meta-regressions conditional on country-specific variables

	Fixed Effects Meta-Regressions							
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SE^2	0.428***	0.314*	0.348*	0.351*	0.354**	0.377**	0.412*	0.406*
	(0.123)	(0.178)	(0.179)	(0.179)	(0.179)	(0.179)	(0.232)	(0.233)
Financial Openness		0.012***	0.013***					
		(0.003)	(0.003)					
FX Reserves			0.012	0.030***	0.031***	0.027**		
			(0.010)	(0.012)	(0.012)	(0.011)		
Restrictions on Outflows			-0.007	-0.014***	-0.017***	-0.017***		
			(0.005)	(0.005)	(0.006)	(0.006)		
Restrictions on Inflows							-0.036**	-0.041***
							(0.015)	(0.016)
GDP Growth				0.010***	0.008**			
				(0.002)	(0.004)			
Upper Middle Income						0.021**	0.080**	0.094**
						(0.009)	(0.037)	(0.041)
Pre-Announced Crawling Peg					0.015	0.041***		
					(0.017)	(0.012)		
Crawling Band							0.026	0.032
							(0.023)	(0.023)
Currency Board								0.065
								(0.077)
Departure from UIP							-0.068***	-0.078***
							(0.025)	(0.027)
External Debt							-0.198*	-0.225**
							(0.107)	(0.110)
Resident								-0.102
								(0.100)
Constant	0.000*	0.019***	0.014**	0.001	0.002	0.011***	0.154**	0.175**
	(0.000)	(0.005)	(0.006)	(0.004)	(0.006)	(0.004)	(0.065)	(0.069)
Observations	330	111	101	101	101	97	80	80
Effective Observations	884,711	8,676	7,876	7,876	7,876	7,500	5,824	5,824

Authors' calculations. Estimates are from a full pooling least squares meta-regression, where each effect size is weighted by its inverse variance (see Eq. (1)). Robust standard errors are in parentheses and clustered at study-level. Variables are defined in Section 2.2. Effects are rescaled to a one standard deviation increase. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level respectively.

Table A3: Fixed Effects Meta-regressions conditional on local and global risk variables

	Fixed Effects Meta-Regressions						
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SE^2	0.410***	0.103	0.102	0.129	0.260	0.245	0.261
	(0.146)	(0.235)	(0.248)	(0.249)	(0.184)	(0.184)	(0.228)
5y-CDS		-0.045**	-0.078***	-0.077***			
		(0.019)	(0.029)	(0.029)			
Exchange Rate Volatility			-0.035	-0.033	-0.030		
			(0.045)	(0.045)	(0.022)		
EME Risk Index (Mxefocxo)			-0.009	-0.011	-0.027**	-0.020*	-0.084
			(0.076)	(0.076)	(0.012)	(0.011)	(0.080)
i-i* Volatility				-0.016*	-0.019**	-0.019**	-0.019**
				(0.010)	(0.009)	(0.009)	(0.009)
US Treasury Volatility (Move)					-0.039***	-0.031**	-0.168***
					(0.015)	(0.013)	(0.063)
VIX					-0.143***	-0.108***	-0.018
					(0.046)	(0.039)	(0.078)
Implicit oil Volatility (Ivolcrud)							-0.231***
							(0.081)
Constant	2.8E-7*	0.001	0.014	0.017	0.001	-0.001	0.009
	(1.5E-7)	(0.011)	(0.140)	(0.140)	(0.005)	(0.004)	(0.095)
Observations	272	66	66	66	89	89	86
Effective Observations	749,056	5,112	5,112	5,112	6,924	6,924	6,672

Authors' calculations. Papers which already control by risk are excluded. Estimates are from a full pooling least squares meta-regression, where each effect size is weighted by its inverse variance (see Eq. (1)). Robust standard errors are in parentheses and clustered at study-level. Variables are defined in Section 2.2. Effects are rescaled to a one standard deviation increase. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level respectively.

Table A4: WLS and Random Effects Meta-regressions conditional on country-specific variables

	WLS & Random Effects Meta-Regressions							
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SE^2	0.316***	0.250***	0.258***	0.259***	0.257***	0.258***	0.662***	0.693***
	(0.022)	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)	(0.133)	(0.134)
Financial Openness		0.010***	0.014***					
		(0.001)	(0.002)					
FX Reserves			0.000	0.013**	0.013**	0.012**		
			(0.005)	(0.005)	(0.005)	(0.005)		
Restrictions on Outflows			-0.000	-0.007***	-0.013***	-0.009***		
			(0.003)	(0.003)	(0.003)	(0.003)		
Restrictions on Inflows							-0.044***	-0.047***
							(0.008)	(0.009)
GDP Growth				0.007***	0.003*			
				(0.001)	(0.002)			
Upper Middle Income						0.019***	0.100***	0.108***
						(0.004)	(0.020)	(0.022)
Pre-Announced Crawling Peg					0.030***	0.036***		
					(0.008)	(0.006)		
Crawling Band							0.065***	0.065***
							(0.018)	(0.019)
Currency Board								0.045
								(0.044)
Departure from UIP							-0.064***	-0.071***
							(0.014)	(0.015)
External Debt							-0.140**	-0.166**
							(0.068)	(0.075)
Resident								-0.092***
								(0.028)
Constant	0.000***	0.016***	0.021***	0.004**	-0.002	-0.005***	0.139***	0.155***
	(0.000)	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)	(0.039)	(0.042)
Observations	330	111	101	101	101	97	80	80
Effective Observations	884,711	8,676	7,876	7,876	7,876	7,500	5,824	5,824

Authors' calculations. Estimates are from a full pooling least squares meta-regression, where each effect size is weighted by its inverse variance and by the number of observations of each study (see Eq. (1)). Robust standard errors are in parentheses and clustered at study-level. Variables are defined in Section 2.2. Effects are rescaled to a one standard deviation increase. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level respectively.

Table A5: WLS and Random Effects Meta-regressions conditional on local and global risk variables

	WLS & RE Meta-Regressions						
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SE^2	0.323***	-0.159	-0.229*	-0.210	0.289***	0.285***	0.288***
	(0.025)	(0.134)	(0.134)	(0.134)	(0.030)	(0.030)	(0.105)
5y-CDS		-0.069***	-0.142***	-0.144***			
		(0.008)	(0.015)	(0.015)			
Exchange Rate Volatility			-0.077***	-0.075***	-0.011		
			(0.023)	(0.023)	(0.009)		
EME Risk Index (Mxefocxo)			-0.034	-0.037	-0.009**	-0.007*	-0.103***
			(0.042)	(0.042)	(0.004)	(0.004)	(0.020)
i-i* Volatility				-0.011**	-0.021***	-0.021***	-0.019***
				(0.005)	(0.005)	(0.005)	(0.005)
US Treasury Volatility (Move)					-0.039***	-0.037***	-0.168***
					(0.006)	(0.006)	(0.011)
VIX					-0.080***	-0.072***	-0.027
					(0.015)	(0.013)	(0.021)
Implicit oil Volatility (Ivolcrud)							-0.227***
							(0.012)
Constant	0.000***	-0.078***	0.044	0.049	-0.009***	-0.010***	0.046
	(0.000)	(0.007)	(0.077)	(0.078)	(0.002)	(0.002)	(0.029)
Observations	272	66	66	66	89	89	86
Effective Observations	749,056	5,112	5,112	5,112	6,924	6,924	6,672

Authors' calculations. Papers which already control by risk are excluded. Estimates are from a full pooling least squares meta-regression, where each effect size is weighted by its inverse variance and by the number of observations of each study (see Eq. (1)). Robust standard errors are in parentheses and clustered at study-level. Variables are defined in Section 2.2. Effects are rescaled to a one standard deviation increase. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level respectively.

Appendix B Descritpive statistics

Table B1: Descriptive statistics of country-specific variables

VARIABLES	Obs	Mean	Sd	Min	Max
Financial Openness	111	0.46	0.25	0.08	0.94
Restrictions on Inflows	109	0.64	0.19	0	0.95
Restrictions on Outflows	109	0.64	0.24	0.05	1
Pre-Announced Crawling Peg	115	0.34	0.48	0	1
Crawling Band	115	0.43	0.50	0	1
Currency Board	115	0.03	0.18	0	1
Upper Middle Income	105	0.53	0.50	0	1
GDP Growth	111	3.75	2.23	-4.20	7.41
FX Reserves	103	0.13	0.07	0.03	0.32
External Debt	109	0.40	0.15	0.21	0.75
Departure from UIP	96	7.68	7.78	0.12	37.92
Resident (non-resident=0)	324	0.03	0.16	0	1

Table B2: Descriptive statistics of local and global risk variables

VARIABLES	Obs	Mean	Sd	Min	Max
5y-CDS	90	269	175	97.4	691
Exchange Rate Volatility	121	148	267	0	821
i-i* Volatility	115	8.6	37.6	0	205
EME Risk Index (Mxefocxo index)	319	1,076	407	617	1,649
US Treasury Volatility (Move index)	328	91.4	22.6	49.4	132
VIX	328	11.8	5.2	4.9	25.6
Implicit oil Volatility (Ivolcrud)	290	31.8	7.5	20.3	50.2


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