The determinants of cross-border portfolio equity flows: new evidence from emerging markets*

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Abstract: We exploit a proprietary database containing foreign trading data from 20 exchanges for the 2006 - 2018 to expand the existing evidence on cross-border equity flows towards emerging markets. We study whether push and pull factors, as well as explicit and implicit barriers to investment, corporate governance standards and market structure features, influence cross border equity inflows. We firstly find that pull factors are an important determinant of foreign inflows, while push factors have a smaller influence. We also find that emerging markets that remove explicit barriers to investment and adopt stricter corporate governance practices manage to attract larger inflows in the long run, conditional on push and pull factors. Removing information barriers also matters, but relatively less. Market structure features have instead little influence on cross-border flows towards emerging markets.

JEL codes: G11, G15

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1. Introduction

Most emerging markets in the world have gone through a well-documented process of liberalisation and integration over the last 30 years. Bekaert, Harvey, & Lumsdaine (2002) estimate that most emerging economies started this process between the end of the 1980's and the first half of the 1990's. Edison & Warnock (2003), looking at the intensity of capital controls, show that most emerging markets attained greater and greater openness over the 1990-2000 period, finding comparable results to Bekaert et al. (2002). As a result of these liberalisations, cross-border portfolio flows towards emerging economies substantially increased from the second half of the 1990s till the start of the financial crisis.[1] After a slowdown during the crisis period, cross-border flows towards emerging economies surged again for a couple of years (Forbes and Warnock, 2012) to then reach stable and sizable levels after 2011 (own elaboration on IMF data).[2] Cross border portfolio flows have accounted for a non-negligible fraction of emerging markets' GDP and capital accounts since the crisis (Ahmed and Zlate, 2014; Ghosh et al., 2014) and are expected to be relevant in size for the year 2018.[3]

Considering these trends, we believe that studying the determinants of cross-border portfolio flows is a worthwhile topic of investigation (Ahmed, 2017). This paper focuses on a particular

[1] Ghosh, Qureshi, Kim, & Zalduendo (2014) document a sharp increase in portfolio inflows to emerging economies between the year 2000 and the financial crisis, capping nearly 8% of EME's aggregate GDP in 2006.

[2] In 2011 portfolio flows saw an abrupt slowdown (Yang, 2016; own elaboration on IMF data). For an illustration of these trends till 2013 see Ahmed & Zlate (2014) and James et al. (2014).

[3] The Institute for International Finance (2017) estimates that international portfolio inflows towards emerging markets will be above 270 billion USD in 2018. Using IMF data, we calculate that net portfolio investment towards emerging countries was over 71 billion USD during Q1 2018.

component of cross-border portfolio flows, equity investment. The reason is twofold. On one hand, following the mid-90s liberalisations most of emerging equity exchanges have attracted important levels of foreign participation and trading, which in turn arguably contributed to their own growth and development (Errunza, 2001; Han Kim and Singal, 2000) and to the growth and development of their economies (Levine and Zervos, 1998).[4] In fact, many of these exchanges have over the years consolidated their positions as globally important financial institutions, reaching levels of market capitalisation that are comparable to those of advanced economies[5] and are important shares of their own countries' GDPs.[6] On the other hand, however, relatively few rather dated contributions specifically deal with cross-border equity flows (Brennan and Cao, 1997a; Chintrakarn, 2007; Edison and Warnock, 2008; Froot et al., 2001; Griffin et al., 2004; Richards, 2005). We therefore aim to update and expand the evidence on the topic, providing additional empirical results using data that include the post-crisis period.

[4] In fact, it is argued that to stimulate liquidity, emerging markets should find a good balance between domestic institutional, domestic retail and international participation, thus supporting the idea that some levels of international participation are needed to maintain a good level of market liquidity (WFE and Oliver Wyman, 2016; Alderighi, 2017).

[5] Several emerging markets have reached a market capitalisation of over one trillion USD, namely: B3; BSE India Limited; Johannesburg Stock Exchange; NSE India Limited; Shanghai Stock Exchange; Shenzhen Stock Exchange; Taiwan Stock Exchange (Source WFE Monthly Reports, April 2018).

[6] The market capitalisation of the Stock Exchange of Thailand, Bursa Malaysia and the Johannesburg Stock Exchange as of December 2017 was larger than their countries' GDPs (120%, 144% and 352% respectively). In India, United Arab Emirates and Jordan market capitalisation was more than 50% of their GDP, and in Brazil it nearly capped 50% in December 2017 (Source: World Bank).

We exploit a unique proprietary database containing information on foreign institutional participation and trading from a sample of emerging exchanges[7] to investigate the determinants of cross-border portfolio equity inflows towards emerging markets.[8] We firstly assess whether it is mostly push (foreign market returns and volatility, and the correlation between foreign and local market returns) or pull factors (domestic market returns and volatility) to influence cross-border flows. We then study what levers and interventions, conditional on push and pull factors, are mostly effective in attracting equity inflows towards emerging markets. We estimate linear regression models that control for market and time fixed effects as well as for a rich set of controls. Our database contains monthly information for 20 geographically diverse emerging and frontier market exchanges over the 2006-2018 period and is a representative sample of emerging and frontier markets worldwide. Thus, our results are generalisable to the population of emerging and frontier markets and expand the external validity of the evidence on the topic.[9]

[7] We use the term "emerging markets" loosely to indicate any market that is not classified as advanced by either FTSE or MSCI. This categorisation includes advanced emerging, emerging and frontier markets.

[8] We study gross inflows, that is the mere difference between foreign buys and sells of stocks listed in the domestic market, without subtracting net outflows from domestic investors. The literature debates whether gross or net inflows should be studied (Ahmed, 2017; Forbes and Warnock, 2012; Ghosh et al., 2014). Given that exchanges are the primary focus of this paper we study the determinants of gross inflows, as foreign investment of domestic investors is beyond the control of stock markets. We agree however that for macroeconomic purposes the determinants of net (rather than gross) inflows would be more relevant (Ghosh et al., 2014).

[9] The markets are (in alphabetical order): Amman Stock Exchange (Jordan), Athens Stock Exchange (Greece), B3 (Brazil), Bolsa de Valores de Colombia (Colombia), Bombay Stock Exchange Limited (India), Borsa Istanbul (Turkey), Bursa Malaysia (Malaysia), Colombo Stock Exchange (Sri Lanka), Dubai Financial Market (United Arab

We find that pull factors matter more than push ones in explaining cross-border flows. Domestic market returns account for an important share of monthly inflows towards emerging markets: a one-percentage point increase in domestic returns is associated with a 24.4 USD million increase in cross-border flows, roughly 35% of the average monthly inflows in the sample. Likewise, domestic market volatility shows a negative correlation with inflows: a one-percent increase in domestic volatility is associated with a decrease in inflows equal to 9.5 million USD, 13% of the average monthly inflows in the sample. On the other hand, returns from foreign countries, their respective correlations with domestic returns and foreign market uncertainty show weak statistical significance and contribute proportionally less to the model's variance, suggesting that push factors are not as important in explaining inflows towards emerging economies.

We also find that removing barriers to investment and enhancing corporate governance standards are the most effective levers in attracting cross-border flows, conditional on push and pull factors. For example, a country removing capital inflows restrictions sees an increase in inflows equal to 302 million USD over the sample period (significant at the 1% level). Similarly, a market introducing a full set of well-accepted corporate governance standards (Aggarwal et al., 2011, 2009) is found to attract foreign inflows as high as 756 million in the

Emirates), Johannesburg Stock Exchange (South Africa), Kazakhstan Stock Exchange (Kazakhstan), Moscow Exchange (Russia), Nairobi Securities Exchange (Kenya), National Stock Exchange of India Limited (India), Nigerian Stock Exchange (Nigeria), Stock Exchange of Mauritius (Mauritius), Taipei Exchange (Taiwan), Taiwan Stock Exchange (Taiwan), The Egyptian Exchange (Egypt), The Stock Exchange of Thailand (Thailand). The aggregate market capitalization of these markets was 10.4 trillion USD as at December 2017 and accounted for 43% of the market capitalization of the emerging and frontier world. Source: MSCI, FTSE Russel (for the categorisation), WFE monthly reports (for market capitalisation).

long-run (significant at the 1% level). Removing information barriers if found to attract sizable inflows, but the importance of these levers is less relevant from a statistical point of view. For example, after inclusion in in the MSCI Emerging Market Index, the average market is found to attract roughly 350 million USD inflows in the long run, but this coefficient is statistically significant at the 10% level only. We find that market structure and post-trade infrastructure features have a less relevant correlation with inflows.

We add to the literature in several ways. To start with, we use of a more comprehensive sample with respect to previous studies on the topic, comprised of a large number of markets (20 in total) observed at a monthly frequency for a long period of time (more than 11 years). As we demonstrate (see Section 5.1.), this sample is representative of the population of emerging and frontier equity markets worldwide: our results therefore enhance the external validity of the evidence on the topic. In addition, our sample includes the post-crisis period, and thus allows us to assess the behaviour of international investors after the crisis, therefore expanding the existing evidence on the topic which is mostly pre-2007. We are the first to explicitly introduce domestic market volatility and the correlation between foreign and domestic market returns in study on push/pull factors, and therefore include relevant variables omitted by the previous literature. Finally, our paper studies the influence of characteristics that have been somewhat neglected by previous literature, namely market structure and post-trade infrastructure features, two components that are relevant in reducing the direct costs to invest/trade in a given exchange and should therefore be considered as relevant determinants of cross-border flows.

The rest of the paper is structured as follows: Section 2 frames the contribution in the literature. Section 3 describes the database used for the empirical estimations. Section 4

describes the empirical model. Section 5 reports the main regression results. Section 6 provides a discussion and suggestions for future research on the topic.

2. Related literature

In this section we review the literature on the topic to identify the most relevant determinants of cross-border portfolio equity flows.

2.1. Push and pull factors

Research on cross border equity flows has typically studied whether these are determined by characteristics of the source (foreign) country that affect the existing supply of funds ("push factors") or by demand-side characteristics of the destination (domestic) market ("pull factors") (Ghosh et al.,2014).[10] Ghosh et al. (2014) suggest that both push and pull factors are likely to influence equity inflows at the same time, as push factors shift the supply of funds while pull factors shift their demand. Several contributions study the determinants of cross-border capital flows with a specific focus on equity inflows towards emerging economies (Brennan and Cao, 1997; Edison and Warnock, 2008; Froot et al., 2001; Griffin et al., 2004; Richards, 2005). These therefore lie at the core of our identification of relevant push and pull factors.

2.1.1. Push factors

When assessing the relevance of push factors, the literature has mostly focused on returns from foreign countries (Griffin et al., 2004; Richards, 2005). The relation between foreign returns and cross-border inflows is controversial: while on one hand higher foreign returns would encourage foreign investors to invest in their own country (what we can assimilate to

[10] Note that for the rest of the paper, we will use the term "foreign" to identify the country where capitals are originated, and we will use the term "domestic" to identify the destination country of investments.

a "substitution effect"), on the other hand higher returns provide foreign investors with more spare resources to invest abroad (what we can refer to as an "income effect" and is typically referred to as a "wealth effect" in the literature: see Brennan and Cao (1997); Edison and Warnock (2008, page 2021)). To identify foreign returns (as controlling for returns from any possible country in the world is not possible), the literature has focused on the countries/regions that have historically been the largest source of outbound investment: usually the US and Western Europe.[11] In some studies, US and European returns have been shown to be positively correlated with inflows, thus supporting the wealth effect interpretation (Aron et al., 2010; Bohn and Tesar, 1996; Griffin et al., 2004; Richards, 2005), while other studies find no such relationship (Brennan and Cao, 1997).[12]

Volatility of foreign markets is also regarded as a relevant push factor, and one that is expected to be negatively correlated with inflows, as international investors typically prefer to invest in advanced economies in times of higher uncertainty (Ghosh et al., 2014). Similar to returns, it is not possible to control for market volatility in every country in the world. Aron et al. (2010) and Ghosh et al. (2014) therefore use US market volatility (either the VIX index

[11] According to Leuz et al. (2009), half of the foreign portfolio investment worldwide can be attributed to US investors alone. The IMF estimated that the US accounted for 30.2% of foreign investment in equity and investment funds worldwide as of June 2017. They also estimated that the European Economic Area accounted for 40.8% of foreign investment in equity and investment funds worldwide, with the UK alone representing 7.7% and Germany 4.3% as of June 2017 (Source: IMF Coordinated Portfolio Investment Survey). In a related research, the authors estimated that the United States alone accounted for nearly 42% of the funds toward EBRD countries as at H2 2017, followed by the United Kingdom followed with 20% of the holdings (WFE and EBRD, 2018).

[12] Edison and Warnock (2008) find instead that higher US interest rates and above-trend US economic activity are negatively related with inflows, in line with the "substitution effect" hypothesis.

or volatility calculated on the S&P 500 returns) in their regression specifications, arguing that the US market volatility is a globally applicable measure of investors' uncertainty.[13] As expected, these contributions find a negative relationship between levels of the VIX index and inflows (Aron et al., 2010; Ghosh et al., 2014; Yang, 2016).

Another potentially relevant push factor is the correlation between foreign and domestic returns. Coeurdacier and Guibaud (2011) find that international investors tend to invest more in countries in which returns are negatively correlated with their own countries' returns, i.e. they exploit hedging opportunities at an international level (see also Portes and Rey (2005)). Levy and Levy (2014) note however that the increasing integration of financial markets hampers these very same opportunities, as returns tend to show increasingly high positive correlations at an international level.

2.1.2. Pull factors

The literature has mostly concentrated on domestic returns when assessing the relevance of pull factor. In a seminal contribution, Bohn and Tesar (1996) find that net purchases of equities by US investors are positively related with the expected domestic excess of returns in 12 out of 22 countries in their sample. They attribute this finding to return-chasing behaviour. The theoretical formulations of Brennan and Cao (1997) and Griffin et al. (2004) predict that domestic returns should attract foreign inflows, and find empirical support for this prediction. Likewise, Richards (2005) finds that domestic returns attract more foreign inflows.

[13] For more information on the CBOE VIX index please refer to: http://www.cboe.com/vix

Somewhat surprisingly, if one excludes Edison and Warnock (2008), the literature has somewhat neglected domestic market uncertainty/volatility as a relevant pull factor, despite even the theoretical specifications of some of the cited contributions predict a negative relation between net purchases and domestic volatility (Bohn and Tesar, 1996; Griffin et al., 2004). We however believe that domestic market risk should be considered as a relevant pull factor (Edison and Warnock, 2008).

Finally, many asset managers implement passive investment strategies and track well-recognised indices, such as the MSCI and/or FTSE Emerging Markets and Frontier Markets Indices (EBRD and IPREO, 2018).[14] To the extent that the rates of returns on these indices influence international investors' sentiment (Richards, 2005), their performance should be considered as a relevant pull factor.[15]

2.2. Longer-run determinants

The contributions that are perhaps the most similar to this paper, Richards (2005) and Griffin et al. (2004), use daily trading data to estimate the determinants of cross-border equity inflows. These papers mainly study whether foreign and domestic returns influence inflows, without focusing on longer-run factors (likely, because of the frequency of their data). As our

[14] This argument is strongly supported by conversations with stock exchange representatives and buy-side investors.

[15] Strictly speaking, macroeconomic factors and stock market characteristics might also be considered among pull factors, following the definitions found in Ghosh et al. (2014) and Fernandez-Arias and Montiel (1996), and the literature on capital flows (Ahmed, 2017; Yang, 2016). In this contribution, we consider them as control variables, because we decided to focus our attention on return and risk factors, in accordance with the literature on cross-border equity flows (Griffin et al., 2004; Richards, 2005; Edison and Warnock, 2008).

data allows us to study inflows at a monthly frequency (see Section 4), we decided to investigate whether additional, longer run characteristics influence cross-border equity inflows, adopting a similar strategy to Edison and Warnock (2008). To identify these characteristics, we borrow from the related literatures on the home-bias[16] (Ahearne et al., 2004; Chan et al., 2005; Dahlquist et al., 2003; Eichler, 2012; Kang, 1997; Lau et al., 2010; Levy and Levy, 2014) and on cross-border *capital* inflows (Ahmed et al., 2005; Ahmed, 2017; Aron et al., 2010; Forbes and Warnock, 2012; Ghosh et al., 2014).

2.2.1. Explicit barriers to investment

During the 1990s, explicit barriers to investment (such as capital controls or ownership restrictions for foreign investors) were considered the main determinants of the home bias. Following the liberalisation process many emerging markets went through during the mid-1990s (Bekaert et al., 2002; Edison and Warnock, 2003), the home bias was expected to reduce. As instead the home bias persisted, economists started looking for the cause of the phenomenon elsewhere (Ahearne et al., 2004; Levy and Levy, 2014).

Nonetheless, international financial markets are still far from being perfectly integrated, and capital controls and ownership restrictions persist in many emerging and frontier economies

[16] The home bias is the well-documented tendency of domestic investors to attribute excessive weight to domestic stocks in their portfolios. This empirical regularity is at odds with the predictions of the International Capital Asset Pricing Model, according to which investors should in fact hold the world portfolio (Lintner, 1965; Sharpe, 1964). Explicit barriers to investment and information asymmetries are typically used to explain the home-bias. For an excellent literature review on the topic see Ahearne et al. (2004).

(Edison and Warnock, 2008).[17] These are expected, when present, to hamper capital inflows (OMFIF and Barclays, 2017) and exacerbate the home bias (Ahearne et al., 2004). In addition, the literature finds that local market frictions, such as higher tax rates, reduce equity inflows and increase the home-bias (Chan et al., 2005). These should therefore also be considered as explicit barriers to investment.

2.2.2. Information costs

As mentioned, the literature agrees that explicit barriers to investment alone are not enough to fully explain the home bias (Ahearne et al., 2004). Building upon the theoretical framework proposed by Merton (1987), the literature postulates that foreign investment would also be hampered by the indirect, non-explicit barrier represented by information costs. That is, foreign investors would tilt their portfolios towards stocks in the home market as they lack awareness, familiarity and information on securities abroad, and obtaining such information is costly (Ahearne et al., 2004; Kang, 1997; Portes and Rey, 2005). The empirical evidence confirms that information asymmetries induce higher degrees of home bias: for example Portes and Rey (2005) find that distance is an important (negative) determinant of cross-border flows. As stock trading does not imply any physical transfer, they attribute the negative correlation between distance and portfolio equity investment between countries to information asymmetry: that is, foreign investors would know less about (and therefor invest less in) distant markets or securities. Coeurdacier and Guibaud (2011) also find that greater

[17] From a case study interview it emerged that Bolsa de Comercio de Buenos Aires didn't have any international participation between 2011 and 2015, because of strict capital controls imposed by the Argentinian government during that period. China is perhaps the most relevant example of a large emerging economy that imposes barriers on foreign participation and trading, with the presence (for example) of different share classes for foreign investors. On China, see Ding et al. (2013); Wei et al. (2005).

distance hampers cross-border flows but that the presence of a common language and a similar legal system are positively correlated with equity inflows.

2.2.3. Institutional quality, rule of law and corporate governance standards

While drawing a line between explicit barriers to investment and information costs is relatively simple, the literature has treated features that might well be considered among "information costs" as discreet categories.[18] We follow Chan et al. (2005) and consider institutional and regulatory quality as discreet characteristics with respect to interventions aimed at reducing information asymmetries. The literature agrees that foreign asset managers prefer to invest in countries characterised by higher corporate governance standards, higher institutional quality and stricter rule of law (OMFIF and Barclays, 2017). For example, Dahlquist et al. (2003) find that US investors tend to invest less in countries characterised by a higher expropriation risk index. Leuz et al. (2009) show that US investors tend to invest less in tightly held firms (such as family owned and managed businesses), but only in countries with low securities regulation, low disclosure requirements and where the legal system is not Anglo-Saxon (common law). On the same lines, Eichler (2012) finds that US investors do not necessarily invest more in countries with higher *de jure* disclosure standards but weight more countries where corporate disclosure is applied *de facto*, emphasising how it is the enforcement rather than the mere presence of a rule to attract international investors.

2.2.4. Market structure and post-trade infrastructure

[18] Ahearne et al. (2004) for example consider low accounting standards and low scores on rule of law as information barriers, while other contributions (Dahlquist et al., 2003) consider them as institutional quality indicators.

The literature has neglected the relevance of market structure in attracting international investors to the market. Yet, it is shown that several market structure features serve to enhance market and/or stock liquidity and improve price discovery. These include, among others: market-making (Biais et al., 2016; Charitou and Panayides, 2009; Pagano and Röell, 1996), direct market access (Oliver Wyman and WFE, 2016), securities lending and borrowing (Dreff, 2010) and colocation (Brogaard et al., 2015). These features benefit local investors as much as foreign ones, and therefore might have a role in attracting foreign participants.

Similarly, the introduction of a CCP should in principle mitigate counterparty risk (Cont and Kokholm, 2014; Duffie and Zhu, 2011; Loon and Zhong, 2014) and therefore make trading more appealing for all market participants (including foreign investors). Foreign investors might therefore be tempted to invest more in exchanges where a CCP is present.

3. Database description

Analyses are performed on a proprietary longitudinal database collected from exchange members of the World Federation of Exchanges (WFE) during the first half of 2018.[19] During May 2018, the authors submitted a data-entry template to all WFE emerging market members.[20] Forms were filled by representatives working at the member exchanges with

[19] Established in 1961, the World Federation of Exchanges is a global industry association that represents more than 200 financial market infrastructures and clearinghouses around the world. Membership is acquired through an application process and a formal evaluation of whether the market (or clearinghouse) meets minimum criteria of regulation, transparency and economic relevance.

[20] The activity of the WFE is organized around thematic working groups, composed by member exchanges who voluntarily decide to take part in them. One of the working groups is centered around emerging markets (the

quantitative data points on foreign trading (value and number of foreign trades, split by buys and sells), and on the number of ETFs and depository receipts listed on their market. The quantitative data collected is not an estimation, but represents the actual amount of trading and/or listed financial products in a given month. The form also contained a section dedicated to qualitative information on policies, interventions and characteristics likely to influence foreign participation and trading. In particular, we obtained information on:

- Capital controls and other restrictions to foreign investors (for example, ownership restrictions);
- Corporate governance requirements for listed companies;
- Presence of dividend and capital gains taxes and stamp duties;
- Whether the market requires or recommends disclosure in English language;
- Whether listed companies have to adhere to IFRS accounting standards;
- Market structure characteristics (presence of Market Making, DMA, SLB, Short-selling, Colocation);
- Presence of a CCP.

We collected monthly data from 20 emerging markets, covering the January 2006 - April 2018 period, although some markets did not manage to provide data for the whole sample period. Therefore, our database is an unbalanced panel.

The so-collected database was merged to a database containing WFE market level indicators at a monthly frequency as well as market-level and macroeconomic indicators collected from a variety of sources (see Appendix A in the Supplementary Materials for greater detail). The resulting database amounts to more than 2,000 observations.

4. The empirical model

4.1. The model specification

Emerging Markets Working Group, EMWG). The data template was submitted to EMWG representatives, as well as to emerging market exchanges not belonging to the EMWG.

The relevance of the determinants identified in Section 2 is tested using regression analyses on (restrictions to) the following linear specification:

Equation 1: The model specification

$$\begin{aligned}\mathrm{E}[\text{Equity inflows}_{it} | X] &= \beta_0 + \beta_1 Macroeconomic\ Indicators\ and\ Market\ Characterstics_{it} \\ &+ \beta_2\ Push\ Factors_{it} + \beta_3 Pull\ Factors_{it} \\ &+ \beta_4\ Explicity\ Barriers\ to\ Foreign\ Investment_{it} \\ &+ \beta_5\ Familiarity\ Factors_{it} \\ &+ \beta_6\ Corporate\ Governance\ and\ Institutional\ Quality_{it} \\ &+ \beta_7\ Market\ Structure\ Characteristics_{it} + \beta_8 Market\ Dummies \\ &+ \beta_9 Year\ Dummies + \beta_{10} Month\ Dummies \quad (1)\end{aligned}$$

For each of the factors and levers described in Section 2, we provide a brief description of their empirical counterparts.

4.1.1. Dependent variables: equity inflows

Stock markets submitted data on monthly value of buy and sell trades performed by international investors. We follow Griffin et al. (2004) and calculate equity inflows as the value of foreign buys minus the value of foreign sells. We follow Dahlquist and Robertsson (2001) and identify foreign trading as buys and sells performed by a foreign investor and *not* by a foreign dealer (stock markets indicated that dealers are required to flag foreign buys and sells).[21] We perform our analyses using unscaled inflows (differently from Griffin et al. (2004) and Froot et al. (2001) who scale inflows by market capitalisation). We however perform the

[21] As pointed out in several contributions (see for example Choe et al., 2005; Griffin et al., 2004), a limitation of foreign trading and ownership data is that a domestic investor trading through a foreign institution would be recorded as a foreign trade. As submitting exchanges require traders to flag whether the investor is foreign, we believe this problem does not affect our data.

same analyses using scaled inflows as a robustness check, finding comparable results.[22] Formally:

Equation 2: Dependent variable

$$Inflow_{it} = Foreign\ Buy_{it} - Foreign\ Sell_{it}\ (2)$$

To make sure that the indicator works as it should, we cross-check it against foreign ownership data (percentage of market capitalisation held by foreign investors) obtained from 10 out of 20 of the submitting exchanges. Intuitively, inflows should be positively correlated with foreign ownership. We sum up past inflows to calculate quarterly, semi-annual and annual inflows, and assess the correlation of these variables with the foreign ownership one. We find that cumulative inflows are positively correlated with foreign ownership in seven out of 10 of the markets, with statistically significant correlations (at the 0.1% level) increasing in magnitude as the frequency of capital inflows goes down. We report a correlation matrix and a time series plot for a selected exchange in Table B1 and Figure B1 Appendix B (Supplementary Materials). As a second cross-check, we also aggregate inflows and compare them with data from the IMF, finding that the two time series are highly correlated (see Figure 2 in Section 4).

4.1.2. Push factors

[22] Given the purpose of our study, we believe that levels of foreign inflows would work better than the share of foreign inflows over market capitalisation as many of the considered policy levers and determinants would market capitalisation as well (and therefore the denominator of the dependent variable). This would make the marginal effect of the regressors on the dependent variable tricky to interpret without a structural specification: stock market returns would for example positively influence both capital inflows, but also market capitalisation through domestic and foreign trading activity. See footnote 7 in Griffin et al. (2004) for a discussion.

We follow the cited literature (Aron et al., 2010; Griffin et al., 2004; Richards, 2005) and use US and European returns as our main push factor. We calculate returns as the log differences of the end-of-month values of the Dow Jones, S&P500, DAX, FTSE100 and CAC40 indices.

To capture international uncertainty, we include in the specification end-of-month values of the VIX index, following Aron et al. (2010) and Ghosh et al. (2014).

We control for the correlation between domestic and foreign returns. We follow Portes and Rey (2005) and calculate the correlation between foreign and local returns as the rolling correlation of end-of-month returns over the past 12-month period. We calculate correlation scores between domestic returns and returns on the foreign indices mentioned above (Dow Jones, S&P500, DAX, FTSE100 and CAC40), thus obtaining five different variables. To make sure that the indicator works as it should, we test the documented regularity that correlation of market returns increases during periods of market turmoil/instability (see Chesnay and Jondeau, 2001; Knif et al., 2005, and related literature). We find that our estimates are positively correlated with both domestic and US/international volatility as measured by the VIX index, and that these relations are statistically significant at the 0.1% level. We report the correlation matrix in Table B2 in Appendix B (Supplementary Materials).

4.1.3. Pull factors

We calculate monthly domestic returns as the log difference of the end-of-month values of domestic exchanges' broad market indices.

We calculate daily volatility as the standard deviation of the returns on the broad market index calculated over the previous 22 trading days. Monthly volatility is calculated as the average of the daily volatilities for the month, scaled up by the square root of 22, as common

practice in the industry.[23] In Appendix B, we show how that our measure is highly correlated with volatility measures implemented by some of the submitting exchanges, supporting the robustness of our calculation (see Figures B2 and B3 in Appendix B, Supplementary Materials).

Finally, we calculate returns on the MSCI Emerging Markets and Frontier Indices and on the FTSE Emerging Market Index as the log differences of end-of-month values (Richards, 2005).

4.1.4. Explicit barriers to investment

While it is clear that explicit barriers to investment raise transaction costs for foreign investors thus lowering their returns (Edison and Warnock, 2008; Griffin et al., 2004; Stulz, 1981), in practice identifying these barriers (or a relaxation of such barriers) is more challenging. As mentioned in Bekaert et al. (2002), the market liberalisation process is very complex, and entails intertwined reforms and policies that affect both financial markets and the real economy, and in turn have an impact on macroeconomic conditions by and large (Bekaert et al., 2005).

To control for explicit barriers to investment, we created "rule based measures" (Edison and Warnock, 2003), focusing our attention on levers that are either commonly mentioned in the academic literature and/or for policy purposes. More specifically, in addition to surveying the literature (Bekaert et al., 2002; Chan et al., 2005; Edison and Warnock, 2008; OMFIF and Barclays, 2017) we used the IMF AREAER reports (IMF, 2016) and the methodology used by S&P to calculate the Investment Weight Factor (IWF) for inclusion into IFCI indices (S&P Dow Jones Indices, 2018) to identify what both the academic literature and practitioners in the

[23] The methodology mirrors that of the volatility measure adopted by Borsa Istanbul: http://www.borsaistanbul.com/en/data/data/equity-market-data/index-data/volatility.

industry commonly regard as barriers to foreign investment. We identified the following broad categories:

- General ownership restrictions to foreign investors (either individual or collective);
- Sectorial ownership restrictions to foreign participation (either individual or collective);
- Presence of different classes of shares for foreign investors;
- Capital inflow restrictions; and
- Capital repatriation restrictions.

We then asked stock exchanges to indicate whether, during the January 2006 – April 2018 period, any of the above barriers were in place, and if so, to provide a brief description and indicate for what period. Recognising the importance of local market frictions, such as taxes (Chan et al., 2005), we also asked exchanges to report whether during the sample period they had capital gain taxes, dividend taxes and stamp duties. After reviewing the data submissions, we codified the information received and created a dummy variable for each of the above levers.

4.1.5. Information costs

As mentioned, information asymmetries are important in explaining the home bias (Ahearne et al., 2004). While it is in principle clear that reducing informational barriers should in principle attract portfolio inflows (Chan et al., 2005; Kang, 1997; Leuz et al., 2009), identifying what measures should be adopted is not straightforward. The literature uses very different measures of information asymmetries/costs. Based on the literature and on explorative dialogues with exchange representatives, we identified the following levers:

- Recommended/compulsory disclosure in English language (as the literature generally controls for common language: see Chan et al., 2005; Coeurdacier and Guibaud, 2011; Portes and Rey, 2005); and
- Adherence of listed companies to IFRS accounting standards (Ahearne et al., 2004; OMFIF and Barclays, 2017).

We then asked stock exchanges to indicate whether, during the January 2006 – April 2018 period, any of the above was in place, and if so to provide a brief description and indicate for what period. After reviewing the data submissions, we codified the information we received and created a dummy variable for each indicator.

We also control whether a country/market is included in the MSCI Emerging Markets or Frontier Markets Index (loosely following Leuz et al., 2009), as inclusion in a well-recognised index is a signal that a country/market complies with certain minimum standards in terms of corporate governance, institutional quality, rule of law. Inclusion in an index therefore *de facto* lowers information costs for investors. We received information on whether and when a country was introduced in the respective indices directly from MSCI.

4.1.6. Institutional quality, rule of law and corporate governance standards

In Section 2 we emphasised how international investors prefer markets with high corporate governance standards, levels of investors protection and certainty of law enforcement (Dahlquist et al., 2003; Eichler, 2012; Leuz et al., 2009). These characteristics are typically difficult to measure. In particular, corporate governance requirements are liable to be different across jurisdictions, making a direct comparison between different countries challenging. Referencing Aggarwal et al. (2009) and Aggarwal et al. (2011) we used what they identified as the most studied corporate governance requirements among academics and policymakers, namely:

- If there is a single class of common shares;
- If the CEO and Chairman positions have to be held by different people;
- If the board has a minimum size;
- If the board is comprised of a minimum share of independent directors;
- If the audit committee is comprised of a minimum share of independent members; and

- If the audit committee is ratified annually.[24]

We then asked stock exchanges to indicate whether, during the January 2006 – April 2018 period, any of these corporate governance practices was in place, and if so to provide a brief description and indicate for what period. After reviewing the data submissions, we codified the information submitted by exchanges and created a dummy variable for each of them. We then created a corporate governance index by summing up all these dummy variables. The higher the value of the index, the greater the number of concomitant corporate governance practices in place in the market.

We also downloaded measures of institutional quality, investor protection and regulatory effectiveness from the World Economic Forum Global Competitiveness Report and the World Bank Governance Indicators (see Appendix A in the Supplementary Materials).

4.1.7. Market structure and post-trade infrastructure

As mentioned, we believe that a comprehensive empirical model investigating the determinants of cross-border equity inflows should control for market structure and post-trade infrastructure features. Based on the literature and industry experience, we identified the following key characteristics:

- Direct Market Access (DMA);
- Securities Lending and Borrowing (SLB);
- The ability to short-sell;
- Colocation;
- Market Making; and

[24] Aggarwal et al. (2009) and Aggarwal et al. (2011) consider forbidding or limiting the presence of staggered boards as another relevant corporate governance requirement. As most stock exchange in our sample were not familiar with this practice (which we understand is a US one), we decided to omit it from our data collection and analysis.

- The presence of a CCP.

We then asked stock exchanges to indicate whether, during the January 2006 – April 2018 period, any of the above features were present in their market, and if so, to provide a brief description and indicate for what period. After reviewing the data submissions, we codified the information submitted by exchanges and created a dummy variable for each of them.

4.1.8. Control variables: market and macroeconomic factors

As noted in Chan et al. (2005), both economic and stock market development are likely to be important determinants of international participation. We therefore include macroeconomic indicators and stock market characteristics in our model as control variables.

We introduce several macroeconomic factors in our specification, namely: domestic real interest rate, exchange rate risk, GDP, domestic savings/GDP, domestic debt/GDP, exports/GDP. For a list of these variables (including their source), see Appendix A in the Supplementary Materials.

We also control for several stock market characteristics, namely: market capitalisation, number of foreign and domestic listed companies, number of listed ETFs, number of listed depository receipts. These indicators were either submitted by the exchanges themselves or taken from WFE monthly reports. For a list of these variables, see Appendix A in the Supplementary Materials.

4.2. The estimation technique[25]

To study the determinants of cross-border flows we estimate a cross-market longitudinal regression model. Given the nature of our data, we believe that the most suitable technique

[25] This section draws from the methodology section of Alderighi (2018).

for such estimation would be within-group regression. Indeed, unobserved heterogeneity is very likely to be correlated with the explanatory variables, thus leading to omitted variable bias (Wooldridge, 2010) and making both the pooled OLS and the GLS estimators ('random effect') unsuitable for this kind of study. To support this choice, we firstly compare pooled and fixed-effects regression results to show that pooled OLS coefficients would be characterised by a high degree of bias. We then perform an Hausman test to assess the suitability of the random-effect estimator. The test results show that unobservable heterogeneity is correlated with the regressors, therefore making the random-effect estimator inconsistent. We provide further detail on this in Appendix C (Supplementary Materials).

Rejecting the null hypothesis in the Hausman test does not make the fixed-effect estimator valid. Consistency of the within-group estimator relies indeed on the so-called *strict exogeneity* assumption, that requires regressors to be orthogonal to "all past, current, and future innovations" (Mayer, 2016). Although this bias is generally negligible in 'large T' samples (as the one used for this paper), the problem cannot be simply overlooked on this ground, as failure to reject the strict exogeneity hypothesis might invalidate inference even in the presence of consistency (Alvarez and Arellano, 2003; Mayer, 2016). Wooldridge (2010) proposes a simple test for the strict exogeneity assumption, based on an auxiliary regression containing the first leads of a subset of the explanatory variables. Although we are aware of the presence of newer (and perhaps more sophisticated) strict exogeneity tests (Mayer, 2016; Su et al., 2016), we use Wooldridge's test because it is straightforward to implement and widely accepted. Results are reported in Appendix C (Supplementary Materials). The test allows to conclude that strict exogeneity is not a problem in our sample.

The use of a 'large T panel' with relatively fewer cross sectional units (as typical of macro-panel data) lead researcher to apply problems that are typically related to time-series analysis (such as non-stationarity and cointegration) to the context of longitudinal data (Baltagi and Kao, 2000). In particular, concerns might arise that inflows are characterized by a unit root. We test for the presence of a unit root in our dependent variables, and strongly reject their presence. The test results are commented in Appendix C (Supplementary Materials).

4.3. Qualitative analyses

In addition to the reported quantitative analyses, the authors performed qualitative analyses to triangulate and support the quantitative results. More in detail, we conducted seven case study interviews with stock exchange representatives, and 10 structured interviews with buy-side investors. While this paper remains quantitative in nature, we believe that the evidence gathered through qualitative analyses is valuable and we refer to it either in support of theoretical arguments or to complement quantitative results.

5. Results

5.1. Summary statistics

[TABLE 1 about here]

All reported summary statistics are calculated over both the cross sectional and time dimensions.

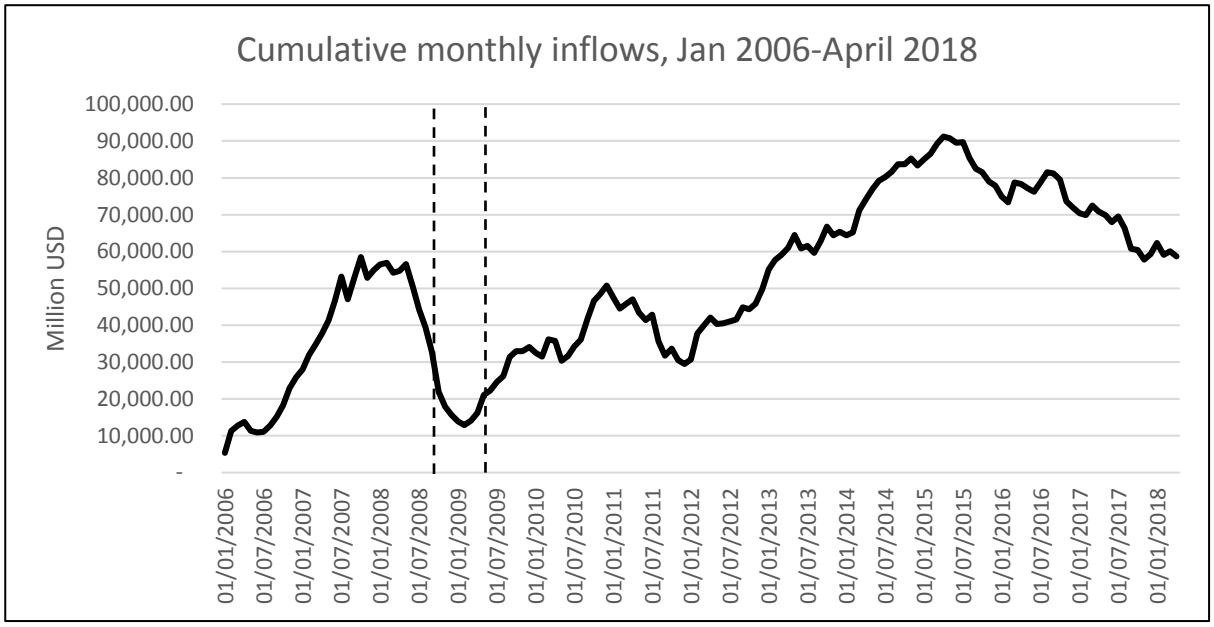
The average exchange in our sample has a market capitalization of 380 billion USD, a mid-sized exchange according to the categorization adopted by the World Federation of Exchanges (see for example WFE, Median Simple Spread reports, 2017). It has a more than 564 listed domestic companies, but slightly less than 9 foreign listed companies. To check whether our sample is representative of the population of emerging and frontier markets, we

assess whether the December 2017 sample means of four different indicators (market capitalisation, number of listed companies, value of EOB trades and number of EOB trades) are statistically different from their respective population means using standard t-tests. We calculate the population means and standard deviations using the full universe of frontier and emerging markets as reported in the WFE monthly reports. We find that the sample means are not statistically different from the population means at standard confidence levels. We repeat this exercise for June 2012 (mid-point) and January 2006, finding the same result. These findings (reported in Section D of the supplementary materials) suggest that our sample is representative of the population of emerging and frontier exchanges.

In line with the trends reported in the introduction, submitting exchanges saw positive cross border equity inflows over the sample period. According to our estimations, the mean monthly inflows towards the markets in our sample were 70.10 million USD, ranging from an outflow of 6.5 billion dollars (minimum) to an inflow of nearly 13 billion USD (maximum). Mean quarterly inflows were 205.96 million USD (minimum: -11 billion USD; maximum: 13 billion USD), semi-annual 400.86 million USD (minimum: -13 billion USD; maximum: 15 billion USD), and annual ones 800.82 million USD (minimum: -19 billion USD; maximum: 23 billion USD). Total cumulative inflows towards the exchanges in the sample amounted to over 160 billion USD over the January 2006 - April 2018 period. We also note that 15 out of 20 exchanges (75% of our cross-sectional units) were characterised by positive cumulative and average inflows over the same period. As evident from Figure 1 below, after a rapid initial surge at the beginning of our sample period, capitals outflew of emerging markets due to the financial crisis, to surge again in the early 2010s. Recent years saw slowdown of capital inflows. Figure 2 shows that cumulative annual inflows for the same subsample of markets follow the same pattern as World Bank/IMF data (the two series show a correlation of

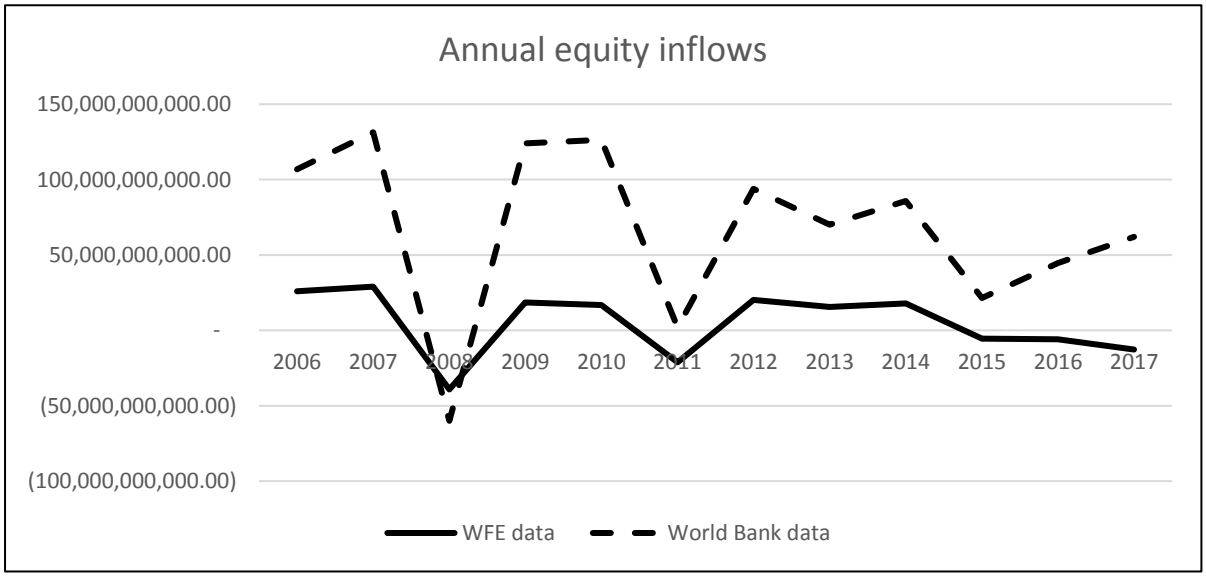
93.35%), confirming that our sample is representative of the population of emerging and frontier economies.

Figure 1: Cumulative monthly inflows, Jan 2006-April 2018



Note: includes only data from exchanges that submitted international trading data for the whole January 2006 – April 2018 period, namely: Amman Stock Exchange, Athens Stock Exchange (ATHEX), BSE India Limited, Colombo Stock Exchange, Dubai Financial Market, Johannesburg Stock Exchange, Kazakhstan Stock Exchange, Moscow Exchange, National Stock Exchange of India, Stock Exchange of Mauritius, Taipei Exchange, The Egyptian Exchange, The Stock Exchange of Thailand. The vertical dashed bars indicate the start and the end of the financial crisis, lasting from September 2008 to April 2009 as indicated in Barrot et al. (2016).

Figure 2: Annual inflows, 2006–2017



Note: includes only data from exchanges that submitted international trading data for the whole January 2006 – April 2018 period, namely: Amman Stock Exchange, Athens Stock Exchange (ATHEX), BSE India Limited, Colombo Stock Exchange, Dubai Financial Market, Johannesburg Stock Exchange, Kazakhstan Stock Exchange, Moscow Exchange, National Stock Exchange of India, Stock Exchange of Mauritius, Taipei Exchange, The Egyptian

Exchange, The Stock Exchange of Thailand. World Bank data: cross border equity inflows towards middle - and low-income countries. Correlation between the two series: 93.35%.

5.2. Main results

5.2.1. Cross-border equity inflows: pushed or pulled?

We firstly analyse whether cross-border equity inflows depend on foreign ("pushed") or local market performances ("pulled"). Results are displayed in Table 2. To draw conclusions on which factors are more relevant in explaining the dependent variable, we compare a model where we control for baseline macroeconomic indicators and market characteristics only (Column (1)) with models where we add push and pull factors respectively (Columns (4) and (5)). We then add both push and pull factors at the same time (Column (6)) to see whether the significance of one set of factors affects the significance of the other when considered together.

In fact, the specification in Column (1) is nested in the specifications of Column (4) and (5) respectively. Therefore, we can test whether the vectors of additional coefficients (that is, either the push or the pull factors added in Columns (4) and (5)) are jointly significantly different from zero using Likelihood Ratio tests. We find that both push and pull factors are significant contributors to the model's variance, as the null hypothesis that the non-restricted model is equal to the restricted one is rejected at the 1% level for both LR tests. Nevertheless, the introduction of pull factors increases the adjusted R-squared of the model significantly more than the introduction of push factors: on average, pull factors account for 7.8% of the models' adjusted R-squared, as opposed to 3.5% for push factors. In addition, we note that both the AIC and the BIC are lower for the model containing pull factors than the one for the model containing push factors. This evidence suggests that pull factors matter relatively more in explaining the dependent variable.

Among push factors, we note that returns on the FTSE100 and on the S&P500 indices have a positive and significant influence on equity inflows. This suggests that domestic and international asset managers who invest in UK and US indices tend to invest more towards emerging economies when UK and US market conditions are more favourable (the so-called "wealth effect"), although the significance of US returns disappears in Column (6). A one-percentage point increase in returns on the FTSE100 index is associated with an inflow increase of 18.41 million USD, roughly 25.8% of the average monthly inflow in the sample. These results are consistent with the wealth-effect explanation put forward by Griffin et al. (2004) and Richards (2005). We note however that neither the correlation between local and foreign returns, nor US/global uncertainty (as proxied by the VIX index) have a significant influence on inflows, despite the signs of the coefficients are overall consistent with our expectations. These results (confirmed in the robustness checks section) suggest that push factors have relatively little importance in explaining equity inflows in our sample.[26]

The fact that push factors have little importance in explaining inflows is in contrast with the literature, which finds that US returns (Griffin et al., 2004; Richards, 2005), US stock market volatility (Aron et al., 2010; Ghosh et al., 2014) and the correlation between domestic and foreign returns (Coeurdacier and Guibaud, 2011) are significant determinants of inflows. We believe this result might be due to the increasing international breadth of indices commonly used to estimate the relevance of push factors, such as the FTSE100 or the S&P500. On one

[26] Note that in the main models, we introduce US, UK and EU returns (and the respective correlations with the domestic market) as proxied by returns on the: Dow Jones, FTSE100 and CAC40 respectively. We swap the CAC40 with the DAX and the Dow Jones with the S&P500 in a robustness check. Similarly, in the main models we introduce returns on the MSCI Indices and swap them with returns on the FTSE EM index in a robustness check.

hand, these indices nowadays are a looser indication of the performance of local economies, as they in fact give exposure to a wider range of countries, including emerging markets themselves.[27] On the other hand, these indices are largely held and traded by local *and* international investors, henceforth returns on these indices do in fact benefit both.[28] We therefore argue that the relevance of push factors as determinants of inflows is somewhat trickier to estimate than in the past, and perhaps not well-captured by the returns or volatility of these indices. Future research should assess more in detail both the levels of international exposure given by large local indices and the international spread of those who invest in them. The concept of "push factors" and the estimation of their relevance should be revised in the light of such an assessment.

On the pull side, we note that "contemporaneous" domestic returns have a statistically significant positive influence (at the 5% level) on monthly inflows.[29] A one-percentage point increase in domestic returns is associated with a 24.4 USD million increase in monthly inflows (domestic returns coefficient in Columns (6)), roughly 35% of the average monthly inflows in the sample. This suggests that domestic returns account for an important part of monthly inflows, consistently with the return-chasing hypothesis and the empirical evidence on the

[27] This concept emerged quite clearly from conversations with buy-side investors. See also www.sharesmagazine.co.uk/article/a-safer-way-to-get-international-exposure, www.schroders.com/en/uk/private-investor/insights/markets/how-the-ftse-100-has-changed-over-33-years/

[28] See www.ons.gov.uk/economy/investmentspensionsandtrusts/bulletins/ownershipofukquotedshares/2016.

[29] The concept of "contemporaneous returns" cannot fully apply when using monthly data, as discussed in Griffin et al. (2004), and we acknowledge the well-known limitations of using low-frequency data. Yet, we decided to use contemporaneous returns in our regressions as the literature shows that the influence of returns on inflows decays quite quickly (Griffin et al., 2004).

topic (Bohn and Tesar, 1996; Edison and Warnock, 2008; Griffin et al., 2004; Richards, 2005). According to our results, domestic volatility also has a statistically significant negative influence on monthly inflows, but only at the 10% level. A one-percent increase in domestic volatility is associated with a decrease in inflows equal to 9.5 million USD. This result suggests that foreign capitals tend to be repatriated in periods of higher market turmoil, a phenomenon colloquially referred to as “flights to safety” or “flights to quality” in the industry environment.

We also find that returns on the MSCI EM Index are a significant predictor of monthly inflows (at the 10% only, but throughout all specifications), even when controlling for domestic returns (Richards, 2005). Note, as expected, that the coefficients of MSCI EM and FM returns are sensibly lower when domestic returns are controlled for (compare Columns (5) and (6)). Possibly, this result is driven by the rise of passive investment strategies which would not differentiate between specific emerging markets but would consider them as part of the index portfolio (EBRD and IPREO, 2018). The coefficient of MSCI EM returns is sizable: a one-percentage point increase in returns on the MSCI Index is associated with an inflow increase of 16.47 million USD, roughly 23.3% of the average monthly inflow in the sample.

On control variables, we note that macroeconomic factors overall show the correct signs, but no statistical significance: debt over GDP and real interest rate show a negative correlation with inflows (see Aron et al., (2010)), as well as exports over GDP. This latter result is consistent with the fact that positive capital inflows imply a negative trade balance from an accounting perspective. In addition, GDP growth and larger domestic savings over GDP are (as expected) associated with higher inflows. The lack of statistical significance can perhaps be attributed to the nature of our data: most of these indicators are indeed observed at a

quarterly (GDP) or annual frequency (savings, exports, debt), and therefore show low within-group variation. This notoriously inflates the standard errors of the within-group estimator (Allison, 2010), in turn potentially leading to a lack of statistical significance.

Finally, we note that most market characteristics also show the correct sign, but only the coefficient of domestic listed companies is statistically different from zero.[30] A larger pool of domestic companies is associated with larger inflows, suggesting that international investors value local diversification opportunities.[31] Ten additional companies listed on the market are associated with larger monthly inflows by 5.6 million USD.

5.2.2. Cross-border equity inflows: additional levers

We explore the relevance of additional country-specific levers in influencing cross-border flows. We use the specification of Table 2, Column (6) as our baseline model, and add different sets of levers discreetly, following an approach similar to Chan et al. (2005). Results are displayed in Table 3.

The specification of Table 2, Column (6) is nested in the specifications displayed in Columns (1) to (5) in Table 3. We therefore perform LR tests to assess whether the introduction of the levers adds explanatory power to the dependent variable. We find that this is the case throughout all specifications: the null hypothesis that the unrestricted model is equal to the restricted model is rejected at the 1% level for the addiction of: explicit barriers to investment,

[30] Regressing foreign buys and sales on a set of market characteristics shows that market characteristics have an overall similar influence on buys and sells, suggesting that more sizable, liquid markets stimulate trading activity overall. The fact that these indicators have a similar influence on both buys and sells can explain the lack of statistical significance in the inflows model. Results are available upon request.

[31] Conversations with buy-side investors strongly support this finding.

corporate governance and market infrastructure features, and at the 5% for the remaining additions. The information criteria are minimised for the model containing explicit barriers to investment, followed by the one controlling for corporate governance standards, suggesting these two sets of factors are the most important in explaining cross-border flows. It is worth noting however that the adjusted R-squared and the information criteria are very similar across specifications, suggesting that each of the additions matters more or less equally in explaining cross-border flows.

We find that explicit barriers to investment and local market frictions hamper foreign inflows (Column (1)). A country introducing capital inflows restrictions sees a reduction in inflows equal to 302 million USD over the sample period. This is result is consistent with the literature (Chan et al., 2005). Similarly, the presence of capital gain taxes has a negative correlation with inflows, although significant only at the 10% level: a country introducing capital gain taxes sees a reduction in monthly inflows equal to 317 million USD over the sample period. The presence of stump duties also matters: a country introducing stamp duties on financial securities sees a reduction in monthly inflows equal to 158 million USD over the January 2006-April 2018 period. The correlation is significant at the 1% level.[32]

Reducing information costs is found to have a sizable long-run influence on inflows, although the statistical significance of the related coefficients is mild (Column (2)). Adhering to IFRS standards is associated with a statistically significant increase in inflows (at the 10% level) by 183 million USD. After inclusion in the MSCI Emerging Market Index, a market can attract

[32] We introduced all identified explicit barriers in the econometric model, but a few of them were discarded because of collinearity, namely: capital repatriation restrictions, sectorial restrictions and presence of different share class for international investors.

roughly 350 million USD inflows in the long run (the coefficient is statistically significant at the 10% level). Recommending disclosure in English is also found to brings slightly less than 150 million USD in the long-run (the relation is significant at the 10% level).

We find that institutional quality, rule of low and political stability do not influence monthly inflows, although all variables have the expected sign (Column (3)). This lack of significance might be attributed, similarly to macroeconomic factors, to the low within-group volatility of these annual indicators (Allison, 2010).

According to our empirical results (see Column (4)) better corporate governance practices attract foreign inflows, consistently with the literature (Dahlquist et al., 2003; Leuz et al., 2009) . While inflows are not perfectly monotonic in the number of requirements in place, markets introducing a high number of concomitant requirements (five or six) manage to attract the highest inflows in the long run. Introducing one single requirement is associated with a long-run increase in inflows by almost 519 million USD (significant at the 5% level). Introducing five requirements is associated with a long-run equity inflow of almost 600 billion USD (significant at the 5% level). A market introducing the full set of considered requirements is found to attract foreign inflows as high as 756 million in the long-run (significant at the 1% level). [33]

With respect to market structure and post-trade infrastructure features, we find that only the introduction of SLB has a positive and statistically significant relation at the 10% level (Column

[33] These results are pretty much consistent with interviews with buy-side investors, who largely declared that they value the most the ability to move capitals in and out of the country, rule of law and certainty of enforcement, and corporate governance standards. Removing information cost barriers is overall seen as something that is “nice to have” but not crucial for their investment decision.

(5)). We conclude that market structure features are not preponderant determinants of cross-border equity flows.

5.3. Endogeneity

It must be kept in mind that, in addition to the cited literature on the determinants of the home/foreign bias and international capital flows, there is an equally important literature on the consequences of foreign participation and trading on the domestic market that often focuses on the same indicators. For example, while international investors are attracted by better corporate governance practices (Leuz et al., 2009), they are also found to enhance corporate governance standards in the domestic market (Aggarwal et al., 2011). As documented, foreign investors prefer higher domestic returns, as well as more liquid and less volatile stocks; in turn, however, foreign participation has an influence on stock trading and stock market liquidity, volatility, prices (Errunza, 2001; Han Kim and Singal, 2000; Li et al., 2011; Rhee and Wang, 2009; Wang, 2007). We believe that most estimations proposed in the literature, and ours makes no exception, should acknowledge that regression and estimation results would be biased because of simultaneity, i.e. foreign investors are attracted by certain characteristics that are in turn influenced by international participation and trading. Tackling endogeneity problems with appropriate techniques (for example, policy evaluation analyses) is a task for future research.

5.4. Robustness checks

We perform a number of robustness checks, to assess the resilience of our results to changes in the specification and/or the sample.[34]

[34] Results available upon request.

To start with, we perform our analyses excluding three markets in which international investors face more limited exchange rate risk: ATHEX (as Greece is in the Eurozone), Dubai Financial Market (as the UAE Dirham is pegged to the USD) and Amman Stock Exchange (as the Jordanian Dinar is also pegged to the USD). One can express concern that inflows towards these three markets could drive the overall results. When considering push and pull factors, the results are comparable to the main ones, with the exception that domestic volatility has a slightly weaker statistical influence, while returns on the MSCI frontier market index acquire statistical significance: a one percentage point increase in the index is associated with a 16 million USD increase in inflows (significant at the 5% level). When considering levers and interventions, the results are overall comparable to the main ones.

We are conscious that our measure of portfolio inflows contains large purchases, often considered FDIs (Aron et al., 2010). As a robustness check, we exclude large trades from our sample. Unfortunately, we don't observe trade sizes. To exclude large trades, we therefore calculate the average trade size, relative to the local market capitalisation. Formally:

$$Average\ relative\ trade\ size_{itk} = \frac{Value\ of\ trade_{itk}}{Number\ of\ trades_{itk} * Market\ Capitalisation_{it}} \quad (3)$$

Where k = buy, sell. We then exclude observations for which the average trade size (for both buys and sells) is larger than the 95th and the 90th percentile of the sample distribution. The estimations convey similar results, suggesting that the main results are not driven by the presence of large trades.

We exclude the financial crisis from our estimations, as a factor potentially driving the results. In a simple check, we just exclude all observations prior to 2010 to estimate all models in the post-crisis period, obtaining comparable results. We however note that the coefficient of

MSCI EM and FM returns are considerably more sizable (a one-percentage point increase in returns on the MSCI EM index is associated with an inflow increase of 27.24 million USD) and show greater statistical significance than in Tables 2 and 3. This suggests that, after the crisis, the importance of index-tracking investment strategies might have increased. In a separate check we exclude the crisis period indicated in Barrot et al. (2016) (September 2008 to April 2009) and find comparable results to the main ones.

We estimate all models by substituting the returns on the MSCI EM and FM markets indices with the returns on the FTSE emerging markets index. Returns on the FTSE EM index are positive and significant at the 5% level. This result confirms that investors' sentiment based on widely recognised tracking index is an important determinant of cross-border inflows. We then estimate all models by substituting returns on the Dow Jones with returns on the S&P500 and returns on the CAC40 with returns on the DAX index, finding comparable results.

We estimate all models by substituting the VIX index with volatility scores for the FTSE100, the Dow Jones and the CAC40 indices. We find comparable results. In addition, we find that volatility on the FTSE100 index has a negative and significant relation with inflows, reinforcing the idea that better market conditions in London stimulate inflows towards emerging markets.

One might argue that push factors would be better captured by macroeconomic variables, such as yield or interest rate differentials between the US and the domestic market (Ahmed, 2017; Yang, 2016). We introduce the US policy interest rate in the regression and find that it doesn't have a negative correlation with inflows. We substitute this variable with the interest rate differential between the US and the domestic market (and remove domestic real interest

rate from the regression models) and find no significant relation. This result is in line with (Ahmed, 2017, Table 3) but in contrast with (Yang, 2016).

Finally, we run our models using inflows weighted by the lag of market capitalisation as a dependent variable, as found in Griffin et al. (2004) and Edison and Warnock (2008). On the pull side, we find that domestic returns have a strong relation with inflows (with the correct sign). On the push side, we find a significant negative correlation of the VIX index. On the levers side, we find comparable results, although the influence of corporate governance requirements is somewhat weaker. This is expected, though, as better governance standards benefit domestic investors as well, and are likely to be positively related to market capitalisation, the denominator of the dependent variable.

6. Conclusions

In this paper, we empirically assess the determinants of cross-border equity flows towards emerging and frontier markets. In accordance with the literature, we firstly study the relevance of push and pull factors in explaining inflows. We find that cross-border flows are mostly "pulled" by better domestic market performance (higher domestic market returns and lower domestic volatility). We find however that push factors matter relatively less in explaining international equity flows.

We then assess whether several levers and interventions are good predictors of cross-border flows. Perhaps not surprisingly, we find that explicit barriers to investment keep investors out of the market, while stricter corporate governance requirements are positively related to foreign equity investment. Reducing information barriers is associated with sizable inflows but matters relatively in terms of statistical significance. We find weak or no support that market structure and post-trade infrastructure features are associated with larger inflows.

We provide a few hints for future research. Firstly, we believe that the lack of significance on the push factors' side deserves proper attention. Nowadays, important advanced market indices, such as the FTSE100, are characterised by an international breadth that partly unties them from their local economies. Therefore, considering returns on these indices "push factors" could be misleading. As a matter of fact, these indices give a weaker indication than in the past of both local market performance (because of their international exposure) and the returns enjoyed by local investors (because of the international participation in these indices). This can explain why according to our estimations push factor matter relatively less than pull ones in explaining inflows. Future research should assess more in detail the levels of international exposure given by large international indices, as well the international spread of their investors. The concept of "push factors" and the estimation of their relevance in the context of cross-border equity flows should be revised in the light of such assessments.

On a more technical side, we acknowledge that our estimations are affected by simultaneity bias: for example, as much as foreign investors are attracted by less volatile markets, they also are found to contribute to price stabilisation. Future research should estimate models that allow to perform casual inference, to assess the casual effect of these levers and interventions on inflows. Empirical models can for example apply instrumental variable estimations or use policy evaluation techniques such as difference-in-differences regressions. Finally, we believe that future research should study more in detail the determinants of foreign trading activity, a phenomenon that, albeit related, we have found to be driven by different factors from cross-border inflows.

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Table 1: Descriptive Statistics

	(1) Mean	(2) Std. dev	(3) Median	(4) Min	(5) Max
Inflows (million USD)					
Monthly	70.10	836.91	6.27	-6507.64	12990.09
Quarterly	205.96	1636.67	22.45	-11306.73	13640.99
Semi-annual	400.86	2598.17	70.95	-12443.43	15568.90
Annual	800.82	4226.63	177.74	-19110.53	23784.42
Debt/GDP (%)	57.79	32.84	52.69	6.70	199.06
Savings/GDP (%)	22.40	8.59	22.10	4.11	40.40
Exports/GDP (%)	39.55	24.12	29.85	7.09	97.19
GDP growth (%)	0.00	0.06	0.00	-0.54	0.35
Real interest rate	0.07	0.74	0.11	-5.45	4.06
Market capitalization (billion USD)	380.82	471.96	130.46	2.63	2404.84
# foreign listed companies	8.57	17.47	1.00	0.00	87.00
# domestic listed companies	564.82	982.17	275.00	29.00	5985.00
# ETFs	9.22	15.06	2.00	0.00	99.00
# DRs	4.50	18.29	0.00	0.00	147.00
Monthly domestic returns (%)	0.44	6.53	0.73	-40.38	35.16
Monthly domestic volatility (%)	1.14	1.13	0.92	0.15	40.56
Foreign returns (%)					
CAC40	0.20	4.63	0.35	-14.52	11.83
DAX	0.63	5.18	1.13	-21.31	15.50
FTSE100	0.23	3.67	0.77	-13.95	8.11
Dow Jones	0.70	3.73	0.80	-15.15	9.12
S&P500	0.68	3.87	1.10	-18.56	10.23
Foreign volatility (%)					
CAC40	1.26	0.63	1.14	0.41	5.17
DAX	1.22	0.60	1.12	0.40	4.91
FTSE	0.99	0.54	0.86	0.27	4.85
Dow Jones	0.89	0.57	0.72	0.20	4.81
S&P500	0.95	0.63	0.77	0.26	5.04
Correl. domestic/foreign returns (%):					
CAC40	0.36	0.34	0.43	-0.70	0.96
DAX	0.37	0.35	0.44	-0.78	0.95
FTSE100	0.39	0.33	0.44	-0.74	0.94
Dow Jones	0.36	0.33	0.41	-0.81	0.96
S&P500	0.40	0.33	0.47	-0.72	0.96
EM Returns - MSCI Index (%)	0.34	6.50	0.49	-32.16	15.41
FM Returns - MSCI Index (%)	-0.20	5.27	0.42	-28.67	16.61
EM returns - FTSE Index (%)	0.34	6.49	0.70	-32.90	16.16
Ownership restrictions - foreign investors	0.34	0.47	0.00	0.00	1.00
Capital inflow restrictions	0.18	0.39	0.00	0.00	1.00
Capital gain tax present	0.36	0.48	0.00	0.00	1.00
Dividend tax present	0.48	0.50	0.00	0.00	1.00
Stamp duty present	0.47	0.50	0.00	0.00	1.00
Corporate governance index (1-6)	3.31	1.59	3.00	0.00	6.00
Disclosure in English compulsory	0.21	0.41	0.00	0.00	1.00
Disclosure in English	0.05	0.22	0.00	0.00	1.00

recommended					
Inclusion MSCI EM Index	0.66	0.47	1.00	0.00	1.00
Inclusion MSCI FM Index	0.31	0.46	0.00	0.00	1.00
Adherence to IFRS standards	0.64	0.48	1.00	0.00	1.00
Co-location present	0.30	0.46	0.00	0.00	1.00
Short-selling present	0.57	0.49	1.00	0.00	1.00
SLB present	0.62	0.48	1.00	0.00	1.00
Market making present	0.33	0.47	0.00	0.00	1.00
DMA present	0.55	0.50	1.00	0.00	1.00
CCP	0.41	0.49	0.00	0.00	1.00
Observations	2248				

Table 2: Are cross border equity flows pushed or pulled?
Fixed-effect estimator (within-groups linear regression)

	(1)	(2)	(3)	(4)	(5)	(6)
Domestic returns	-	2429.109***	-	2427.407***	-	2437.225***
		(809.609)		(817.776)		(813.592)
Domestic volatility	-	-751.695*	-	-952.517*	-	-949.867*
		(410.654)		(482.206)		(498.209)
EM Returns (MSCI Index)	-	1956.465*	-	1993.835*	-	1687.473*
		(1032.498)		(1128.232)		(934.568)
FM Returns (MSCI Index)	-	423.954	-	310.040	-	324.376
		(458.161)		(584.351)		(566.003)
Foreign returns						
CAC40	-	-	374.412	-	-653.227	-582.468
			(825.796)		(760.304)	(801.890)
FTSE100	-	-	3180.123**	-	3885.827**	1811.835**
			(1191.837)		(1658.991)	(845.140)
Dow Jones	-	-	1269.805**	-	1384.443*	-641.200
			(584.603)		-653.227	(898.797)
Correlation domestic/foreign returns						
CAC40	-	-	101.977	-	-74.338	-76.655
			(65.297)		(71.249)	(71.570)
FTSE100	-	-	-104.888	-	-112.057	-121.874
			(152.309)		(124.817)	(117.689)
Dow Jones	-	-	-23.602	-	2.175	14.863
			(98.249)		(75.824)	(71.785)

VIX	-	-	-1.625 (2.186)	-	-2.966 (3.733)	-0.997 (4.045)
Constant	-408.646 (389.268)	93.099*** (20.170)	112.822*** (34.543)	-305.125 (356.564)	-141.194 (373.074)	-211.488 (361.168)
Macroeconomic Indicators	Yes	No	No	Yes	Yes	Yes
Market characteristics	Yes	No	No	Yes	Yes	Yes
Seasonality	Yes	No	No	Yes	Yes	Yes
Year Effects	Yes	No	No	Yes	Yes	Yes
R-square (within)	0.057	0.101	0.049	0.135	0.095	0.139
R-square (between)	0.002	0.024	0.015	0.023	0.022	0.035
Adjusted R-square	0.041	0.099	0.046	0.119	0.076	0.120
Number of markets	20.000	20.000	20.000	20.000	20.000	20.000
Average T	112.400	112.450	112.550	112.400	112.400	112.400
Observations	2248.000	2249.000	2251.000	2248.000	2248.000	2248.000

Heteroscedasticity-robust clustered standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Macroeconomic factors include: nominal GDP growth, debt/GDP, exports/GDP, domestic savings/GDP, real interest rate, standard deviation of exchange rates against local currency (USD, EUR, GBP). Market characteristics include: number of foreign listed companies, number of domestic listed companies, number of ETFs, number of depository receipts, market capitalization (second-order polynomial).

Table 3: Levers and interventions
Fixed-effect estimator (within-groups linear regression)

	(1) Explicit barriers to investment	(2) Institutional quality	(3) Corporate governance	(4) Information costs	(5) Market infrastructure features
Ownership restrictions - foreign investors	-41.143	-	-	-	-
	(69.610)				
Capital inflow restrictions	-302.605***	-	-	-	-
	(91.172)				
Capital gain tax present	-317.179*	-	-	-	-
	(155.281)				
Dividend tax present	25.187	-	-	-	-
	(107.385)				
Stamp duty present	-158.373***	-	-	-	-
	(54.435)				
Disclosure in English:					
Compulsory	-	90.740	-	-	-
		(79.827)			
Recommended	-	148.511*	-	-	-
		(80.538)			
Inclusion MSCI Index:					
Emerging	-	349.340*	-	-	-
		(195.400)			
Frontier	-	261.927	-	-	-
		(186.511)			
Adherence to IFRS standards	-	183.622*	-	-	-
		(91.321)			
Sound local market regulation	-	-	19.838	-	-
			(64.469)		
Political stability	-	-	1.443	-	-
			(2.685)		
Corruption	-	-	-10.139	-	-
			(11.590)		
Strength Investors' protection	-	-	-	23.255	-
				(74.832)	
Strength audit reports	-	-	-	-119.143	-

				(93.481)	
Efficacy of corporate boards	-	-	-	60.510	-
				(118.867)	
Corporate governance requirements in place:					
One	-	-	-	518.920**	-
				(208.113)	
Two	-	-	-	531.135***	-
				(160.821)	
Three	-	-	-	492.998**	-
				(199.264)	
Four	-	-	-	417.349	-
				(248.876)	
Five	-	-	-	599.693**	-
				(226.392)	
Six	-	-	-	756.187***	-
				(255.379)	
Co-location present	-	-	-	-	-60.440
					(195.221)
Short-selling present	-	-	-	-	171.282
					(129.461)
SLB present	-	-	-	-	182.499*
					(103.873)
Market making present	-	-	-	-	-57.959
					(70.052)
DMA present	-	-	-	-	234.725
					(198.987)
CCP present	-	-	-	-	89.411
					(140.978)
Constant	-97.701	72.054	-1021.224	-692.944*	-603.895*
	(383.356)	(492.761)	(898.322)	(362.485)	(319.267)
Seasonality	Yes	Yes	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes	Yes	Yes
Macroeconomic Indicators	Yes	Yes	Yes	Yes	Yes
Market characteristics	Yes	Yes	Yes	Yes	Yes
Pull factors	Yes	Yes	Yes	Yes	Yes
Push factors	Yes	Yes	Yes	Yes	Yes
R-square (within)	0.145	0.143	0.142	0.148	0.146

R-square (between)	0.107	0.008	0.061	0.008	0.002
Adjusted R-square	0.124	0.122	0.121	0.12	0.124
Number of markets	20.000	20.000	20.000	20.000	20.000
Average T	112.400	112.400	107.450	112.400	112.400
Observations	2248.000	2248.000	2149.000	2248.000	2248.000

Heteroscedasticity-robust clustered standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Macroeconomic factors include: nominal GDP growth, debt/GDP, exports/GDP, domestic savings/GDP, real interest rate, standard deviation of exchange rates against local currency (USD, EUR, GBP). Market characteristics include: number of foreign listed companies, number of domestic listed companies, number of ETFs, number of depository receipts, market capitalization (second-order polynomial). Pull factors include: domestic returns, domestic volatility. Push factors include: foreign returns (FTSE100, CAC40, Dow Jones), foreign volatility (VIX Index), correlation between domestic and foreign returns (FTSE100, CAC40, Dow Jones).

Supplementary materials

A. List of external indicators

Indicators obtained from WFE monthly reports:

- Market capitalisation (monthly, current USD millions)
- Value of share trading (monthly, current USD millions)
- Number of trades in shares (monthly, thousands)
- Turnover velocity (monthly, percentage)
- Number of domestic listed companies (monthly, full number)
- Number of foreign listed companies (monthly, full number)
- Number of listed ETFs (monthly, full number)

Indicators obtained from external sources:

- MSCI Index, FTSE EM Index (daily, full number): Thomson Reuters
- Broad market index (daily, full number): Thomson Reuters
- Blue-chip Index (daily, full number): Thomson Reuters
- Exchange rates, local currency against USD, EUR, GBP (daily, full number): Thomson Reuters
- CPI (monthly): Thomson Reuters Datastream TRICE
- Policy interest rate (monthly): Thomson Reuters Datastream TRICE, IMF
- Political stability (annual, 0-100 scale): World Bank Governance Indicators
- Control of corruption (annual, 0-100 scale): World Bank Governance Indicators
- Regulatory quality (annual, 0-100 scale): World Bank Governance Indicators
- Ease of financing through local equity market(s) (annual, 1-7 scale): World Economic Forum Global Competitiveness Report
- Sound of local equity market regulation (annual, 1-7 scale): World Economic Forum Global Competitiveness Report
- Debt over GDP (annual, percentage): World Economic Forum Global Competitiveness Report
- Domestic savings over GDP (annual, percentage): World Economic Forum Global Competitiveness Report
- Exports over GDP (annual, percentage): World Economic Forum Global Competitiveness Report

- GDP (annual, billion current PPP USD): World Economic Forum Global Competitiveness Report
- Strength of investors' protection (annual, 1-7 scale): World Economic Forum Global Competitiveness Report
- Strength of audit and disclosure reports (annual, 1-7 scale): World Economic Forum Global Competitiveness Report
- Protection of minority shareholders (annual, 1-7 scale): World Economic Forum Global Competitiveness Report
- Inclusion of a country in the MSCI EM and FM Indices (dummy): MSCI

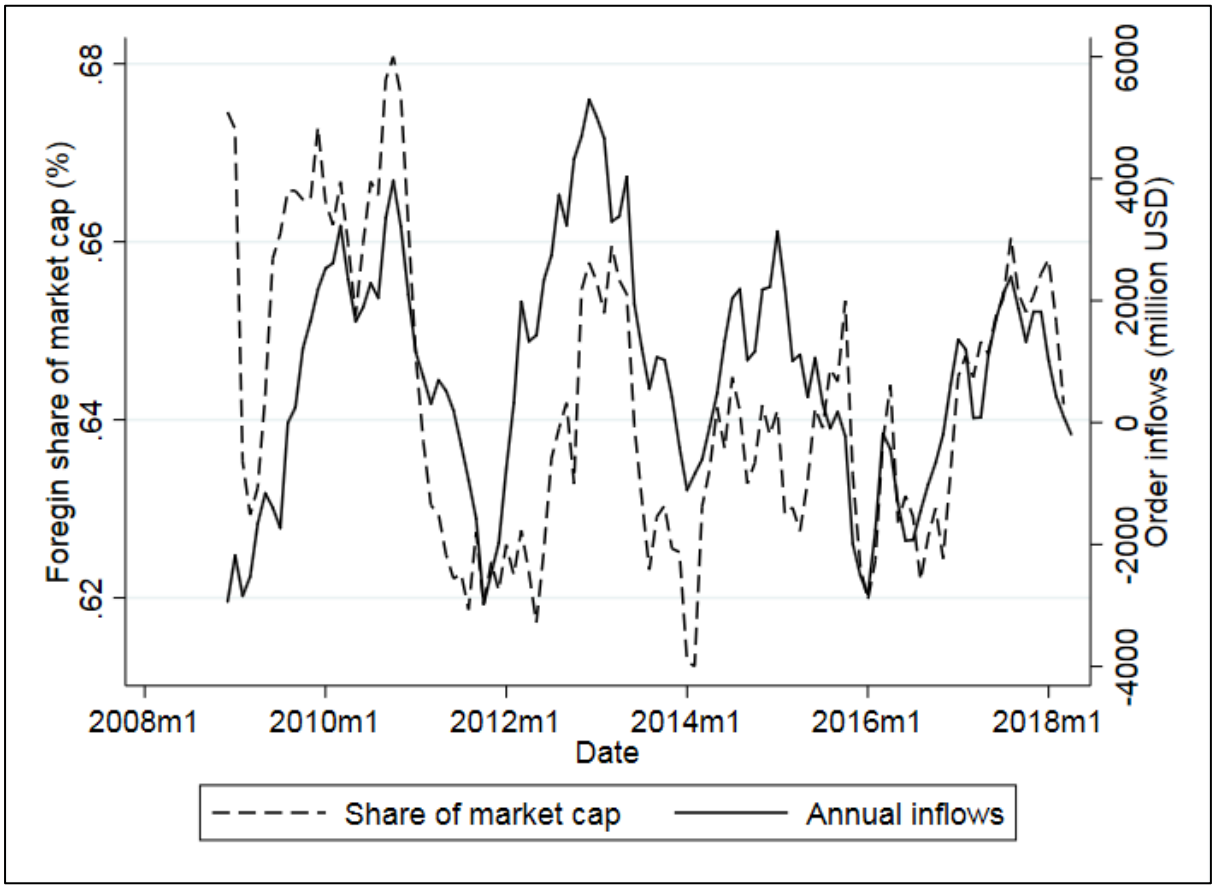
B. Sanity checks for constructed variables

Table B1: correlation between share of market capitalisation and equity inflows (boldfaced)

	(1) Foreign share of market cap	Monthly inflow	Quarterly inflow	Semi-annual inflow	Annual inflow
Foreign share of market cap	1	-	-	-	-
Monthly inflow	**0.176**	1	-	-	-
Quarterly inflow	**0.332*****	0.563***	1	-	-
Semi-annual inflow	**0.411*****	0.355***	0.665***	1	-
Annual inflow	**0.462*****	0.243**	0.482***	0.720***	1

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure B1: Share of market capitalisation and annual equity inflows for a selected exchange



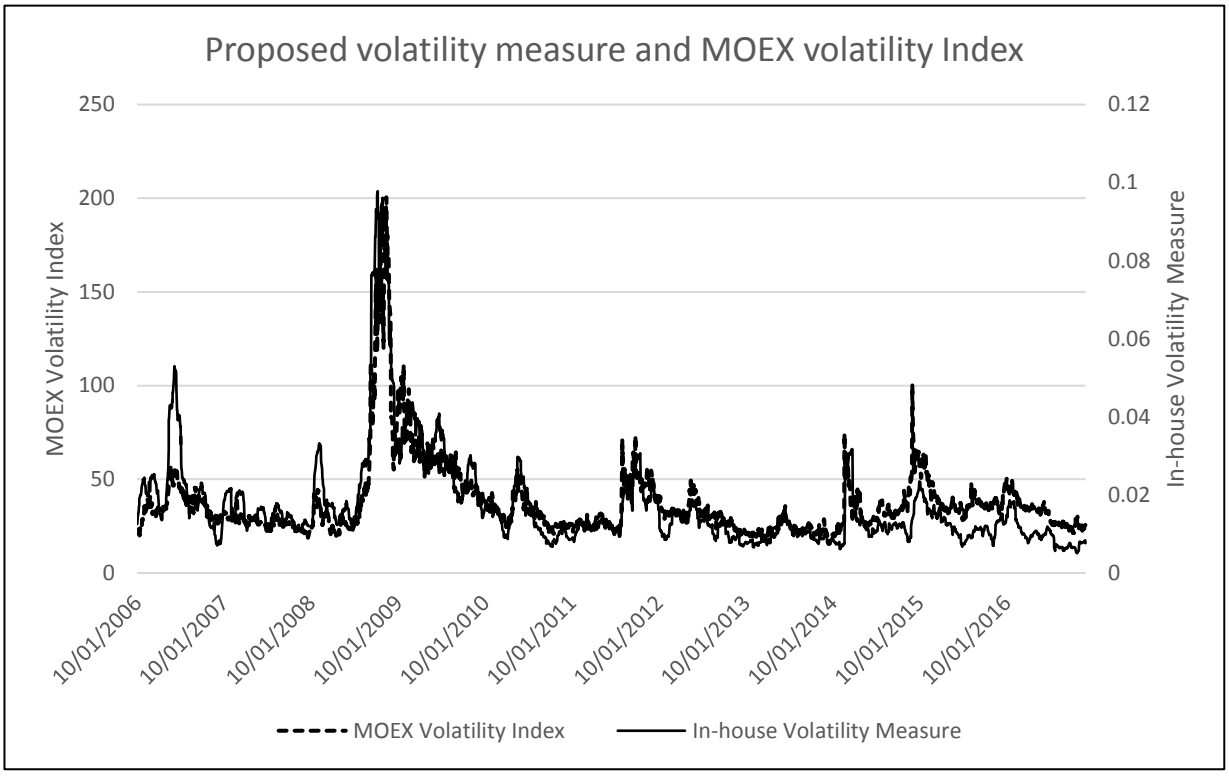
Note. Correlation between the two measures: 46.2%

Table B2: correlation between returns correlation and market instability (boldfaced)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Correlation domestic/foreign returns:	*CAC40*	*FTSE100*	*DAX*	*Dow Jones*	*S&P 500*	VIX	Domestic volatility
Correlation domestic/foreign returns:							
CAC40	1						
FTSE100	0.820***	1					
DAX	0.916***	0.792***	1				
Dow Jones	0.748***	0.724***	0.745***	1			
S&P500	0.785***	0.754***	0.791***	0.968***	1		
VIX	**0.310*** **	**0.300*** **	**0.268*** **	**0.286*** **	**0.287*** **	1	
Domestic volatility	**0.211*** **	**0.206*** **	**0.184*** **	**0.162*** **	**0.176*** **	0.320***	1

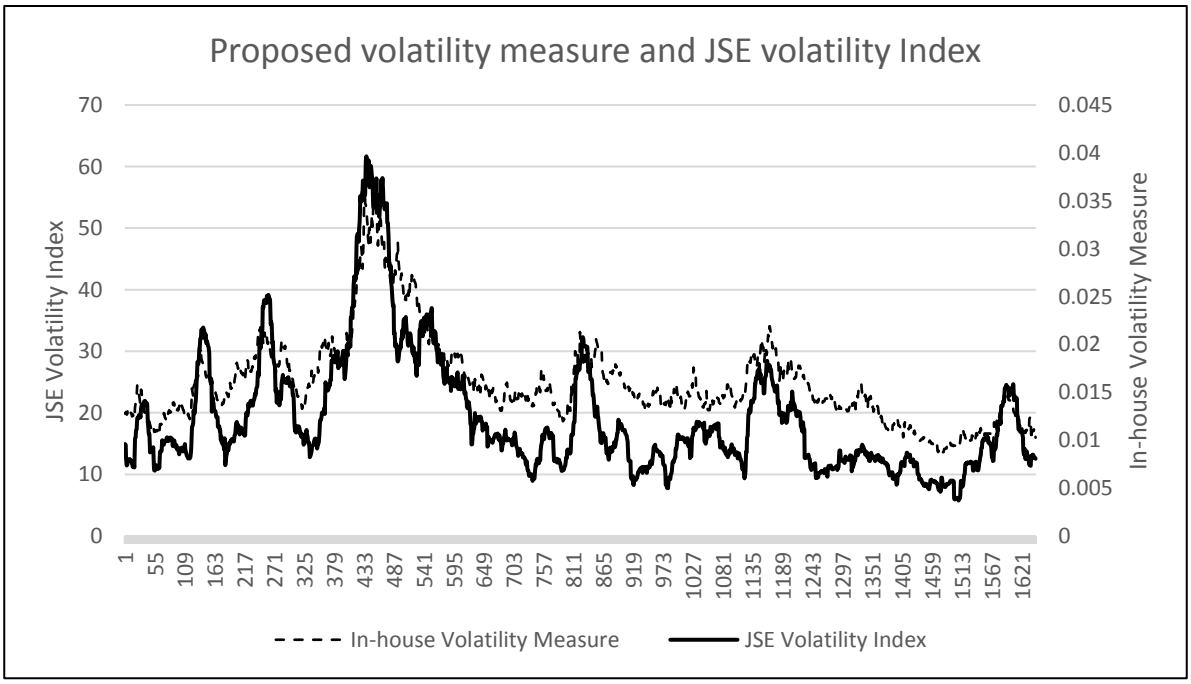
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure B2: time series plot of the in-house volatility measure and the MOEX Volatility Index



Note. Correlation between the two measures: 86.82%

Figure B3: time series plot of the in-house volatility measure and the JSE Volatility Index



Note. Correlation between the two measures: 89.15%

C. Sanity checks for the application of the within-group estimator

Bias in pooled OLS estimator and Hausman test: To support the choice of the fixed-effect estimator, we compare and contrast pooled OLS and within-group estimation results using the specification of Table 2, Column (6). We find that the within-group regression model coefficients substantially differ from the pooled OLS ones, suggesting that estimating the model without controlling for fixed effects would lead to bias in the estimates. We don't observe any abnormal behaviour in terms of standard errors, hinting that the regressors have overall satisfactory levels of intra-group volatility (Allison, 2009). We also compare and contrast the random and the fixed effect results using a Hausman test (Hausman, 1978). Under the Hausman test's null hypothesis, unobservable heterogeneity is uncorrelated with the regressors, a situation in which the random effect model would be preferred over the fixed effect one on the ground of efficiency. We reject the null hypothesis at the 1% level, concluding that the random effect model is not an appropriate technique.[35]

Strict exogeneity: As mentioned in Section 4.2, we test for the presence of strict exogeneity using the procedure found in Wooldridge (2012). We follow Felbermayr and Jung (2009) and use a standard F-test to check the joint significance of all leads. One might argue that the test results are dependent on the choice of the leaded regressors in the subsample. We show that this is not the case for our estimations by running several tests, using different subsamples of leaded regressors. Table C1 contains the test results.

[35] Results available upon request.

Table C1: Wooldridge's tests of strict exogeneity

P-values of F-tests on the coefficients of the leaded regressors

Dependent variable	(1) Monthly inflow
Subsample 1 (3 random regressors)	0.48
Subsample 2 (7 random regressors)	0.46
Subsample 3 (5 random regressors)	0.92
Subsample 4 (6 random regressors)	0.18

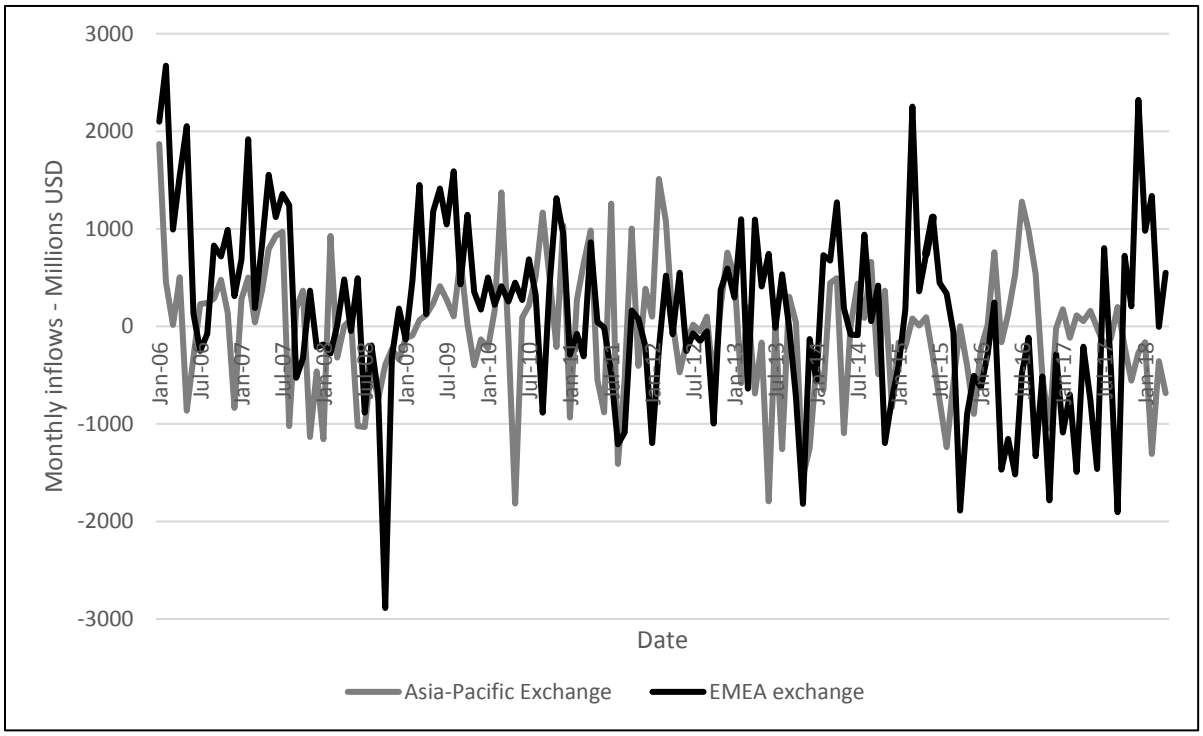
The baseline specification for the tests is that of Table 1, Column (6).

We also note that the coefficients of the lead regressors are not *individually* significant in all specifications. We conclude that strict exogeneity is not an issue in our estimations.

Stationarity: As mentioned in 4.2, concerns might arise that the dependent variable is characterised by a unit root. If so, regression results might be the result spurious correlations. Therefore, we take care of checking that the dependent variable does not follow a unit root process.

Preliminary analyses of individual time series allow to (visually) conjecture that this would not be a source of concern in our database. Patterns suggesting stationarity like the one shown in Figure C1 below are common across almost all stock exchanges in the sample.

Figure C1: Time series plot of monthly inflows for two exchanges in our sample



Estimation of AR(p) models on the individual time series hints that the processes are largely stationary, and that autocorrelation should not go, on average, far beyond the 3rd order. Consistently, we perform GLS augmented Dickey-Fuller tests (Elliott et al., 1996) for each market, setting five as a maximum number of lags, and in a vast majority of exchanges we are able to reject the presence of a unit root for both variables.

We finally implement a Fisher test to detect the presence of a unit root in panel data (Maddala and Wu, 1999). We choose this test because it can be used in presence of unbalanced panels, and because research has demonstrated it is more powerful than other well-established procedures, such as the IPS test (Baltagi and Kao, 2000; Im et al., 2003). We use the demeaning procedure introduced by Levin et al. (Levin et al., 2002) to control for possible correlation across cross-sectional units. We set the number of lags to three consistently with the results described above, but the result below are robust to changes in the number of lags. We are able to reject the null hypothesis that all panels have a unit root for the dependent variable. The null is rejected at the 1% level.

D. Representativeness of the sample

Table D1: Z-tests

Indicator	Sample mean	Sample size	Population Mean	Population SD	Z-value	Cumulative prob.	p-value	Date
Market cap	520,000.00	20	416,068.58	915,509.41	0.508	69.42%	30.58%	Dec-17
Value traded	19,800.00	20	21,806.97	94,673.95	-0.095	46.22%	53.78%	Dec-17
# of trades	16,933.42	20	16,296.29	50,589.62	0.056	52.25%	47.75%	Dec-17
Listed comp.	711.11	20	421.75	833.50	1.553	93.97%	6.03%	Dec-17
Market cap	389,000.00	18	393,723.24	511,868.74	-0.039	48.44%	51.56%	Jun-12
Value traded	15,700.00	18	14,494.45	37,777.86	0.135	55.38%	44.62%	Jun-12
# of trades	10,061.36	18	11,160.09	26,121.24	-0.178	42.92%	57.08%	Jun-12
Listed comp.	722.71	17	537.27	886.75	0.862	80.57%	19.43%	Jun-12
Market cap	247,000.00	15	203,295.41	228,646.53	0.740	77.04%	22.96%	Jan-06
Value traded	15,200.00	14	9,949.60	28,396.82	0.692	75.55%	24.45%	Jan-06
# of trades	6,263.59	13	4,482.93	11,315.11	0.567	71.48%	28.52%	Jan-06
Listed comp.	799.85	13	559.07	888.123	0.977	83.58%	16.42%	Jan-06

Market capitalisation, value traded: expressed in million USD. Number of trades: expressed in thousands. Listed companies: expressed in units. Source of the raw data: WFE Monthly reports.

E. Long-term vs short-term inflows

As mentioned in Section 5.2, the coefficients reported in Tables 2 and 3 represent the long-run influence of the regressors on cross-border equity inflows. Especially with respect to the levers and interventions coefficients, it would be interesting to understand for how long these policies are effective. To make a rough assessment, one can firstly compare the coefficients in Table 2 and 3 with the Summary Statistics reported in Table 1: inclusion in the MSCI Emerging Markets Index is estimated to attract foreign inflows for roughly 250 million USD, more than the average quarterly inflows, but less than the average semi-annual inflows. Therefore, one might expect this policy to be effective for a period of four to five months.

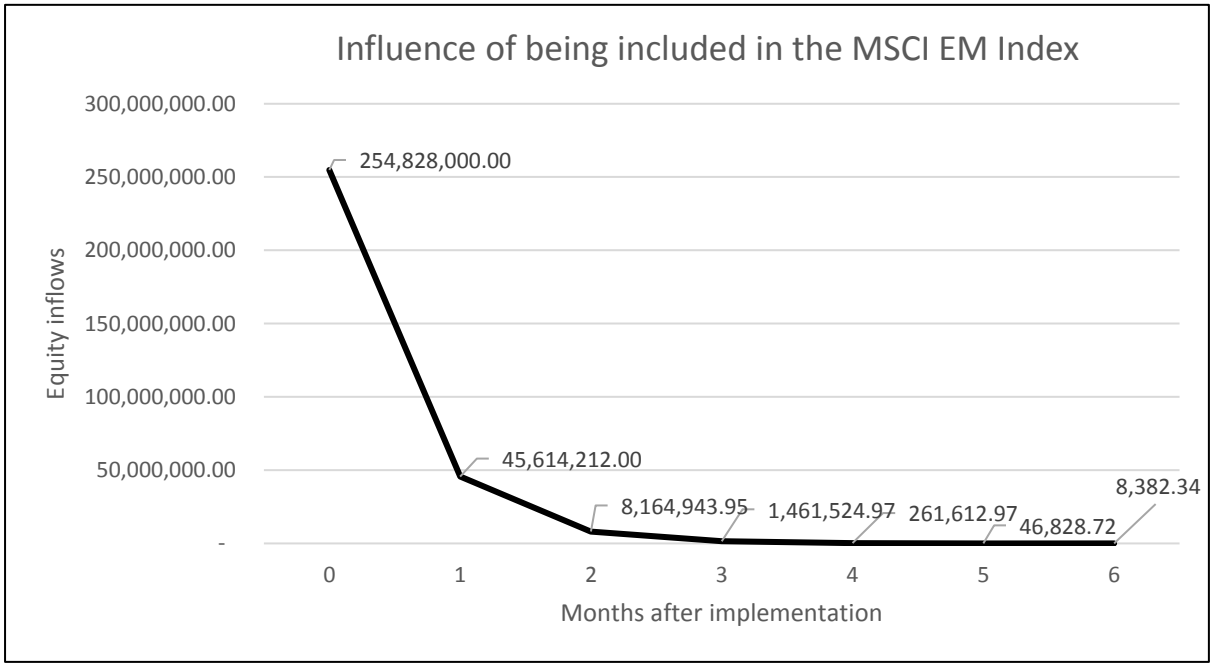
We estimate the specifications in Table 3 using a dynamic panel data model to more carefully quantify for how long interventions remain effective after implementation. Estimation of dynamic panel data models presents several well-acknowledged problems that lead to bias in the within group estimator (Anderson & Hsiao, 1982; Arellano & Bond, 1991; Nickell, 1981). In this context, however, where estimation is performed on a 'large T, small N' panel, bias problems should be minimized, as when T is large the dynamic within-group estimator is proven to be consistent (Bond, 2002). As the average number of periods in our estimation is more than 100, we safely conjecture that a dynamic within-group estimator would be consistent.[36]

In this framework, the coefficient of the lagged dependent variable can be interpreted as the rate of convergence to the long-run coefficient. In our estimations, the coefficient of the

[36] Results of this estimation are available upon request.

lagged dependent variable is 0.18. At this rate of convergence, we estimate the influence of the policies to be negligible after 4-5 months, consistently with our initial assessment. Figure D1 graphically illustrates the result.

Figure D1: Influence of being included in the MSCI EM Index



Note: elaboration based on the estimation of a DPD model (specification of Table 3, column (4)).

We also follow Edison and Warnock (2010) and we estimate the models in Table 3 using quarterly, semi-annual and annual inflows as dependent variables. Consistently, we find that the interventions have some statistical significance on quarterly inflows, but not on semi-annual and annual inflows.[37]

[37] Results of these estimations are available upon request.