

Capital Flows to Emerging Markets: The Role of Information Transparency

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Abstract Using annual capital flow data from 1990 to 2010 for 21 emerging markets, this study empirically investigates the impact of macroeconomic information transparency on capital flows, taking into account financial market uncertainty. The level of information transparency is measured using the country's compliance with the IMF's SDDS. The findings reveal that SDDS compliance mitigates the negative influence of the VIX index on both net and total gross inflows. However, the positive effect of SDDS compliance on capital inflows is observed only when the VIX index reaches a sufficiently high level. This relationship is primarily driven by other investment inflows, as it is the only type of capital flow significantly affected by the SDDS compliance in conjunction with VIX. The results suggest that although enhanced information transparency in emerging markets may not attract more foreign capital during normal periods, it provides stability by reducing the decline in other investment inflows during times of financial turmoil, ultimately contributing to the overall stability of total capital inflows.

Keywords: Capital Flows, SDDS, Information, Emerging Markets

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I. Introduction

Information frictions have long been discussed in the literature on international portfolio investment as one of the reasons why international portfolios are less diversified than expected (French and Poterba 1991; Gehrig 1993; Chan, Covrig, and Ng 2005). Studies on the home bias puzzle have emphasized that foreign investors and domestic investors behave differently due to information asymmetries, which increase uncertainty in foreign investment.

Nonetheless, since the 1990s onwards, financial integration has witnessed a decrease in home bias along with globalization and international risk sharing (Baele, Pungulescu, and Ter Horst 2007; Sorensen, Wu, Yosha, and Zhu 2007). Indeed, the Global Financial Crisis (GFC) demonstrated that the high level of financial integration could pose significant challenges to participating countries in terms of the transmission of global financial shocks (Milesi-Ferretti and Tille 2011).

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This paper examines the impact of information asymmetries on international capital flows in the context of financial integration. Specifically, it investigates whether country-level information transparency plays a mitigating or amplifying role in emerging markets' capital flows, taking into account financial market volatility.

For emerging markets, the relationship between information transparency and capital flows may not always be positive (Furman and Stiglitz 1998). As mentioned, increased availability of economic data is expected to reduce the perceived risk of host countries among foreign investors. This is particularly relevant for emerging economies, as their information may be relatively less known compared to advanced countries. However, the effect may also be insignificant in cases where the potential pool of foreign investors is limited. For example, economic information on emerging markets prior to a transparency reform may have been known only to a small group of investors who were particularly interested in these markets. In this scenario, the newly available information is unlikely to have an impact on foreign investors at large, and thus, information availability may not be associated with a significant increase in capital inflow for a while.

Using annual capital flow data of 21 emerging markets between 1990 and 2010, this study empirically examines the effect of macroeconomic information transparency on capital flows. As the measure of information transparency, the study employs the country's compliance status with the IMF's Special Data Dissemination Standard (SDDS), following the approach of Hashimoto and Wacker (2016). First, it estimates the relationship between the country's SDDS compliance status and net capital inflows, considering the standard determinants of capital flows, including the VIX index. To account for the effects of improvements in information transparency and financial integration at a global level over time, the study incorporates the SDDS compliance status of the rest of the world, as well as capital flows from the rest of the world. Second, the study separates net inflows into total gross inflows and outflows to examine the reactions of foreign investors and domestic investors to SDDS compliance and assess their respective contributions to net inflows. Finally, the study explores whether the information transparency effect varies based on global risk aversion, the crucial push factor of international capital flows. By decomposing total gross inflows into portfolio investment inflows, direct investment inflows, and other investment inflows, the study investigates which type of capital inflows responds more to improved information availability.

The SDDS is one of the transparency reforms by the IMF, introduced in 1996 in response to the financial crisis in Mexico. It sets internationally consistent macroeconomic data dissemination standards, including standards for data release frequency and timeliness. Under the SDDS, countries were invited to subscribe between 1996 and 1998, with a commitment to meet the standards in the near future (Glennerster and Shin 2003). The IMF collects and releases macroeconomic data on behalf of member countries based on the SDDS, thereby contributing to the increase in the quality of information available on the participating countries.

This paper finds evidence of a significant relationship between meeting the SDDS specifications and an increase in net capital inflows. The estimates provide a clearer picture when assuming that the information effect is conditional on global risk aversion. In periods of low VIX, SDDS compliance is negatively associated with net inflows and total gross inflows. However, during times of global financial stress, the negative effect disappears, and the positive effect of SDDS compliance emerges. The decomposition of different types of capital inflows indicates that the result is driven by inflows in the other investment category (banking), which is the only type of capital inflow responsive to SDDS compliance. The results remain robust when considering year fixed effects, the gap in economic fundamentals with advanced countries, years of SDDS compliance, publication of external debt data, and a comparison to advanced countries.

Since the occurrence of the GFC, the drivers of international capital flows have been extensively studied, with a shift in focus towards gross capital flows rather than net flows, and a distinction made between different asset classes (Milesi-Ferretti and Tille 2011; Forbes and Warnock 2012; Fratzscher 2012; Broner, Didier, Erce, and Schmukler 2013; Ghosh, Qureshi, Kim, and Zalduendo 2014). These studies argue that global factors, notably the U.S. interest rate and global risk aversion, play a key role in international capital movements. Additionally, the literature emphasizes the importance of distinguishing between activities by domestic and foreign investors to understand capital flow volatility. It is highlighted that banking flows were the most affected type of capital flows during the GFC. Furthermore, information frictions are another important factor explaining capital flows.

Studies on bilateral capital flows often measure information frictions using physical or cultural distance between trading countries. For instance, the studies by Portes, Rey, and Oh (2001) and Portes and Rey (2005) discuss a 'gravity' model that explains international capital transactions. In contrast, the studies by Lane and Milesi-Ferretti (2008) and Thapa, Paudyal, and Neupane (2013) highlight the role of informational proximity or availability, measured through cultural and physical proximity variables. These studies find that greater information frictions are significantly related to fewer capital transactions, although there are inconsistent empirical results regarding which type of capital flows, notably foreign direct investment versus portfolio investment, are more responsive to improved availability of information.

As a more direct measure of information frictions, the transparency of country-level information (availability and quality of data) has been utilized in previous studies (Gelos and Wei 2005; Hashimoto and Wacker 2016; Brandao-Marques, Gelos, and Melgar 2018).¹⁾ Using a measure of country data opacity, Gelos and Wei (2005) demonstrated a positive association between portfolio investment and country transparency, while Hashimoto and Wacker (2016) argued that SDDS

1) Previous studies in the literature, such as those conducted by Glennerster and Shin (2003), Choi and Hashimoto (2017), and Brandao-Marques, Gelos, and Melgar (2018), have demonstrated that country transparency is correlated with lower borrowing costs and a diminished transmission effect of global financial shocks.

compliance leads to an increase in foreign direct investment but not in portfolio investment.

This paper extends the work of Hashimoto and Wacker (2016) in several ways. It examines the role of information availability during periods of high market volatility by simultaneously considering the effects of information frictions and global risk aversion. Additionally, it distinguishes between emerging markets and advanced countries, assuming that macroeconomic information of advanced countries was relatively familiar to investors compared to that of emerging economies. The study finds that capital inflows to emerging markets indeed react differently to information and global risk aversion compared to advanced countries. Moreover, by considering other investment inflow, which was severely impacted by the GFC, along with portfolio investment inflow and direct investment inflow, the study demonstrates that other investment inflow to emerging markets exhibits the highest level of responsiveness to information transparency during periods of high financial volatility.

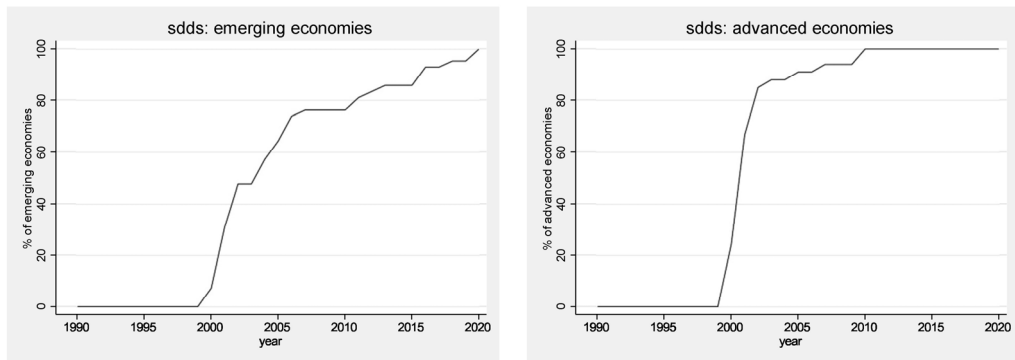
The rest of the paper is organized as follows. Section 2 describes the data. Section 3 discusses the regression model and presents the results. Section 4 checks the robustness of the results, and Section 5 concludes.

II. Data

Country information transparency is proxied by whether countries met the SDDS requirements or not. The compliance dates of SDDS subscribed countries can be obtained from the IMF's website. Figure 1 illustrates the percentage of countries that met the SDDS specifications by 2020, distinguishing between emerging and advanced countries.²⁾ The two groups differ in terms of SDDS compliance, with advanced countries achieving compliance at a faster rate compared to emerging economies, which gradually met the specifications over time. For instance, approximately 90% of SDDS subscribed advanced countries met the requirements, while the corresponding percentage for emerging markets was 64.3% by 2005.

Due to the significant variation in compliance dates among emerging economies, it is challenging to precisely determine the date of transparency reform and compare the pre- and post-effects. Therefore, to restrict the sample to those who experienced the reform during similar periods, the analysis only includes countries that met the SDDS specifications by 2005 within the period between 1990 and 2010. Moreover, the sample consists of countries with valid observations for at least one year before and after the compliance period. Table A1 and Table A2 in the online appendix provide the SDDS compliance dates and the covered periods for emerging markets and advanced economies, respectively.

2) Among the subscribers of the SDDS, advanced countries are classified based on the categorization provided in the IMF's World Economic Outlook. The remaining countries are categorized as emerging markets.

Figure 1. SDDS compliance by country group

The study utilizes disaggregated annual data on capital flows, specifically portfolio investment assets and liabilities, direct investment assets and liabilities, and other investment assets and liabilities. This data is sourced from the IMF's Balance of Payments database.³⁾

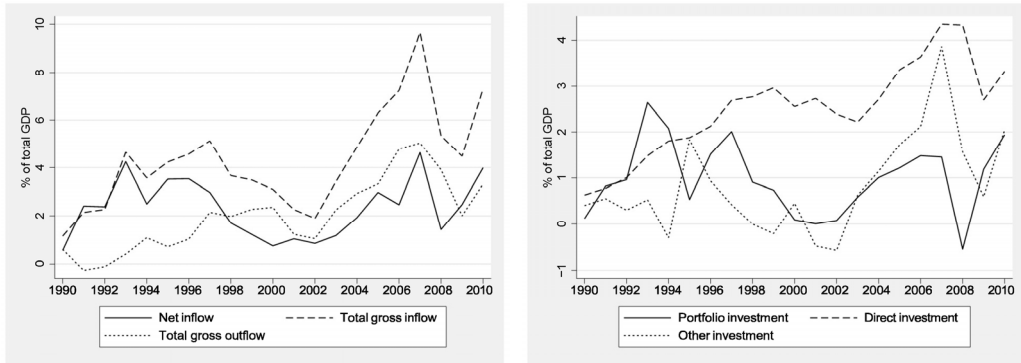
Total gross inflow and outflow are calculated by summing the respective types of gross capital inflows (liabilities) and outflows (assets). Net inflow is derived by subtracting total gross outflow from total gross inflow. To ensure consistency in the sample, only observations with valid data for all six types of capital flows are included in the regressions.

Figure 2 illustrates the movement of capital flows in emerging markets from 1990 to 2010. The data is presented as the aggregate sum of all emerging economies divided by their nominal GDP. The left graph indicates a slight decrease in total gross inflows to emerging economies around 2002, followed by a significant increase until the GFC led to a sharp decline. On the other hand, the share of total gross outflows was initially negligible in the early 1990s but gradually increased over time, resulting in substantial net inflows to emerging economies.

The right graph of Figure 2 provides a breakdown of total gross inflows into three categories: portfolio investment inflow, direct investment inflow, and other investment inflow. Among these categories, direct investment inflow had the largest share, accounting for over 40% on the eve of the GFC. The share of portfolio investment inflow was relatively high initially but did not experience significant growth over time. On the other hand, other investment inflow saw a substantial increase between 2002 and 2007. However, all three types of capital inflows, particularly other investment inflow, experienced a sharp decline during the GFC.

3) Similar to the approach used by Hashimoto and Wacker (2016), this study relies on capital flow data rather than stock data. Capital flow data is considered to be more responsive to policy changes and economic conditions, providing a better reflection of the dynamic nature of capital movements.

Figure 2. Capital flows of emerging economies



III. Empirical Analysis

A. Regression model

To examine the relationship between capital flows and information transparency of emerging markets, considering global risk aversion and potential heterogeneity across different types of capital flows, the following regression model is employed:

$$CF_{it}^k = \alpha + \beta_1 SDDS_{it} + \beta_2 VIX_t + \beta_3 SDDS_{it} VIX_t + \beta_4 SDDSR_o W_{it} + \beta_5 CFR_o W_{it}^k + X_{it}'\gamma + \delta_i + \epsilon_{it}$$

in which CF_{it}^k represents the k -th type of capital flow (e.g., net inflow, total gross inflow, total gross outflow, portfolio investment inflow, direct investment inflow, and other investment inflow) as a share of GDP associated with country i in year t . Given that capital outflow from emerging economies was less active than capital inflow to the economies, I expect foreign investors and domestic investors to respond heterogeneously to a change in a country's information quality.

$SDDS_{it}$ is a dummy variable that takes the value of 1 for years after a country meets the SDDS specifications. Then, I include the logarithm of the annual average VIX index, which serves as a proxy for global risk aversion. VIX_t is interacted with $SDDS_{it}$ to investigate the effect of country transparency on capital flows conditioning on investor risk aversion. This specification implies that the relationship between increased country transparency and capital flows depends on the global market condition. The interaction term β_3 captures the conditional effect of country transparency on capital flows, considering the level of global risk aversion.

If a higher quality of information makes countries more resilient to market nervousness, β_3 would show a positive sign. However, if it brings a destabilizing effect, the sign would be negative.

As emerging economies started gradually meeting the SDDS requirements since 2000, the SDDS dummy variable can also capture time effects. To account for the effects related to the global-level improvement in information transparency and financial integration, I include two additional variables. First, $SDDSR_o W_{it}$ represents the GDP-weighted annual average of SDDS compliance for the rest of the world, reflecting the information transparency of other countries. Second, $CFR_o W_{it}^k$ represents the GDP-weighted annual average of capital flows for the rest of the world of the k -th type, capturing the level of financial integration. The inclusion of $SDDSR_o W_{it}$ and $CFR_o W_{it}^k$ allows us to capture the effects of global information transparency and financial integration on capital flows.⁴⁾

The coefficients β_4 and β_5 provide insights into how the information transparency of other countries and the level of financial integration influence capital flows. A higher information transparency of the rest of the world implies that capital is likely to move towards the rest of the world, while a more integrated international financial market suggests an increase in capital flows.

X_{it} represents a vector of control variables that capture various determinants of capital flows. These control variables are included to account for factors other than information transparency and global risk aversion that may affect capital flows. For variables with a potential contemporaneous effect on capital flows, I use a lagged variable. The control variables include:

- Real GDP growth: Higher economic growth in emerging economies is expected to attract more international capital inflows.
- One-year lagged short-term interest rate: Higher interest rates in emerging economies are expected to attract international investors seeking higher returns.
- One-year lagged real effective exchange rate: A depreciated real effective exchange rate may lead to increased capital inflows as it enhances trade competitiveness.
- Government stability index: Greater political stability is seen as a positive signal for investors and may attract more capital inflows.
- Trade openness index: Greater trade openness indicates a higher degree of integration with the global economy and can be associated with increased capital inflows.
- Exchange rate regime: Less flexible exchange rate regimes may reduce exchange rate risk, potentially attracting more capital inflows.

4) The baseline regression intentionally does not include year fixed effects to allow the VIX index to capture investors' appetite over time. However, in Section 4, I include year fixed effects to examine the robustness of the results.

The specific descriptions of these variables and their sources can be found in Table A3 in the online appendix. Including these control variables helps us account for the influence of these factors on capital flows and isolate the effects of information transparency and global risk aversion.

Country fixed effects α_i are included to capture time-invariant or long-term country characteristics that may be correlated with a country's decision to be more transparent. Robust standard errors, clustered at the country level, are used to account for potential serial correlation.

Table 1. *Summary Statistics*

	Mean	SD	Min	Med	Max
Net inflow (%)	3.47	6.16	-14.43	2.89	44.71
Total gross inflow (%)	6.17	8.19	-29.00	4.77	62.28
Total gross outflow (%)	2.70	5.59	-17.49	1.71	56.46
Portfolio investment inflow (%)	1.17	2.26	-9.13	0.75	11.34
Direct investment inflow (%)	3.54	4.97	-15.71	2.66	50.38
Other investment inflow (%)	1.47	4.48	-30.68	0.81	16.46
Net inflow RoW (%)	2.40	1.31	-0.52	2.22	5.57
Total gross inflow RoW (%)	13.08	8.48	1.37	9.26	33.79
Total gross outflow RoW (%)	10.68	8.17	-0.24	7.16	28.61
Portfolio investment inflow RoW (%)	3.01	2.84	-1.49	1.72	9.40
Direct investment inflow RoW (%)	6.45	3.31	1.51	6.35	13.31
Other investment inflow RoW (%)	3.61	3.76	-1.38	1.86	13.92
SDDS	0.50	0.50	0.00	1.00	1.00
SDDS RoW	0.53	0.40	0.00	0.82	0.89
VIX (log)	3.01	0.31	2.52	3.11	3.49
Real GDP growth (%)	3.63	4.41	-15.10	4.40	14.80
Short-term interest rate (%)	15.75	18.07	0.18	9.05	80.88
REER (log)	4.51	0.19	3.82	4.55	4.90
Government stability	8.16	1.68	3.17	8.29	11.50
Financial openness	0.09	1.34	-1.92	-0.15	2.32
Trade openness (%)	0.69	0.40	0.14	0.58	2.10
Exchange rate regime	9.46	3.33	2.00	10.00	15.00
Observations	341				

Notes. The statistics are based on the final panel used for regressions in Section 3. All capital flows are presented as a share of GDP.

The final panel is unbalanced and consists of 341 observations from 21 emerging economies.

The sample remains unchanged throughout the regressions. Table 1 presents the summary statistics of the main variables. Since the short-term interest rates in emerging economies during the sample period include some extreme cases, with maximum rates exceeding 15,000%, I winsorize the short-term interest rates at the top 1%.⁵⁾ The exchange rate regime classification

by Ilzetzki, Reinhart, and Rogoff (2019) ranges from 1 to 15, with a higher number indicating a more flexible exchange rate regime.

From 1990 to 2010, the average net inflow to emerging economies as a share of GDP was 3.47%. As depicted in Figure 2, total gross inflow to emerging economies exceeded total gross outflow by a significant margin. The largest share of capital inflow came from direct investment inflow, averaging 3.54%, while the shares of portfolio and other investment inflows were below 1.5%. For the rest of the world, the average gap between gross inflow and outflow was much smaller, resulting in a net inflow share of 2.4%.

B. Results

I begin the analysis by investigating the relationship between each explanatory variable and net inflow without considering an interaction effect. Table 2, column (1), reveals that net inflow to emerging markets is negatively associated with global risk aversion, while there is no statistically significant relationship between net inflow and SDDS compliance. This finding remains qualitatively consistent when considering financial integration by incorporating SDDS compliance and net capital inflow of the rest of the world in columns (2) and (3).

In column (4) of Table 2, the regression includes country characteristics, and the coefficients for the SDDS variables become statistically significant. Assuming that the effect of SDDS compliance is unconditional to global risk aversion, the compliance with SDDS is positively associated with net inflow, while the SDDS compliance of the rest of the world is negatively associated. Additionally, high real GDP growth, a high real effective exchange rate, and a less flexible exchange rate are significantly associated with an increase in net inflow.⁶⁾

5) For example, Brazil experienced hyperinflation until 1994, which was accompanied by four-digit interest rates. Since this study uses interest rate as one of the explanatory variables, not as a key variable, I decided to winsorize it to limit the effect of extreme outliers.

6) The coefficient for the short-term interest rate shows a negative sign, although it is only marginally statistically significant. This can be understood in the following way: emerging economies such as Brazil, Türkiye, and Romania experienced unusually high interest rates during the 1990s due to currency defense and/or the transition from centrally planned economies to market economies. Therefore, high interest rates during that period may not necessarily represent high returns; instead, they can indicate economic distress, which deters foreign investors.

Table 2. *SDDS and Net Inflow*

	Net inflow			
	(1)	(2)	(3)	(4)
SDDS	1.150 (1.217)	1.803 (1.082)	1.356 (1.085)	2.051** (0.969)
VIX	-3.347*** (1.091)	-3.259*** (1.107)	-3.523*** (1.108)	-2.103** (0.841)
SDDS RoW		-0.987 (1.687)	-0.624 (1.868)	-4.418*** (1.140)
CF RoW			0.558 (0.334)	0.340 (0.306)
Real GDP growth				0.387*** (0.127)
Short-term interest rate				-0.037* (0.020)
REER				5.069** (1.810)
Government stability				0.153 (0.183)
Financial openness				0.845 (0.677)
Trade openness				1.884 (3.779)
Exchange rate regime				-0.453** (0.174)
Obs.	341	341	341	341
N	21	21	21	21
R ²	0.048	0.050	0.069	0.327

Notes. The dependent variable is net capital inflow as a share of GDP. The SDDS variable is a dummy that equals one after the year of SDDS compliance. Robust standard errors are reported in parentheses. *, **, and *** denote a p-value less than 10%, 5%, and 1%, respectively.

Table 3 examines the breakdown of net inflow into gross inflow and gross outflow. The dependent variable is total gross inflow in columns (1)-(3) and total gross outflow in columns (5)-(8). Without any other explanatory variables, SDDS compliance is related to an increase in total gross inflow, given the level of VIX. However, the statistical significance of SDDS compliance disappears when the SDDS compliance of the rest of the world and the average total gross inflow to the rest of the world are included (column (3)). This suggests that international financial integration absorbs the explanatory power of SDDS compliance in explaining the increase in total gross inflow. Again, the results remain unchanged when the standard determinants of capital flows are added.

Table 3. *SDDS and Total Gross Flows*

	Total gross inflow				Total gross outflow			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SDDS	3.693*** (1.272)	3.810*** (0.991)	1.509 (1.010)	1.905 (1.375)	2.544** (0.910)	2.007** (0.785)	0.850 (0.669)	0.274 (0.810)
VIX	-4.389*** (1.143)	-4.374*** (1.170)	-0.084 (1.864)	0.759 (1.162)	-1.042* (0.555)	-1.114** (0.512)	1.419 (1.289)	1.730 (1.357)
SDDS RoW		-0.177 (1.535)	-2.664** (1.149)	-5.602*** (1.428)		0.811 (0.910)	-0.731 (0.673)	-0.666 (0.825)
CF RoW			0.337** (0.121)	0.281*** (0.095)			0.192** (0.081)	0.207** (0.078)
Real GDP growth				0.379*** (0.130)				-0.012 (0.055)
Short-term interest rate				0.003 (0.024)				0.037 (0.025)
REER				7.091*** (1.776)				2.168 (1.678)
Government stability				-0.369 (0.252)				-0.449* (0.222)
Financial openness				1.039** (0.427)				0.188 (0.586)
Trade openness				8.604* (4.582)				7.101* (3.848)
Exchange rate regime				-0.424** (0.199)				0.038 (0.104)
Obs.	341	341	341	341	341	341	341	341
N	21	21	21	21	21	21	21	21
R ²	0.092	0.092	0.148	0.296	0.062	0.064	0.094	0.153

Notes. Each column shows the dependent variable used in the regression. Capital flows are presented as a share of GDP. The SDDS variable is a dummy that equals one after the year of SDDS compliance. Robust standard errors are reported in parentheses. *, **, and *** denote a p-value less than 10%, 5%, and 1%, respectively.

Meanwhile, total gross outflow is not related to SDDS compliance or the SDDS compliance of the rest of the world, although it shows a positive association with global financial integration. This finding suggests that domestic investors' purchases of assets in other productive countries during the sample period were mostly driven by financial integration rather than the overall improved information quality.

Table 4 presents the results of the baseline regression model. The notable change is that now the coefficient for the SDDS dummy is negative. For net inflow, both the SDDS dummy and VIX have negative coefficients, but the interaction term shows a statistically significant positive coefficient. Given the same level of the VIX index, meeting the SDDS requirements is associated with a higher net inflow. When countries do not comply with the SDDS requirements, a 1% increase in the VIX index is associated with a 0.054 percentage point

decrease in net inflow. However, by complying with the SDDS requirements, the negative effect associated with the VIX index reduces to 0.007 (-0.054+0.047) percentage points. Similarly, after meeting the SDDS specifications, the relationship between the VIX index and total gross inflow changes from -0.036 to 0.043 (-0.036+0.079) percentage points.

Table 4. SDDS Effect Conditional on VIX

	(1)	(2)	(3)	(4)	(5)	(6)
	Net inflow	Total gross inflow	Total gross outflow	Portfolio	Direct	Other
SDDS	-12.533** (5.899)	-23.153*** (7.770)	-1.171 (5.425)	1.508 (3.559)	0.666 (2.986)	-18.587*** (4.891)
VIX	-5.483*** (1.644)	-3.673* (1.931)	1.503 (1.525)	-0.076 (1.000)	-0.229 (0.776)	-3.620** (1.316)
SDDS × VIX	4.775** (1.988)	7.983*** (2.505)	0.458 (1.724)	-0.312 (1.146)	-0.231 (0.964)	6.573*** (1.667)
SDDS RoW	-4.021*** (0.889)	-5.334*** (1.244)	-0.666 (0.826)	-0.884 (0.706)	-1.673** (0.742)	-2.274*** (0.667)
CF RoW	0.300 (0.306)	0.371*** (0.101)	0.214** (0.083)	0.237** (0.104)	0.259** (0.119)	0.271*** (0.072)
Real GDP growth	0.385*** (0.120)	0.376*** (0.120)	-0.012 (0.055)	0.035 (0.034)	0.078 (0.053)	0.261** (0.093)
Short-term interest rate	-0.038* (0.021)	0.005 (0.027)	0.038 (0.026)	0.011 (0.010)	-0.013 (0.010)	0.004 (0.027)
REER	5.069*** (1.718)	6.933*** (1.792)	2.156 (1.679)	1.072 (1.064)	2.630*** (0.800)	3.425* (1.680)
Government stability	0.375* (0.202)	-0.069 (0.250)	-0.434* (0.214)	-0.020 (0.089)	-0.004 (0.168)	-0.039 (0.131)
Financial openness	0.743 (0.666)	0.843* (0.421)	0.177 (0.582)	-0.322 (0.274)	0.912*** (0.281)	0.315 (0.306)
Trade openness	3.012 (3.778)	9.752* (4.802)	7.163* (3.911)	-1.832** (0.787)	6.619** (3.078)	5.293** (2.430)
Exchange rate regime	-0.437** (0.186)	-0.407* (0.207)	0.039 (0.103)	-0.077 (0.082)	-0.020 (0.129)	-0.304** (0.107)
Obs.	341	341	341	341	341	341
N	21	21	21	21	21	21
R ²	0.339	0.311	0.153	0.127	0.185	0.306

Notes. Each column shows the dependent variable used in the regression. Capital flows are presented as a share of GDP. The SDDS variable is a dummy that equals one after the year of SDDS compliance. Robust standard errors are reported in parentheses. *, **, and *** denote a p-value less than 10%, 5%, and 1%, respectively.

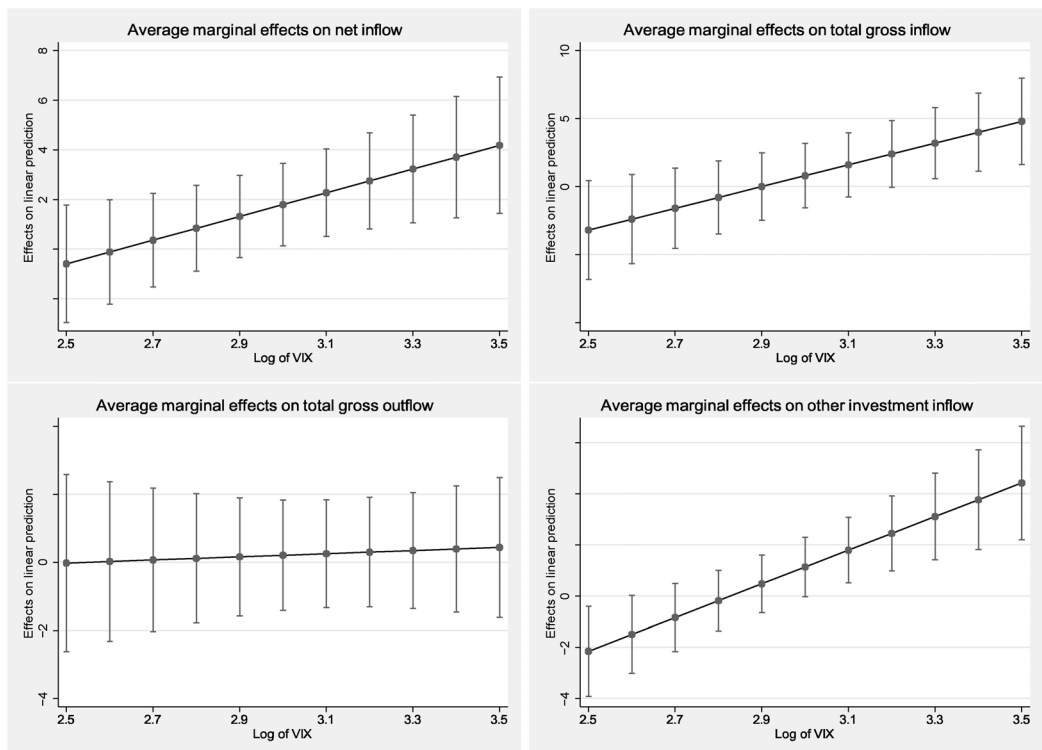
Nonetheless, due to the large magnitude of the negative coefficient for the SDDS dummy, the marginal effect of SDDS compliance on net and total gross inflows can be negative depending on the level of the VIX. During times of low VIX, emerging economies do not benefit from SDDS compliance in terms of capital inflows until the negative effect diminishes

as the VIX increases. However, in the case of total gross outflow, there is no significant association with SDDS, indicating that the relationship between net inflow to emerging economies and SDDS compliance is primarily driven by changes in total gross inflow.

In columns (4)-(6), I differentiate total gross inflow by type. The results are striking in the sense that the response of total gross inflow to SDDS compliance is mostly explained by other investment inflow alone. Portfolio investment inflow and direct investment inflow are neither associated with the SDDS dummy nor with the VIX. On the contrary, other investment inflow to emerging markets increases for those who have met the SDDS requirements as the VIX index increases.

Figure 3 displays the average marginal effects of SDDS compliance on net inflow, total gross inflow, total gross outflow, and other investment inflow, categorized by the level of the VIX index. Each graph represents the marginal effects along with a 95% confidence interval.

Figure 3. Average marginal effects of SDDS compliance



The marginal effect of SDDS compliance on capital flows becomes positive when the VIX index reaches a sufficiently high level. For net inflow, the threshold of the log of VIX at which the effect of SDDS turns positive, within a 95% confidence interval, is around 3, which

corresponds to roughly over 20 in the normal VIX index.⁷⁾ The upper right graph in Figure 3 illustrates that the log of VIX needs to be above 3.2 for the marginal effect of SDDS to be positive on total gross inflow. However, as indicated in the bottom left graph, the relationship between SDDS compliance and total gross outflow is not statistically significant at any level of VIX. Among the different types of gross inflows, other investment inflow is the only type that significantly responds to SDDS compliance. Similar to net inflow, SDDS compliance has a net positive effect on other investment inflow when the log of VIX is above 3.

Overall, the results suggest that, in the context of global risk aversion, improving a country's information transparency by meeting the SDDS requirements alone does not lead to a significant increase in capital inflows to emerging economies. However, as global risk aversion increases, both net and gross capital inflows tend to rise, mitigating the reduction in capital inflows that would otherwise occur. This response is primarily driven by changes in banking inflows, while portfolio and direct investment inflows show little sensitivity to improvements in macroeconomic information transparency. Therefore, the findings imply that emerging economies with better quality information experience more stable or less volatile banking inflows when global risk aversion increases, contributing to the overall stabilization of total capital inflows.

IV. Robustness Checks

In this section, I check the robustness of the results in five ways.

First, I include year fixed effects instead of using the world average of SDDS compliance and capital flows. The purpose of this is to account for time-specific global shocks. In Table 5, the main effect of the VIX index is now captured by the year fixed effects. The results confirm that SDDS compliance is positively related to total gross inflows, although the statistical significance is reduced. This relationship is primarily driven by changes in other investment inflows, while there is no significant association between SDDS compliance and portfolio or direct investment inflows.

Second, I replace the country-specific fundamental variables with their differentials compared to advanced countries. This adjustment helps account for the annual global effects on these variables. Specifically, I use the differentials in real GDP growth with G7 countries, short-term interest rates with the U.S., and real effective exchange rates with the U.S. Table 6 presents the results, which show that the finding regarding other investment inflows remains robust. However, similar to the first robustness check, the statistical significance of the coefficients for total inflows is weakened. This suggests that the effect of SDDS compliance

7) The logarithm of the VIX during the sample period is plotted in Figure A1.

is largely associated with time-specific factors when examining aggregated capital flows, while banking inflows are more sensitive to the availability of information.

Table 5. *Year Fixed Effect*

	(1)	(2)	(3)	(4)	(5)	(6)
	Net inflow	Total gross inflow	Total gross outflow	Portfolio	Direct	Other
SDDS	-10.8450 (9.6645)	-21.1007* (11.1664)	-10.2557 (6.9313)	4.6870 (2.9124)	-3.6354 (4.3737)	-22.1523*** (7.7506)
SDDS × VIX	3.8491 (3.1714)	7.3416* (3.7728)	3.4925 (2.3529)	-1.5462 (0.9134)	1.1505 (1.5346)	7.7374*** (2.6672)
Covariates	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Obs.	341	341	341	341	341	341
N	21	21	21	21	21	21
R ²	0.381	0.339	0.193	0.210	0.251	0.338

Notes. Each column shows the dependent variable used in the regression. Capital flows are presented as a share of GDP. The SDDS variable is a dummy that equals one after the year of SDDS compliance. Robust standard errors are reported in parentheses. *, **, and *** denote a p-value less than 10%, 5%, and 1%, respectively.

Table 6. *Differential with Advanced Countries*

	(1)	(2)	(3)	(4)	(5)	(6)
	Net inflow	Total gross inflow	Total gross outflow	Portfolio	Direct	Other
SDDS	-6.411 (5.897)	-14.630* (7.829)	-0.506 (4.776)	2.866 (3.397)	2.628 (3.237)	-14.124*** (4.369)
VIX	-5.042*** (1.616)	-3.119 (1.825)	1.714 (1.482)	0.001 (1.011)	0.015 (0.748)	-3.316** (1.203)
SDDS × VIX	2.575 (1.991)	5.035* (2.513)	0.209 (1.527)	-0.802 (1.089)	-0.915 (1.041)	4.995*** (1.439)
Real GDP growth	0.426*** (0.123)	0.397*** (0.122)	-0.021 (0.055)	0.035 (0.035)	0.092 (0.055)	0.272*** (0.094)
Short-term interest rate	-0.035 (0.021)	-0.003 (0.029)	0.029 (0.024)	0.017* (0.009)	-0.023 (0.014)	0.002 (0.027)
REER	4.949*** (1.305)	5.470*** (1.537)	1.297 (1.153)	1.468* (0.755)	1.998*** (0.650)	2.593* (1.468)
Covariates	✓	✓	✓	✓	✓	✓
Obs.	341	341	341	341	341	341
N	21	21	21	21	21	21
R ²	0.353	0.312	0.150	0.134	0.189	0.306

Notes. Each column shows the dependent variable used in the regression. Capital flows are presented as a share of GDP. The SDDS variable is a dummy that equals one after the year of SDDS compliance. Robust standard errors are reported in parentheses. *, **, and *** denote a p-value less than 10%, 5%, and 1%, respectively.

Third, I incorporate the SDDS compliance years (SDDSY) simultaneously with the SDDS dummy variable in the regression to obtain a more nuanced estimate of the relationship between SDDS compliance and capital flows. Table 7 presents the results, which provide evidence that a longer period of SDDS compliance (SDDSY) is positively associated with net inflows and portfolio investment inflows. It should be noted that the positive coefficient for SDDSY can be explained by the sample period, which limits the post-compliance period to a maximum of ten years. Without this limit on the sample period, the coefficient for SDDSY is no longer statistically significant.

An interesting finding in the results is the positive relationship between the longer period of SDDS compliance and portfolio investment inflows. This suggests that portfolio investment inflows are more responsive to improvements in macroeconomic information transparency, following the pattern observed in banking inflows. On the other hand, the relationship between the longer period of SDDS compliance and direct investment inflows is not statistically significant. This finding aligns with the existing literature, which suggests that foreign direct investment flows are relatively more resilient to global push factors compared to other types of capital flows.

Table 7. *SDDS Compliance Years*

	(1)	(2)	(3)	(4)	(5)	(6)
	Net inflow	Total gross inflow	Total gross outflow	Portfolio	Direct	Other
SDDS	-12.941** (6.088)	-22.817** (8.781)	-2.676 (5.828)	2.141 (3.470)	-1.695 (3.130)	-18.371*** (4.847)
VIX	-5.752*** (1.686)	-3.722* (2.033)	1.660 (1.558)	-0.371 (0.929)	-0.054 (0.767)	-3.763** (1.407)
SDDS × VIX	4.548** (1.991)	7.840** (2.907)	1.029 (1.889)	-0.771 (1.099)	0.702 (0.997)	6.345*** (1.603)
SDDSY	0.278* (0.150)	0.038 (0.277)	-0.107 (0.174)	0.209*** (0.066)	-0.327 (0.190)	0.136 (0.129)
Obs.	341	341	341	341	341	341
N	21	21	21	21	21	21
R ²	0.348	0.311	0.154	0.157	0.195	0.310

Notes. Each column shows the dependent variable used in the regression. Capital flows are presented as a share of GDP. The SDDS variable is a dummy that equals one after the year of SDDS compliance. SDDSY is a continuous variable that represents the number of years after SDDS compliance. Robust standard errors are reported in parentheses. *, **, and *** denote a p-value less than 10%, 5%, and 1%, respectively.

Fourth, as alternative proxy for improved information transparency, I use a dummy variable on the publication of external debt data on National Summary Data Pages (NSDPs).⁸⁾ Once

8) It is similar to previous studies (Marques et al. 2013 and Glennerster and Shin 2003) that employ the publication of Report on Standards and Codes along with SDDS compliance as measures of country reform.

a country starts disseminating data, it can signal the country's willingness to be more transparent to global financial market.

Figure A4 in the online appendix shows the share of emerging and advanced economies that published the external debt data by 2020. Similar to SDDS compliance, the first year of publication of emerging economies is more spread out over time compared to advanced economies. In fact, there were still emerging economies which met the SDDS requirements but did not publish the data on NSDPs by 2020. I set NSDP dummy to have value one for any year after the first publication of the data. Table 8 shows that publishing the data itself (NSDP dummy) is negatively related to net inflow, total gross inflow, and other investment inflow, but the negative effects shrinks as VIX increases.

Table 8. *First Publication of Data on NSDP*

	(1)	(2)	(3)	(4)	(5)	(6)
	Net inflow	Total gross inflow	Total gross outflow	Portfolio	Direct	Other
NSDP	-16.257** (7.078)	-29.764*** (9.516)	-4.049 (5.814)	-0.675 (3.945)	0.152 (3.128)	-19.775*** (4.745)
VIX	-7.160*** (1.937)	-6.230*** (2.080)	1.454 (1.505)	-0.864 (0.739)	-0.699 (1.017)	-3.789*** (1.306)
NSDP × VIX	6.458** (2.374)	10.357*** (3.308)	0.715 (1.885)	0.458 (1.336)	-0.067 (1.123)	6.838*** (1.665)
Covariates	✓	✓	✓	✓	✓	✓
Obs.	341	341	341	341	341	341
N	21	21	21	21	21	21
R ²	0.329	0.297	0.157	0.130	0.178	0.292

Notes. Each column shows the dependent variable used in the regression. Capital flows are presented as a share of GDP. NSDP is a dummy which takes value one after the first publication of external debt data on NSDP. Robust standard errors are reported in parentheses. *, **, and *** denote a p-value less than 10%, 5%, and 1%, respectively.

Finally, I construct a new sample group with advanced countries. As presented in Figure A1, the size of total gross inflow and outflow is similar to each other for advanced economies, therefore, the share of net inflow is considerably small. Also, the share of each type of gross inflow is balanced, all taking 4-5% of GDP.⁹⁾ Table 9 indicates that advanced countries show a completely different picture on the relationship between SDDS compliance and capital flows. For advanced countries, the main effect of SDDS and its interaction effect with VIX are rarely statistically significant, except for direct investment inflow. One possible explanation is that, different from emerging economies, the macroeconomic information of advanced countries was already familiar to foreign investors at the time when the SDDS was introduced, therefore, SDDS compliance could explain little about capital flows of these countries.

9) The summary statistics on advanced countries are reported in Table A4.

Table 9. *Advanced Countries*

	(1)	(2)	(3)	(4)	(5)	(6)
	Net inflow	Total gross inflow	Total gross outflow	Portfolio	Direct	Other
SDDS	-10.127 (6.091)	4.119 (21.184)	14.176 (23.214)	2.268 (11.900)	18.869** (8.297)	10.518 (15.223)
VIX	0.702 (1.856)	4.283 (5.591)	3.597 (5.448)	-1.228 (2.479)	5.148** (2.081)	1.677 (3.780)
SDDS × VIX	3.226* (1.795)	-1.864 (6.885)	-5.047 (7.695)	-2.091 (4.080)	-6.134** (2.804)	-1.873 (4.720)
Covariates	✓	✓	✓	✓	✓	✓
Obs.	446	446	446	446	446	446
N	24	24	24	24	24	24
R ²	0.151	0.286	0.276	0.173	0.171	0.206

Notes. Each column shows the dependent variable used in the regression. Capital flows are presented as a share of GDP. The SDDS variable is a dummy that equals one after the year of SDDS compliance. Robust standard errors are reported in parentheses. *, **, and *** denote a p-value less than 10%, 5%, and 1%, respectively.

V. Conclusion

This paper empirically studies the relationship between country-level information transparency and capital inflows, using annual capital flows data of 21 emerging economies for the period between 1990 and 2010. I examine the information effect both unconditional and conditional to financial market uncertainty, given the overall improvement of information transparency and financial integration at the global level. Information transparency is proxied by country's compliance status with IMF's SDDS, and the global financial market uncertainty is measured by the VIX index. The improvement in global information transparency and financial integration is controlled for by the SDDS compliance of the rest of the world and capital flow to the rest of the world, respectively.

The paper finds that emerging markets who met the SDDS requirement received more net capital inflow, given country characteristics. By decomposing net inflow to total gross inflow and outflow, I show that the positive association between net inflow and information transparency is determined by total gross inflow. Total gross outflow from emerging markets, which had increased during the sample period, turns out to be related to the financial integration rather than information transparency.

Under the assumption that the SDDS effect is conditional on global risk aversion, I find that SDDS compliance reduces the negative effect of VIX on capital flows; SDDS compliance brings additional 0.047 percentage points increase in net inflow and 0.079 percentage points increase in total gross inflow, corresponding to 1% increase in the VIX index. However, the

marginal effect of SDDS compliance becomes positive as the VIX index increases (above 3 for net inflow and 3.2 for total gross inflow in terms of natural logarithm). Furthermore, the results suggest that such a relationship between SDDS compliance and capital inflows to emerging markets is driven by other investment inflow. While portfolio investment inflow and direct investment inflow present no significant association with SDDS compliance, other investment inflow is the only type of capital that shows a significant response to SDDS dummy.

The findings overall imply that the SDDS effect was asymmetric between emerging and advanced economies. For advanced economies, SDDS compliance had an immediate positive effect on direct investment with a decreasing marginal effect as the VIX increased. By contrast, although more transparent emerging markets did not attract more capital from foreign investors in normal times, they experienced less reduction in other investment inflow in times of high financial stress. Future research could empirically investigate further the pecking order of international capital flows to information availability, along with the dynamics in global financial volatility.

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