Essays on International Capital Flows and Benchmarked Investors

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To my wife and best friend, Carla, for she is everything. To my parents and siblings for their constant support. And to my mother-in-law, Susana, that always treated me as a son of her own. We will always miss you.

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Abstract

This thesis provides an empirical investigation of international capital flows and how they affect financial markets and economic activity, with a focus on capital flows from benchmarked investors. In the first chapter, I study different channels through which well-known benchmark indexes impact financial markets across countries. Exogenous, changes in benchmarks affect the asset allocation by international mutual funds, and by doing so they impact capital flows, asset prices and exchange rates. In the second chapter, I show that government access to foreign credit increases private access to credit. I use a natural experiment that increased the capital inflows by benchmarked investors to Colombia's sovereign debt market. Results show that after this event, commercial banks in Colombia reduced their exposure to government debt, and increased credit to the private sector, suggesting positive effects on the real economy. In the third chapter, I argue that because of the way financial globalization is often measured, it has led to the misperception that financial globalization in emerging markets has been growing in recent years. Using alternative measures I find that, financial globalization has grown only marginally and international portfolio diversification has been limited.

Resumen

Esta tesis es un estudio empírico de los flujos de capitales internacionales y como afectan los mercados financieros y la actividad económica, con un enfoque especial en los flujos de capital de inversores que hacen *benchmarking*. En el primer capítulo, estudio los diferentes canales por los cuales famosos índices *benchmarks* impactan los mercados financieros a través de países. Cambios exógenos en *benchmarks* afectan las asignación de activos de fondos de inversión internacional, y al hacerlo, impactan los flujos de capitales, los precios de los activos, y los tipos de cambio. En el segundo capítulo, muestro que el acceso del gobierno al crédito externo aumenta el acceso al crédito por parte del sector privado. Uso un experimento natural que aumento los flujos de capitales por parte de inversores haciendo *benchmarking* al mercado de deuda soberana en Colombia. Los resultados muestran que después de este evento, los bancos comerciales en Colombia redujeron su exposición a la deuda del gobierno, e incrementaron el crédito al sector privado, sugiriendo efectos positivos para la economía real. En el tercer capítulo, argumento que la manera en que la globalización financiera es normalmente medida, ha llevado a la percepción equivocada que la globalización financiera ha crecido sustancialmente en los años recientes. Usando medidas alternativas muestro que la globalización financiera solo ha crecido marginalmente, y la diversificación internacional de portafolio ha sido limitada.

Preface

This doctoral thesis brings together the results of three research papers on international capital flows and their effect for financial markets and economic activity. There is a special emphasis on the role of benchmarked investors, specially on the first and second chapters of this thesis. As a growing number of international mutual funds and other institutional investors follow popular benchmarks more passively to cut costs, evaluate and discipline fund managers, increase transparency, and provide simple investment vehicles (such as, index funds and exchange-traded funds or ETFs), the effects from these benchmarked investors are expected to increase and need to be understood and quantified. This doctoral thesis is a first effort in this direction.

In the first chapter, co-authored with Claudio Raddatz and Sergio Schmukler, we study different channels through which well-known benchmark indexes impact asset allocations, capital flows, asset prices, and exchange rates across countries, using unique monthly micro-level data of benchmark compositions and mutual fund investments during 1996-2014. We exploit different events and the presence of countries in multiple benchmarks to study the impact of benchmarks. We find that movements in benchmarks appear to have important effects on equity and bond mutual fund portfolios, including passive and active funds. The effects persist even after controlling for other relevant variables, such as time-varying industry-level factors, country-specific effects, and macroeconomic fundamentals. Exogenous, pre-announced changes in benchmarks impact asset allocations, capital flows, and abnormal returns in asset prices and exchange rates. These systemic effects occur not just when the benchmark changes are announced, but also later on when they become effective. By impacting country allocations, benchmarks explain apparently counterintuitive movements in capital flows and aggregate prices.

In the second chapter, I use a natural experiment to show that government access to foreign credit increases private access to credit. I identify a sudden, unanticipated and exogenous increase in capital inflows to the sovereign debt market in Colombia. This was due to J.P. Morgan's inclusion of Colombian bonds into its emerging markets local currency government debt benchmark index, which

led to an increase in the share of sovereign debt held by foreigners from 8.5 to 19 percent. This event had significant and heterogeneous effects on Colombia's commercial banks: banks that acted as market makers in the treasury market reduced their sovereign debt holdings by 4.2 percentage points of assets and increased their commercial credit supply by 3.9 percentage points of assets compared to the rest of the banks. The differential increase in credit is around 2 percent of GDP. Firm and industry level evidence suggests that this had positive effects on the real economy. A higher exposure to market makers led to a higher growth in financial debt, investments, employment, production and sales.

In the third chapter, co-authored with Eduardo Levy Yeyati, we argue that, because of the way financial globalization is often measured, it has led to the misperception that financial globalization in emerging markets has been growing in recent years. We characterize the evolution of financial globalization in emerging markets using alternative measures, and find that, in the 2000s, financial globalization has grown only marginally and international portfolio diversification has been limited and declining over time. Next, we revisit the empirical literature on the implications of financial globalization for local market deepening and international risk diversification proposing new measures of the former that, in our view, are better suited to address these questions than those typically used in the literature. We find that, whereas financial globalization in emerging economies indeed fosters domestic market deepening, it falls short of providing the international portfolio diversification needed to yield visible gains in terms of consumption smoothing.

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Chapter 1

INTERNATIONAL ASSET ALLOCATIONS AND CAPITAL FLOWS : THE BENCHMARK EFFECT

Joint with Claudio Raddatz and Sergio Schmukler

1.1 Introduction

Several papers argue that benchmark indexes are important for equity prices and how managers allocate their portfolios across firms.[1] In this paper, we show how benchmarks can matter in the international context, not only for asset allocations but also for capital flows, asset prices, and exchange rates. In doing so, we depart from the typically studied effects of macroeconomic fundamentals on cross-

[1]Several papers study the importance of benchmarks, focusing primarily on the performance evaluation of mutual funds relative to their benchmarks, in particular, on whether active management pays (Lehmann and Modest (1987), Sharpe (1992), Wermers (2000), Cremers and Petajisto (2009), Sensoy (2009), Busse and Wahal (2014), Cremers et al. (2016)). A related literature focuses on how benchmark redefinitions affect stock returns, pricing, and liquidity (Harris and Gurel (1986), Shleifer (1986), Chen et al. (2004), Barberis et al. (2005), Greenwood (2005), Hau et al. (2010), Faias et al. (2011), Hau (2011), Vayanos and Woolley (2013), Vayanos and Woolley (2016), Claessens and Yafeh (2013), Chang et al. (2014), Bartram et al. (2015).

country investment decisions, which have been the focus of the international finance literature.[2]

The "benchmark effect" refers to various channels through which prominent international equity and bond market indexes (such as, the MSCI Emerging Markets Index or the MSCI World Index) affect asset allocations, capital flows, and prices across countries. Theoretical models predict that the investment strategy of these funds is pinned down by the composition of their benchmark indexes (Chakravorti and Lall (2004); Basak and Pavlova (2013); Igan and Pinheiro (2015)). Therefore, changes in the country weights of a popular benchmark can trigger a similar rebalancing among the funds that track it and result in sizeable movements in financial markets.[3] But the implications of this effect on different variables is not trivial and has not been systematically documented using cross-country data.

According to the capital asset pricing (CAPM) model, if benchmark indexes perfectly reflected market weights, their components were atomistic, and their weights were adjusted instantaneously, investors would hold these indexes and the benchmarks themselves would not generate any distortion.[4] But benchmark indexes are imperfect and do not necessarily hold the market portfolio. There are many indexes covering overlapping sets of countries, so their composition and the decisions of the companies that construct them to include different countries in different benchmarks can matter for global asset allocations. Moreover, individual countries tend to have non-negligible weights and can distort different indexes when included/excluded. As a growing number of international mutual funds and other institutional investors follow popular benchmarks more passively to cut costs, evaluate and discipline fund managers, increase transparency, and

[2]Some examples of the many papers on the topic are di Giovanni (2005), Kraay et al. (2005), Lane and Milesi-Ferretti (2007), Antrás and Caballero (2009), Martin and Taddei (2013), Reinhardt et al. (2013), and Gourinchas and Rey (2014).

[3]The extent to which fund portfolios are linked to their benchmarks depends on several factors, including the manager's risk aversion and the correlation among the assets in the benchmark portfolio (Roll (1992); Brennan (1993); Disyatat and Gelos (2001)). Moreover, mutual funds declare prospectus benchmarks but they need not follow them Cremers and Petajisto (2009). Furthermore, the number of assets in benchmark indexes is much larger than that held in mutual fund portfolios (Didier et al. (2013)), which suggests that some funds do not fully replicate these indexes.

[4]Still, price discovery might be hampered, which can exacerbate co-movement across assets (Wurgler (2010)).

provide simple investment vehicles (such as, index funds and exchange-traded funds or ETFs), these effects are expected to increase and need to be understood and quantified.[5]

A clear practical example of the benchmark effect took place when Israel was moved from the MSCI Emerging Markets Index to the World Index (composed of developed markets). Although the upgrade was announced in advance and occurred because Israel's fundamentals had improved (Week (2010)), we show that Israel faced significant capital reallocations, capital outflows, and negative returns when the upgrade became effective due to the behavior of funds following these indexes. These effects have prompted some to argue for South Korea and Taiwan not to be upgraded to developed market status (Bloomberg (2014)). Similar discussions have emerged with the actual and potential upgrades of Portugal (1997), Greece (2001), Qatar (2014), the United Arab Emirates (U.A.E.) (2014), and China (2015) and the downgrades of Venezuela (2006), Argentina (2009), and Greece (2013) (Times (2013a), Times (2013c), Times (2013b), BIS (2014), Economist (2014a)). One reason for the effect on capital flows is that a country's inclusion (exclusion) in a benchmark index should drive managers with index-tracking strategies to rebalance their portfolios and direct flows into (out of) that country (Economist (2012)).

In this paper, we systematically study how benchmarks affect international asset allocations, capital flows, and prices. First, we study to what extent movements in benchmark weights map into movements in the actual country weights ("weights") of the funds that declare that benchmark. We exploit the timing of changes in benchmarks and the presence of a country in multiple benchmarks, to shed light on whether the evidence is consistent with a causal link between benchmarks and portfolio allocations. Second, we show the consequences that the relation between mutual fund weights and benchmark weights has for mutual fund flows, and quantify the importance of benchmarks for capital flows. Third, we use upgrades and downgrades of countries to study how aggregate asset prices and exchange rates respond to benchmark changes. Fourth, we use several key cases to illustrate how benchmark changes can impact countries in different ways.

[5]Other problems can arise due to the use of benchmark weights to overcome agency problems, but these issues are not examined in the empirical analysis of this paper.

To conduct the research, we compile a novel dataset of detailed portfolio allocations across countries by a large number of international mutual funds that we match with the allocations of the benchmarks they follow. The dataset covers the period from January 1996 to September 2014 and contains international mutual funds based in major financial centers around the world investing in at least two countries (i.e., it excludes country funds). A total of 2,837 equity and 838 bond funds are in the sample. These equity and bond funds collectively had 1,052 and 293 billion U.S. dollars in assets under management in December 2011, respectively.[6]

Our results show that benchmarks have statistically and economically significant effects on the allocations and capital flows of mutual funds across countries. Mutual funds follow benchmarks rather closely. For example, a 1 percent increase in a country's benchmark weight results on average in a 0.7 percent increase in the weight of that country for the typical mutual fund that follows that benchmark. Explicit indexing funds seem to follow benchmarks almost one-for-one, generating some mechanical effects in allocations and capital flows. Although the most active funds in our sample are less connected to the benchmarks, they still seem to be significantly influenced by their behavior, with about 50 percent of their allocations explained by benchmarks. The effects on mutual fund portfolios appear relevant even after controlling for time-varying industry allocations and country-specific or macroeconomic factors, usually mentioned in the finance and international finance literatures. The results do not seem to be just the consequence of common shocks affecting both mutual fund weights and benchmark weights (via returns) or reverse causality (which could occur as mutual funds reallocate their portfolio, exerting pressure on returns and benchmark weights). Instead, exogenous events that modify indexes appear to affect both benchmark and mutual fund weights.

By influencing the asset allocations of mutual funds, benchmarks seem to have systemic effects. In particular, benchmarks can explain nearly 40 percent of capital flows from mutual funds, with this percentage increasing to 70 percent in

[6]Mutual funds are offered to investors in different ways, for example, in different currencies and with different costs. These funds have the same portfolios but many times are counted as separate funds. In our data, we just count them once to avoid repeating the portfolios, but we report their aggregated assets.

times of large exogenous changes to benchmarks. Moreover, large benchmark changes (such as upgrades and downgrades of countries) are associated with abnormal returns in asset prices and exchange rates around those events. These abnormal returns behave as predicted by the mutual fund flows; they become positive (negative) when inflows to (outflows from) a country are expected. Notably, these effects are present both during the announcement and effective dates of these changes. For example, the cumulative asset price differential returns are 1.5 percent around the announcement date and 3.5 percent around the effective date. Our results suggest that, through the reallocations they trigger, benchmark changes affect prices beyond the information content of upgrades/downgrades. The evidence is also consistent with limits to arbitrage in the markets affected by benchmark changes.

The rest of the paper is organized as follows. Section 1.2 describes the data. Section 1.3 studies the effect of benchmarks on mutual fund asset allocations. Section 1.4 analyzes the relation between asset allocations and capital flows, and the effects of benchmarks on these flows. Section 1.5 studies how asset prices and exchange rates react around benchmark changes. Section 1.6 presents some case studies that further illustrate the effects on capital flows and asset prices. Section 1.7 concludes.

1.2 Data

Our main database consists of: (i) country weights or weights, w_{ic}, which are the country portfolio allocations of international mutual funds (those investing in several countries); (ii) benchmark weights, w_{ic}^B, which are the country allocations in the relevant benchmarks; (iii) mutual fund-specific information, such as its assets, returns, and relevant benchmarks; (iv) country-specific information, such as stock and bond market index returns.[7] The sub-index i refers to funds, c to countries, and the supra-index B to benchmarks. For the final database, we clean the raw data and merge data from several sources, some of which had not been previously

[7]Benchmark weights w_{ic}^B are fund-specific because each fund chooses its benchmark. We thus denote it with sub-index i. The same applies to other benchmark characteristics such as benchmark returns.

used or matched in the literature. This database covers the period from January 1996 to July 2012 and constitutes an unbalanced panel. We use some additional data (described later in the paper) to study the reactions of capital flows and asset prices, covering newer episodes up to 2014.

Our database contains 2,837 equity funds and 838 bond funds, including global, global emerging, and regional funds, whose total net assets (TNAs, A_{it}) have increased significantly over time.[8] Moreover, funds in our combined dataset capture an important part of the assets held by the industry of international funds. For example, our sample of U.S.-domiciled equity funds had 442 billion dollars in TNAs, while the Investment Company Institute (ICI) reports that, during the same period, U.S. (non-domestic) international funds held 1.4 trillion dollars including the numerous country funds that we exclude due to our interest on country weights. Similar estimates for Europe from the European Fund Asset Management Association (EFAMA) show that our sample accounts for approximately 53 percent of the international funds in this region. Explicit indexing funds (mostly ETFs) represent a fast growing but still relatively small share of the industry. By also including closet indexing funds, both the level and growth rate of the funds that closely track benchmark indexes increases significantly.[9]

Our two main sources for country portfolio allocations of international mutual funds are EPFR (Emerging Portfolio Fund Research) and Morningstar Direct (MS). Both sources include dead and live mutual funds. The data from EPFR are at a monthly frequency, and include open-end equity and bond funds classified according to their geographical investment scope. Global funds invest anywhere in the world, global emerging funds only in emerging countries, and regional funds in groups of countries within a specific geographical region.[10] The data also com-

[8] In 2011, the equity (bond) funds in our sample had 1.2 trillion (303 billion) U.S. dollars in TNAs (Appendix Figure 1.1). Equity funds are domiciled around the entire world but most of the funds are located in Canada, France, Ireland, Luxembourg, the United States (U.S.), and the United Kingdom (U.K.). Most bond funds are domiciled in Denmark, Germany, Ireland, Israel, Italy, Luxembourg, the U.S., and the U.K.

[9] The trends exhibited by the share of total assets of ETFs in our sample also appear in data on U.S. mutual funds from the Investment Company Institute (ICI), which does not identify closet indexing funds.

[10] While global funds theoretically can invest anywhere in the world, a large proportion of them track the MSCI World Index, which only has developed countries as constituents. A minor proportion of these funds track the MSCI All Country World Index, which contains both developed

prise portfolios of ETFs. We use only funds with information for at least one year. For each fund i and each month t, the data contain information on the share of the fund's assets invested in each of 124 countries and cash, as well as its TNAs. We also have information on static characteristics, for example, the asset class, domicile, whether a fund is an ETF, its strategy (passive or active), and, crucially, its declared benchmark. We complement these data with information on the funds' net asset value (NAV) from Datastream and MS. We match the funds from these different databases.

We use similar data from MS to complement the EPFR data. That is, we use data on country weights, TNAs, NAVs, and static fund characteristics for additional international mutual funds not included in EPFR with at least one year of monthly data.[11] This increases importantly the cross-sectional coverage of our final dataset. MS reports country weights in only 52 countries and does not contain data on cash allocations.[12] The combination of the two databases provides us with an extensive cross-sectional and time-series coverage of funds (Appendix Table 1.1). MS contains a large number of funds after 2007 but very few in earlier years, while EPFR has a more balanced number of funds dating back to 1996.[13] In addition, we use stock and bond market country indexes from J.P. Morgan and MSCI to compute the country returns, R_{ct}, which we impute to each fund's investment in each country (we do not have information on the actual returns of each fund in each country).[14] This information comes from Datastream and MSCI.

In addition to our data on fund country weights, we also use data on the coun-

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and emerging countries.

[11] Although MS includes funds that report quarterly, almost 90 percent of the original MS sample reports allocations on a monthly frequency.

[12] In our estimations, we only use country allocations and, thus, do not include the residual category of other countries (those not explicitly reported in the EPFR or MS databases) nor cash.

[13] In our consolidated database we kept the country coverage of MS (52 countries) and adapted the EPFR database to this format, lumping countries outside these 52 in a residual category called "other equity" (also present in MS). We have also performed robustness tests for the impact of this change for the EPFR database. The results are qualitatively similar.

[14] The correlation between the actual fund returns and the computed returns using country returns is 89 percent, which shows that country returns are a good proxy for individual returns. Some of the small unexplained part is due to differences in the country returns and security level returns, but it might also be due to the fact that the data have a small residual category ("other equity/bonds") that we cannot assign to any particular country given the information available.

try benchmark weights and returns of several major benchmark indexes (R_{it}^B). We obtain these data directly from FTSE, J.P. Morgan, and MSCI through bilateral agreements, and indirectly through MS for indexes produced by Dow Jones, Euro Stoxx, and S&P. The benchmarks indexes we use have different scope and are listed in Appendix Table 1.2. For each of the benchmark indexes in MS and MSCI, we collect data on price returns, gross returns, and net returns. We rely heavily on the MSCI benchmark indexes because 86 percent of our data on equity mutual funds declare to follow them.[15] Moreover, we gather data on daily returns to analyze the impact of benchmark changes in asset prices. We use Datastream to collect daily prices in U.S. dollars for firms and sovereign bonds for the episodes analyzed in Section 5.

To match the data on international mutual funds with the benchmark indexes, we assign to each fund the index declared in its prospectus. For funds with no declared index, we impute the benchmark assigned to it by industry analysts, as reported by MS, although the results reported below are similar when considering only funds that explicitly declare a benchmark. We were able to match 88 percent of the equity funds and 18 percent of the bond funds in our database. The reduced matching of bond funds with their benchmarks is not because of matching problems but for lack of information on the detailed portfolio composition of their benchmark indexes.[16][17] We do not use the rest of the funds because it is not clear whether the missing information is due to the fund not following a benchmark or following a benchmark unknown to us (for dead funds, this information was impossible to retrieve).[18] Our final database consists of an unbalanced panel,

[15] Some funds follow a linear combination of two or more indexes. We use that combination as their benchmark.

[16] Most bond funds follow J.P. Morgan bond indexes. However, within this family we could only get access to the detailed composition of the EMBI+, EMBI+ Global, and EMBI+ Global Diversified.

[17] There is no agreement on how to assign benchmarks. Papers use the declared benchmark, the one assigned by analysts, and/or the one that yields the smallest deviation from the fund portfolio (Cremers and Petajisto (2009); Sensoy (2009); Busse and Wahal (2014); Jian Hao and Wang (2014); Cremers et al. (2016))

[18] Having access to the benchmarks makes the matching relatively straightforward given that funds have increasingly reported their benchmarks. For instance, among the funds covered by EPFR, 28 percent of equity funds did not report a benchmark in 1996, while 5 percent did not do so in July 2012. Our matching for equity funds is rather complete because only 9 percent of equity funds in our sample do not report (or are assigned) a benchmark. For bond funds, that number is

where each observation is a country-fund-time observation containing the percentage of TNAs invested in a particular country by a mutual fund, the percentage allocation of that same country at the same time for the assigned benchmark, plus fund-specific information.

We also classify funds according to how active the fund manager is, following Cremers and Petajisto (2009) but using country weights instead of security weights. In particular, we classify funds as "explicit indexing," "closet indexing," "mildly active," and "truly active" funds.[19] Explicit indexing funds are either ETFs or passive funds. Closet indexing funds do not declare to be passive but behave similarly to explicit indexing funds. Mildly and truly active funds are those that deviate importantly from their self-declared benchmarks. Specifically, for each fund we first compute its active share each month and then take the average over time as a time-invariant measure of a fund's deviation from its benchmark allocations. This measure gives the average percentage of a fund's portfolio that deviates from its benchmark.[20] We then define closet indexing funds as those that on average have an active share within two standard deviations of the active share of explicit indexing funds. Funds not belonging to the explicit indexing or closet indexing groups are classified into mildly active (truly active) if they are in the lower part (upper) of the distribution of the active share measure (using the median active share).[21]

1.3 Benchmarks and Asset Allocations

To study systematically how mutual fund weights respond to benchmark weights, we estimate panel regressions that relate a fund's country weight to its benchmark weights, including different fixed effects that capture various types of shocks.

We start by estimating the parameters of the following specification:

16 percent.

[19] One possible alternative to this measure is the root mean square error (RMSE), which penalizes large deviations from the benchmark index. But the measure of active share we use has been the standard in the literature on mutual fund activism since Cremers and Petajisto (2009), in part because it shows the percentage of the portfolio that is invested outside the benchmark.

[20] More formally, it is defined as $AS_{it} = \frac{1}{2}\sum_c |w_{ict} - w^B_{ict}|$.

[21] The results are robust to the selection of benchmarks, where we assign the minimum active share benchmark to each fund.

$$w_{ict} = \theta_{ic} + \theta_{it} + \alpha_1 w^B_{ict} + \varepsilon_{ict} \tag{1.1}$$

where w_{ict} is the weight for fund i, in country c, and at time t; w^B_{ict} is the respective benchmark weight that fund i follows; θ_{ic} and θ_{it} are fund-country and fund-time fixed effects. The fund-country and fund-time fixed effects account for persistent differences in the weight that each fund holds in each country and for the shocks that funds receive at each point in time (such as, redemptions and injections or changes in the cash or other equity positions). The errors, ε_{ict}, are clustered at the benchmark-time level, which allows for unobserved correlation among all funds that declare a common benchmark. The results are robust to alternative clustering structures.[22] We run these regressions pooling all funds and separating them by how active the fund manager is.[23][24]

The results using all equity funds (Table 1.1, Panel A) show that, although there is variation in the estimated coefficients for benchmark weights (α_1 in Equation (1.1)) across groups, all types of funds seem to follow benchmarks to a significant extent. For the group of all funds the coefficient obtained in the weight regressions is 0.77. The coefficients decline monotonically for more active fund managers. For example, explicit indexing funds move almost one-to-one with benchmarks and the percentage of the variance explained is also higher relative to all funds. Estimates for closet indexing funds are close to those of explicit indexing ones, with an estimated coefficient of 0.92, and similar R-squared estimates. In fact, they are much closer to explicit indexing than to mildly active funds, whose estimated coefficient is 0.82. Importantly, the results indicate that benchmark weights are significantly associated with the mutual fund portfolio allocations even for the most active funds in the sample. The coefficient for the truly active funds is 0.5, which is significant statistically and economically. Moreover, a significant part of the variance is captured in the different estimations.[25]

[22] The errors in our specification are correlated at the fund-time level because at each point in time an increase in the weight of a country in a fund's portfolio requires the decline of other countries. Part of this mechanical correlation is removed by excluding residual countries and cash, but it is still likely to be present. The results are qualitatively similar is we use instead the standard errors proposed by Driscoll and Kraay (1998).

[23] Results using log weights instead of weights are very similar to those reported here.

[24] Appendix 1 discusses a possible portfolio decision framework for the interpretation of α_1.

[25] In unreported estimations with no fixed effects we find that benchmark weights explain around

The results for bond funds are qualitatively similar (Table 1.1, Panel B). Although explicit indexing funds do not move one-to-one with benchmarks, the explained variation by the benchmarks is still 99 percent when including the fixed effects. This might be due to a small sample problem given that we have few explicit indexing bond funds in our sample. Moreover, fund managers might invest differently in bonds than in equities due to the different nature of these markets, which might explain the somewhat smaller coefficients for bond funds in general. For example, Raddatz and Schmukler (2012) show that bond funds hold more cash as a buffer against shocks, which could explain a smaller reaction to benchmarks.

Our results are very similar when controlling for both industry- and country-level omitted variables. In particular, to control for the possibility that funds follow the industry given the use of relative performance to evaluate managers against their peers, we add the median weight across a specified segment of mutual funds to the previous regressions.[26] Furthermore, we exploit the fact that countries are included in more than one benchmark at the same time to account for the possibility that country-specific factors (like macroeconomic fundamentals) can play a role in cross-country investments. Namely, we use the variation across benchmarks for the same country-time observation.[27] We control for the omitted country fundamentals by adding a set of country-time fixed effects, absorbing non-parametrically all possible time-varying, country-specific shocks.[28] Figure 1.1 illustrates the results including country-time fixed effects.

A technical concern comes from the persistence of country and benchmark weights, which we address by running the regression in differences:

$$\Delta w_{ict} = \theta_{ic} + \theta_{it} + \alpha_2 \Delta w_{ict}^{B} + \varepsilon_{ict} \tag{1.2}$$

The results suggest that, although the coefficients estimated for α_2 are a bit smaller (Table 1.1, Panel A and B), they are similar to those estimated in levels.[29]

40 percent of the variation in country weights.

[26]For segments, we use: Asia excluding Japan, BRIC, Emerging Europe, Europe, Europe Middle East and Africa, Global, Global Emerging, Latin America, and the Pacific.

[27]There is a significant amount of variation in changes in benchmark weights for a given country at a particular point in time (Appendix Figure 1.2, Panel A).

[28]The results are qualitatively similar when using macroeconomic variables as controls instead of country-time fixed effects.

[29]In unreported robustness exercises, we estimated other dynamic specifications with several

Another potential difficulty in relating benchmark weights and mutual fund weights is that relative returns could drive some of the results. In particular, exogenous fluctuations in returns (a common shock) could affect both variables simultaneously through the buy-and-hold part of the portfolio. Moreover, reverse causality could arise if benchmark weights responded through returns to movements in mutual fund weights, instead of the other way around.

The potential problems that relative returns can introduce are, however, ameliorated by the fact that benchmark indexes are built and adjusted frequently using exogenous criteria (related, among other things, to the inclusion/exclusion of securities, changes in the security loadings, and the reclassification of countries into different groups), independent on the actions of fund managers (Appendix 2). Moreover, because benchmarks have to sum up to 100 percent, all countries in a benchmark are affected by the exogenous changes in one particular country. Though most exogenous changes imply small reallocations, other ones are large.

We can effectively isolate the buy-and-hold from the exogenous components in each benchmark weight. In the absence of exogenous reallocations, the benchmark weight of country c at time t, w_{ct}^B, would just follow a buy-and-hold pattern, $w_{ct}^B = w_{ct-1}^B \left(\frac{R_{ct}}{R_t^B}\right)$, where R_{ct} and R_t^B are the return of the country and the return of the benchmark, respectively. With exogenous changes related to changes in the underlying securities, upgrades or downgrades of countries, and other changes decided exogenously by index providers, E_{ct}^B, benchmark weights follow:

$$w_{ct}^B = w_{ct-1}^B \left(\frac{R_{ct}}{R_t^B}\right) + E_{ct}^B \tag{1.3}$$

By using both of these components separately, we analyze how mutual funds respond to benchmark changes that come from relative returns and from exogenous events.

This decomposition is possible because relative returns are not the only important determinant of changes in benchmark weights, even when on average benchmark weights move almost one-to-one with relative returns (Table 1.2). In fact, after controlling for benchmark-country, benchmark-time, and country-time

lags and an error correction term. The economic significance of those additional terms tends to be small relative to the contemporaneous change in benchmark weights, not changing our conclusions.

fixed effects (the identification comes exclusively from the time variation within a benchmark-country), the R^2 of the various regressions are between 0.3 and 0.6 at the monthly level.[30] A main reason for this result are the regular revisions to the indexes, leading to frequent re-weighting of all the countries.[31] These are exogenous reallocations that are independent of the performance of a country. To formally study how regular exogenous changes to the benchmark indexes affect mutual fund weights, we substitute the benchmark weight in Equation (1.2) for its two components from Equation (1.3) and estimate the parameters of the following specification:

$$\Delta w_{ict} = \theta_{ic} + \theta_{it} + \alpha\Delta\left[w^B_{ict-1}\left(\frac{R_{ct}}{R^B_{it}}\right)\right] + \beta\Delta E^B_{ict} \tag{1.4}$$

We test whether the coefficient for the exogenous shocks is significantly different from zero. This approach exploits all the variation in benchmark weights that is unrelated to the buy-and-hold component to identify their possible causal impact. The results show that the exogenous component has a significantly positive effect on mutual fund weights (Table 1.3, Panel A for equity funds and Panel B for bond funds). As expected, the relation is decreasing for more active funds, but even active fund allocations are positively correlated with this component of benchmark weights.

We then focus on large events. Because these large events are usually pre-announced, finding evidence of an impact on allocations when they take place provides evidence that actual, contemporaneous benchmark weights matter for international mutual funds. However, we face the problem that there are few events of whole country upgrades/downgrades to exploit, so we include episodes of large changes in the intensive margin to increase our statistical power. We identify these "exogenous event times/episodes" using the fact that changes in MSCI in-

[30] Including more lags of log changes in benchmark weights or relative returns do not have much effect on the relative return coefficients, and the economic and statistical significance of the other lags diminish rapidly.

[31] Another potential reason is that because we do not know the return of a country within each benchmark and instead use a common country return imputed to all benchmarks that include that country, the residual term could capture these differences. Nonetheless, this residual is probably small due to the bottom-up approach. That is, benchmarks in the same country category (developed, emerging, frontier) will tend to have the same stocks for each constituent country and the country returns will be similar across them.

dexes are released in the months of February, May, August, and November. We compute the exogenous component during these months as in Equation (1.3) and assume that finding a large exogenous component (below the 25th and above the 75th percentile of the sample distribution) in any of these months is likely due to the announcement of an exogenous change in the calculation of the index.

In particular, we test whether the mutual fund weights respond to benchmark weights differently in days with exogenous events relative to other days by estimating:

$$\Delta w_{ict} = \theta_{ic} + \theta_{it} + \alpha_N \Delta w^B_{ict} D_N + \alpha_E \Delta w^B_{ict} D_E + \varepsilon_{ict} \tag{1.5}$$

where D_N is a dummy indicating normal times and D_E is a dummy indicating times with large exogenous events. Finding that $\alpha_E < \alpha_N (\alpha_E > \alpha_N)$ would mean that the relation between benchmark weights and country weights weakens (strengthens) in months when benchmark weights are largely driven by exogenous episodes. Alternatively, not being able to reject the hypothesis that $\alpha_E = \alpha_N$ means that the exogenous movements in benchmark weights matter for country weights as much as those driven by relative returns. The results show that, while the difference is statistically significant in some cases, it is much lower in economic terms, and that the link between mutual fund weights and benchmark weights remains strong during exogenous episodes (Table 1.3). That is, funds do not tend to respond very differently to exogenous events or other changes in benchmark weights.

Lastly, we test how mutual funds responded to a particular MSCI methodological change event that implied an overall index redefinition (also exploited by Hau et al. (2010) and Hau (2011)). In December 2000, MSCI announced that it would change all its indexes to adjust the market capitalization by the free-float rate (the proportion of the stocks publicly available), becoming effective in two steps, in November 2001 and May 2002. In fact, the changes in E^B_{ct} at those times were indeed much larger (due to the benchmark changes) than during the other months (Appendix Figure 1.2, Panel B). We regress the changes in mutual fund weights against the changes in the buy-and-hold component and the changes in the exogenous component for the months when MSCI made the change effective. With the

exception of the truly active funds, mutual funds responded almost one-to-one to the exogenous changes at the time the indexes were readjusted (Table 1.3).[32]

1.4 Benchmarks and Capital Flows

To quantify how much of the mutual fund flows is driven by benchmarks, we start from the following identity that captures the relation between benchmark weights and flows:

$$F_{ict} = w_{ict}F_{it} + \tilde{A}_{it}\left(w_{ict} - w_{ict}^{BH}\right) \tag{1.6}$$

where F_{ict} is the net flow (in dollars) from fund i in country c at time t. w_{ict} is the portfolio weight the fund decides to have in that country at time t, $\tilde{A}_{it} = R_{it}A_{it-1}$ is the value of the fund's assets at the beginning of time t, and w_{ict}^{BH} is the fund's buy-and-hold weight in that country resulting from movements in total and relative returns. F_{ict} is the net flow (in dollars) to fund i at time t, also known as injections or redemptions.[33]

Then, using Equation (1.1) that links w_{ict} and w_{ict}^{B}, we decompose Equation (1.6) into:

$$F_{ict} = \alpha w_{ict}^{B}F_{it} + \Delta_{ict}^{B}F_{it} + \tilde{A}_{it}\left[\alpha w_{ict}^{B} - \alpha w_{ict-1}^{B}\frac{R_{ct}}{R_{it}}\right] + \tilde{A}_{it}\left[\Delta_{ict}^{B} - \Delta_{ict-1}^{B}\frac{R_{ct}}{R_{it}}\right] \tag{1.7}$$

where $\Delta_{ict}^{B} = w_{ict} - \alpha w_{ict}^{B}$.

The four terms in Equation (1.7) capture different components of mutual fund flows across countries. The first two terms measure how the manager allocates

[32] Explicit indexing funds are excluded in these estimations due to the low number of observations.

[33] By mutual fund flows or capital flows we mean the flows of the funds we analyze into countries in which they invest. Because we do not have aggregate detailed data for all countries, we cannot determine to what extent these fund flows are reflected in the aggregate balance of payments statistics. However, according to some estimates, the EPFR funds alone account for around 25 percent of total foreign portfolio investments (from all sources) at the country level Puy (2013) and there is a significant correlation between the EPFR flows and those obtained from the balance of payments (Fratzscher (2012); Pant and Miao (2012)).

the injections and redemptions the fund faces. The first one captures how injections/redemptions are distributed according to the benchmark weight, the "benchmark flow," and the second one according to the active weight, the "active flow." The third and fourth terms relate to asset reallocations. The third term indicates how the manager reallocates assets when there is an exogenous change in the benchmark weight, the "benchmark reallocation." The fourth term shows how the manager actively reallocates assets, the "active reallocation." The first and third terms jointly capture the benchmark-related capital flows, while the second and fourth terms are associated with the active decisions of the manager.

A variance decomposition based on Equation (1.7) shows that benchmarks account for a non-trivial 38.7 percent of the variation of capital flows when considering all funds in the sample (Table 1.4, Panel A). The benchmark flow explains 16.1 percent and the benchmark reallocation 22.6 percent of mutual fund flows. These percentages vary according to how active a fund is. Benchmark reallocation explains 67.8 percent of mutual fund flows for explicit indexing funds, while this percentage is 12.3 percent for truly active funds. There is also considerable variation across time. When considering months in which MSCI rebalances its indexes, benchmarks explain around 72.7 percent of mutual fund flows, while this percentage drops to 14.3 percent in the other months (Table 1.4, Panel B and C). Moreover, during the MSCI methodological change in 2001-2002 the percentage explained by the benchmark reallocation increases significantly.

Because the fraction of capital flows explained by benchmarks seems to be much more important when there are large exogenous changes in benchmark weights, we additionally compute the variance decomposition for four different countries that experienced an upgrade or downgrade in our sample, Argentina, Colombia, Israel, and Venezuela (Appendix Table 1.3). For these episodes, the benchmark reallocation explains a much larger fraction of capital flows, ranging from 27.5 percent (in Venezuela) to 62.9 percent (in Israel). This pattern is more accentuated when considering explicit indexing funds. In Israel, for instance, the benchmark reallocation term explains 88.7 percent of capital flows of explicit indexing funds, which shows the large importance of benchmark reallocation flows when there are large exogenous changes in benchmark weights.

1.5 Benchmarks, Asset Prices, and Exchange Rates

While the evidence above on capital flows shows the different channels through which benchmarks can affect mutual fund flows, it does not provide information about the aggregate impact of the benchmark effect. To do so, we would need high-frequency information on capital flows from the balance of payments, which most countries do not report. In this section we measure instead the aggregate effect by showing the reaction of asset prices and exchange rates.

We conduct event study analyses of asset prices and exchange rates around episodes where the benchmark effect is clear to identify, such as, country upgrades and downgrades in both debt and equity markets. For each episode, we identify both the announcement and effective dates. We use a range of 79 well-identified episodes across developed, emerging, and frontier countries (listed in Appendix Table 1.4).

This type of analysis presents at least four methodological advantages to study the effect of benchmarks vis-a-vis the informational effect revealed by the benchmark change itself, when incorporations into an index might anticipate excess returns (Shleifer (1986); Denis et al. (2003)). First, because most of these country reclassifications are announced with certainty from 3 to 12 months prior to the effective date, we are able to analyze when (and if) prices react. To the extent that asset prices react at the effective date, not only at the announcement date, it would indicate that not all investors fully anticipate the benchmark change, even when the information about the change is known in advance.[34]

Second, our data allow us to distinguish the positive information the upgrade implies from the mechanical reallocation the benchmark change entails. In particular, when countries are reclassified across categories (developed, emerging, and frontier) their benchmark weight changes significantly, because countries typically receive a weight proportional to their market capitalization. While an upgrade from the emerging to the developed category tends to imply good news, the weight of the country gets reduced because the country is much larger among emerging economies than among developed ones. Given that the pool of assets

[34]This lack of full anticipation is present even in liquid U.S. Treasury security markets (Lou et al. (2013)).

managed across developed and emerging markets is roughly similar, the benchmark effect related to the reallocation could explain why an upgrade might generate capital outflows and a negative price effect, and a downgrade the opposite movements.

Third, we are able to analyze whether large upgrades and downgrades have effects on countries other than those being upgraded/downgraded. If a country with an important benchmark weight in an index is moved to another index, countries in the original index should experience a considerable positive impact from this change as investors would need to reallocate their investments into the fewer remaining countries. Even when the upgrade/downgrade of a country is informationally relevant for that country, it would not be relevant for third countries sharing the benchmark, which would highlight the importance of the benchmark effect.

The episodes we use can be divided into four types. First, MSCI upgrades or downgrades countries by announcing whether a country is switched and the effective date in which this change will eventually occur. In most of the cases, there is a significant gap between the announcement and the effective dates. For our analysis, we take the announcement and effective date as two separate episodes. For the former, we analyze returns during the day of the announcement, as well as during a window covering up to 30 business days afterwards to analyze the persistence of the event. Because the effective date is known in advance and because our data on explicit and closet indexing funds show that they rebalance their portfolio a few days before the effective date, we use a window starting two business weeks before the effective date and analyze the returns between that point and the subsequent 30 business days. We study the behavior of the MSCI stock market index of the countries that receive the grade change. As the global factor we use the MSCI All Country World Index.

Second, we analyze the contagion effects of the upgrade of Qatar and U.A.E. from frontier to emerging market status in May 2014 on other frontier countries. As the announcement date we use April 1, 2014, when MSCI announced the definitive structure of the new MSCI Frontier Markets Index. We also look at the rebalancing of the iShares MSCI Frontier Markets 100 ETF to pin down the exact date when explicit indexing funds started moving their portfolio to adjust

to the large movements experienced in the two upgraded countries. As above, we analyze a window starting two weeks before the effective date, up to the following 30 business days. We use again the MSCI All Country World Index as a global factor. Because of the reallocation within the frontier market index during the effective date, capital outflows were expected in Qatar and U.A.E. (they had already entered into the emerging market funds) and capital inflows were expected in the rest of frontier markets.

Third, similarly to the MSCI benchmark changes, we use 13 different episodes from Barclays, Citigroup, and J.P. Morgan, the three largest debt index producers at the international level. The changes involve the addition of local currency denominated government bonds in the indexes they construct. The total index return for each country is the J.P. Morgan GBI-EM country index, which is a market capitalization based index of the different local currency government bonds. The global factor is the J.P. Morgan GBI, a market-capitalization index of government debt of all the countries. We analyze total returns from these indexes in U.S. dollars. Because all the countries we analyze are in some way upgraded or downgraded from a standalone index, we expect capital flows in the direction of the upgrade or downgrade.

Fourth, we use upgrades and downgrades between non-investment and investment grade in debt markets, announced by Fitch, Moody's, and S&P (the main three rating agencies). While these episodes do not necessarily entail movements by the mutual funds that follow the benchmarks used in this paper, several institutional investors have a mandate to invest only in investment grade debt instruments. Therefore, we would expect reallocations and price movements in sovereign debt markets with these events, in particular, a positive effect from an upgrade and a negative one from a downgrade. We consider only the first announcement by any of the big three rating agencies because markets usually expect the other two rating agencies to follow suit. In most of these events, the announcement and effective dates are the same, so we use a window starting the day of the announcement up to 30 business days afterwards. In the three cases for which there is a distinct announcement date, we use both dates.[35] Because the

[35]The announcements in all these cases are different from the ones described earlier, because countries are put in a watch list, which does not imply with certainty that an event will happen.

movements between investment and non-investment grade should affect all the existing government debt of a country, we analyze the broadest possible index, the J.P. Morgan EMBI Country Index. As the global factor, we use the J.P. Morgan EMBI Global Index.

We use three different types of returns: raw returns, excess returns, and abnormal returns. Raw returns are the returns of the treated group. Excess returns are the returns of the country minus those of the global factor. Abnormal returns are the residuals of a regression of the returns of the country relative to the returns of the global factor during the 180 business days prior to the initial event. We compute the cumulative returns starting two days before the initial date and report a mean test of whether these average cumulative returns are different from zero.[36] We also estimate the same specifications but using the exchange rate instead. We exclude countries with hard or soft pegs (as taken from the IMF AREAER) and use as a global factor the average change in exchange rates from all the countries in our sample. We expect an appreciation (depreciation) for episodes when the benchmark change implies capital inflows (outflows). However, the effect on the exchange rate is expected to be lower than on the specific asset prices because the benchmark change involves only equity or debt. Therefore, we expect a softer movement of the exchange rate during these periods, as equity and debt flows might move in different directions (as shown in the next section for the case of Israel's balance of payments) and other factors might also play a role.

The results show that, when considering all the possible events (including the announcement and effective dates), there is a positive and significant reaction of returns during the event times that is maintained even for the subsequent 30 business days (Table 1.5, Panel A). Raw returns increase by 2.62 percent at their peak. Even excess and abnormal returns show an almost 1.52 and 1.83 percent increase at their peak during the event times, suggesting a significant effect of benchmark changes on asset prices.

When considering only the announcement dates (Table 1.5, Panel B), there are positive and statistically significant returns across all specifications during the event date and later, suggesting that the effect from benchmark changes is perma-

[36] We pool the negative and positive events by normalizing the negative events to be tested as positive ones.

nent. When considering only the effective date (Table 1.5, Panel C), there are no effects in the two weeks prior to the effective date.[37] However, during the week prior to the effective date, the average cumulative returns (of all types) increase significantly: these returns go from 3.5 to 4.3 across the different specifications. Even four weeks after the initial effective date, the effect does not tend to vanish, indicating that there is not a complete reversal of the effect.

We also observe a statistically significant effect in the exchange rates. At the peak, the average exchange rate appreciates/depreciates between 0.5 and 0.61 percent when considering both the announcement and effective dates of an upgrade/downgrade. These effects are present both separately during the announcement and effective dates. Although they keep the sign, after two weeks they are not statistically significant. One possible explanation is that some governments intervene to stabilize the exchange rate. Still, the effects are not negligible given that exchange rates have been hard to predict, capture many factors, and when predictability appears it does so for some countries and short time periods (Rossi (2013)).

The distinction between the two types of dates (announcement and effective) allows us to draw some conclusions about the apparent effect of benchmarks on asset prices. First, because most mutual funds move during the effective date and asset prices react then as well, there does not seem to be a complete arbitrage from other investors during the initial announcement. Second, another interesting finding is that returns seem to peak exactly during the effective date, indicating that there might be a price pressure effect and, perhaps, not enough liquidity in the markets to satisfy the shift in demand from the funds following the benchmark. This generates large abnormal returns that afterwards experience a partial reversion. Third, the size of the effects seems to be much larger during the effective date than during the announcement date. This suggests that the mechanical reallocations that take place during the effective date are more important than the changes that occur, due to anticipation, during the announcement date.

[37] Whereas the daily data on passive funds for some episodes suggest that they start doing the reallocations two weeks prior to the effective date, the effects on returns only appear during the week before the event, suggesting that the large reallocations happen during that week.

1.6 Case Studies

In this section, we illustrate with some cases how the benchmark effect can work in practice by focusing on countries that have suffered significant benchmark changes and for which data can be obtained. The section also shows how different variables (mutual fund weights, mutual fund and aggregate capital flows, prices, and exchange rates) change when benchmarks are modified.

We start with the case of Israel, which illustrates well the impact of benchmarks through the different channels. The change in Israel is part of the often-large restructurings that index-producing companies announce about the calculation of their indexes. The most important changes entail upgrades/downgrades of countries between the categories developed, emerging, and frontier markets and changes related to the index construction methodology.

In June 2009, MSCI announced its decision to upgrade Israel from emerging to developed market status. In May 2010, the benchmark weight of Israel in the MSCI Emerging Markets Index turned zero and its weight in the MSCI World Index became positive. Figure 1.2 shows the behavior of the average weight of Israel among the explicit indexing and truly active funds that declare to follow the MSCI Emerging Markets Index and the MSCI World Index. Explicit indexing funds track the benchmark very closely. At the time the upgrade became effective, the funds that tightly follow the MSCI Emerging Markets Index instantly dropped Israel's weight to zero, while those following the MSCI World Index incorporated Israel to their portfolios. However, when MSCI announced the upgrade decision, these funds did not significantly change their allocation in Israel; instead, they waited until the actual upgrade materialized. Truly active funds did not react so mechanically to the upgrade, but they still gradually adjusted their portfolio in a manner that is consistent with movements in the benchmark weights.

This example shows how there is a very tight connection between benchmarks and passive funds and a looser connection between benchmarks and active funds. It also shows that the reclassification of countries across benchmarks can trigger asset liquidation to reduce the country exposure, not driven by price effects. While the Israel example involved large reallocations and a complete removal and incorporation into two different indexes, there are many more frequent but smaller

changes in the indexes.

To understand the total effect on country flows, it is important to consider that, at that time, Israel's weight in the MSCI Emerging Markets Index was 3.17 percent and in the MSCI World Index 0.37 percent, and the assets in the funds following these two indexes were not very different. Thus, as expected, emerging market funds withdrew 2 billion U.S. dollars from Israel while developed market funds injected 160 million.

This effect at the mutual fund level is in fact similar in size with the movements registered in Israel's balance of payments (Figure 1.3, Panel A). Moreover, this outflow differs from the inflows in other quarters and in debt flows in the same quarter. In particular, during the previous three years to the effective date, there were significant inflows to equity securities, while during the second quarter of 2010 (the effective date) there were almost 2.3 billion U.S. dollars outflows in equities compared to 2 billion U.S. dollars inflows in debt. The magnitude and direction of the equity flows are consistent with mutual funds reallocating their portfolio and inconsistent with the overall positive inflows that Israel was receiving around the upgrade event. The equity capital flows move in a different direction than the upgrade would suggest if the event just contained good news for Israel, and thus point to the importance of the benchmark effect.

In terms of prices, the Israeli stocks in the MSCI index fell almost 4 percent in the week of the announcement and underperformed the MSCI All Country World Index, even when the news was an upgrade (Figure 1.3, Panel B). Moreover, the week prior to the effective date (when index funds rebalanced their portfolio) there was a 4.2 percent drop in the MSCI Israel Index. Still a month after the effective date, there was a considerable gap between the MSCI Israel Index and the MSCI All Country World Index (Figure 1.3, Panel C).

Another interesting case is that of Colombia's debt market. On March 19, 2014, J.P. Morgan announced that it would add five Colombian Treasury (TES) bonds to its Global Bond Index Emerging Markets and Global Bond Index Emerging Markets Diversified. Colombia's benchmark weight would increase from 3.2 to 8 percent in the latter and from 1.8 to 5.6 percent in the former. Data from national sources show that when the benchmark changed the share of Colombian TES bonds held by foreigners increased by a factor of around 2.33 (Figure 1.4,

Panel A). This was driven by an increase in the total purchases of these securities by foreigners, showing a marked difference with previous periods. This episode also shows that the benchmark effect is relevant not only during upgrades or downgrades (extensive margin), but also during significant revisions of the benchmark weight within an index (intensive margin). Three weeks after the announcement, the Colombian local currency bond Index was up 5 percent compared to the J.P. Morgan GBI (Figure 1.4, Panel A), showing a large benchmark effect.

The upgrade of Qatar and U.A.E. from frontier to emerging market status in May 2014 shows that the benchmark effect can also generate significant shocks and reallocations across countries, bringing home changes to the rest of the countries sharing the same benchmark and producing contagion-like effects. This change triggered a large positive effect to other countries that shared the portfolio with these countries. This occurred because Qatar and U.A.E. accounted for around 40 percent of the MSCI Frontier Markets Index, and the other countries in the index were relatively small. Figure 1.5, Panel A depicts the cumulative reallocation of capital flows by frontier markets passive funds during these upgrades. While there is no reaction during the initial announcement date, during the three effective dates in our sample (the adjustment took place gradually) these funds reallocated their holdings out of the upgraded countries and into the other frontier countries.

Because Qatar and U.A.E. comprised around 40 percent of the MSCI Frontier Markets Index, the rest of the frontier markets were expected to have their benchmark weight increased considerably as frontier market funds reallocated away from Qatar and U.A.E.[38] The country comparison shows that, when the upgrade was announced, there was an increase in prices of the stocks of the other frontier countries in the MSCI index (Figure 1.5, Panel B). Coinciding with the movements in capital flows described in Figure 1.5 around the effective date, the asset prices of these countries increased when compared to the MSCI All Country World (Figure 1.5, Panel C). These jumps occurred during the days when passive funds rebalanced their portfolios.

[38]Given the size of the expected reallocation in the MSCI Frontier Markets Index, MSCI considered not removing Qatar and U.A.E. from this index (even when they would still be moved to the emerging market category). In the end, it decided to move forward with the removal, but did it gradually to ameliorate the disruption in the markets.

1.7 Conclusions

This paper shows how benchmarks affect asset allocations, capital flows, asset prices, and exchange rates across countries using a novel dataset of well-known benchmark indexes and mutual funds from around the world investing in equities and bonds. We find that benchmarks have important effects on these variables not only because funds explicitly declare a benchmark to compare their performance, but also because both passive and active funds tend to follow their benchmark asset allocation rather closely. The effects of benchmarks on mutual fund allocations are significant even after controlling for industry effects, country-time effects, macroeconomic fundamentals, and after addressing potential omitted variables and reverse causality problems. The decisions about allocations impact non-trivially capital flows and the upgrades and downgrades of countries are associated with significant price changes.

Although the results do not mean that benchmarks explain all the movements in capital flows, their impact can be particularly important at some points in time, for example, when benchmarks can coordinate managers across institutions whose actions are felt at the systemic level.[39] Benchmark movements could explain not only some of the findings documented in the literature, but also counterintuitive and unexpected movements in cross-country investments and asset prices. For example, advanced emerging countries tend to have larger weights in emerging market indexes than in developed market ones, which can help explain why countries might face capital outflows (inflows) when they are upgraded (downgraded). Moreover, countries sharing the benchmark are faced with capital inflows and asset price increases when a large country is removed from the index, regardless of their fundamentals. This kind of contagion does not involve leverage and is different from other types of contagion described in the literature (Calvo and Mendoza

[39] In particular, through their effect on individual portfolios, benchmarks could lead mutual funds to move in tandem in given countries. This is important because individual funds tend to be relatively small compared to the size of capital flows to a country, but together they can be quantitatively large. While there is a large literature showing that mutual funds might imitate their peers and display herding-type behavior (Scharfstein and Stein (1990); Froot et al. (1993); Hirshleifer et al. (1994); Hong et al. (2005)), only a handful of cases document coordination at the empirical level (Chen et al. (2010); Hertzberg et al. (2011)). This paper provides evidence consistent with another coordinating mechanism.

(2000); Kodres and Pritsker (2002); Manconi et al. (2012); Hau and Lai (2013)).

By impacting international capital flows, benchmark changes at the country level are also associated with aggregate price effects. In particular, stock and debt price indexes and exchange rates revalue or devalue depending on whether the benchmark changes imply capital inflows or outflows. These effects are observed not only during the announcement of the event but also during the date in which the benchmark changes become effective. These results are consistent with the importance of trading by investors following benchmarks, and take place beyond any information content that benchmark changes might entail. They also suggest possible limits to arbitrage in these markets when those announcements are made.

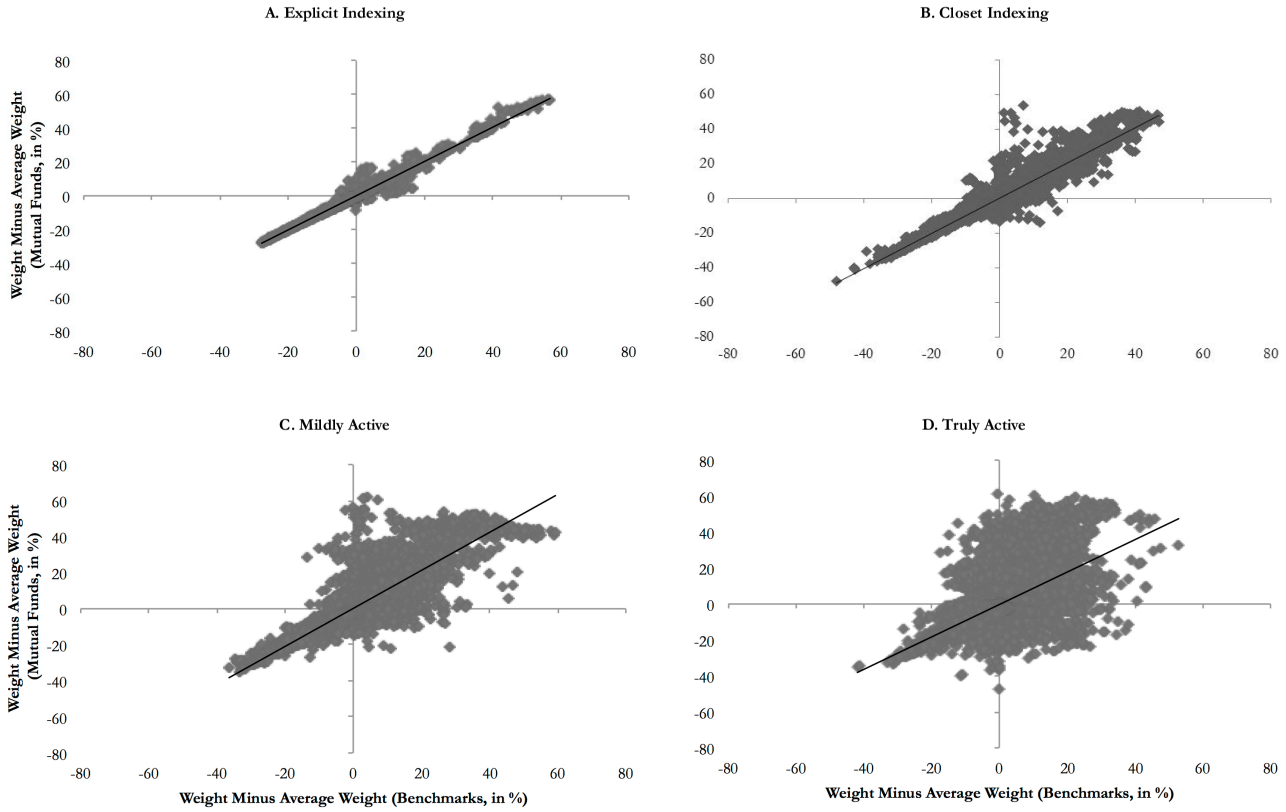
Although this paper presents several new findings, the research on the effects of benchmarks is just at the early stages. The evidence suggests that funds worldwide are becoming less active (Economist (2014b); Times (2015); Cremers et al. (2016)) and the number of benchmarks are increasing rapidly. Therefore, the types of mechanisms documented here are expected to grow over time and the literature might start incorporating them.

One issue that remains to be understood is whether the use of benchmarks can provide an explanation for the momentum and feedback loop theories (Barberis et al. (1998); Daniel et al. (1998); Gervais and Odean (2001); Shiller (2005); Vayanos and Woolley (2013)). A shock to a country's return could lead to a higher benchmark weight, a larger mutual fund allocation, and larger capital flows if funds are receiving inflows and capital is slow moving, perpetuating these loops. Benchmarks might also explain why international mutual funds can behave procyclically, herd, and affect financial markets, increasing volatility and disconnecting asset prices from macroeconomic fundamentals (Kaminsky et al. (2004); Gelos and Wei (2005); Khorana et al. (2005); Broner et al. (2006); Hellwig (2008); Gelos (2011); Mishkin (2011); Fratzscher (2012); Jotikasthira et al. (2012); Levy-Yeyati and Williams (2012); Raddatz and Schmukler (2012); Shiller (2012); IMF (2014); Shek et al. (2015); Forbes et al. (2016))

Another issue pending study is the general equilibrium effects of benchmarks when there are heterogeneous investors. Our results show quantity and price responses even to fully anticipated events. Given that some funds try to replicate their benchmark index almost mechanically, do other funds or sophisticated in-

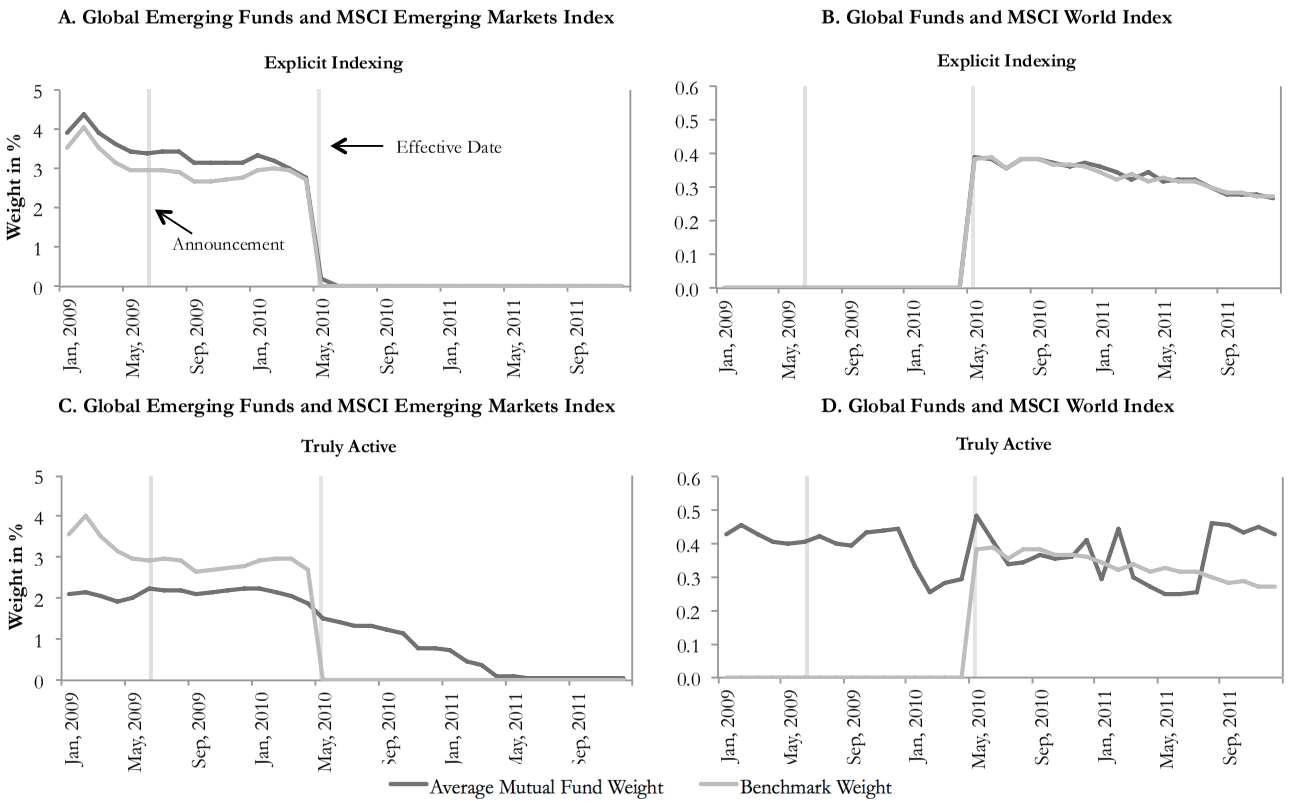
vestors anticipate or compensate for their reaction? Or do they also follow these benchmarks? And what are the effects of benchmarks on small and large firms' capital market financing and real activity?

Figure 1.1: Deviations in Mutual Fund and Benchmark Weights



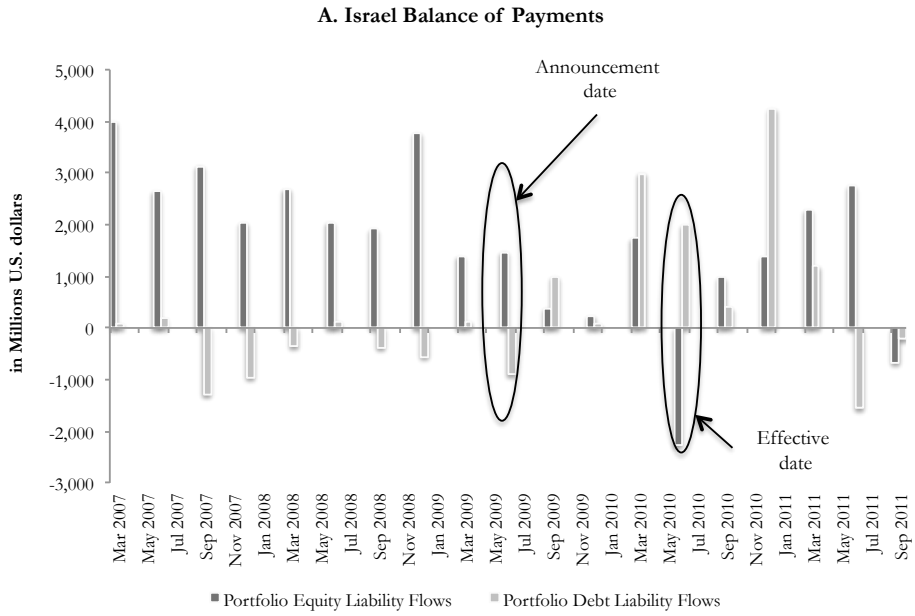
Notes: This figure shows scatter plots of the relation between mutual fund weights and benchmark weights for each country at each point in time. The panels show the scatter plots for explicit indexing (Panel A), closet indexing (Panel B), mildly active (Panel C), and truly active funds (Panel D). The vertical axis shows the mutual fund country weight for a certain benchmark minus the mutual fund average country weight across all the funds that invest in that country. The horizontal axis shows the benchmark weight of a country in a certain benchmark minus the average benchmark weight for the same country across all the benchmarks where the country is included.

Figure 1.2: The Upgrade of Israel from Emerging to Developed Market



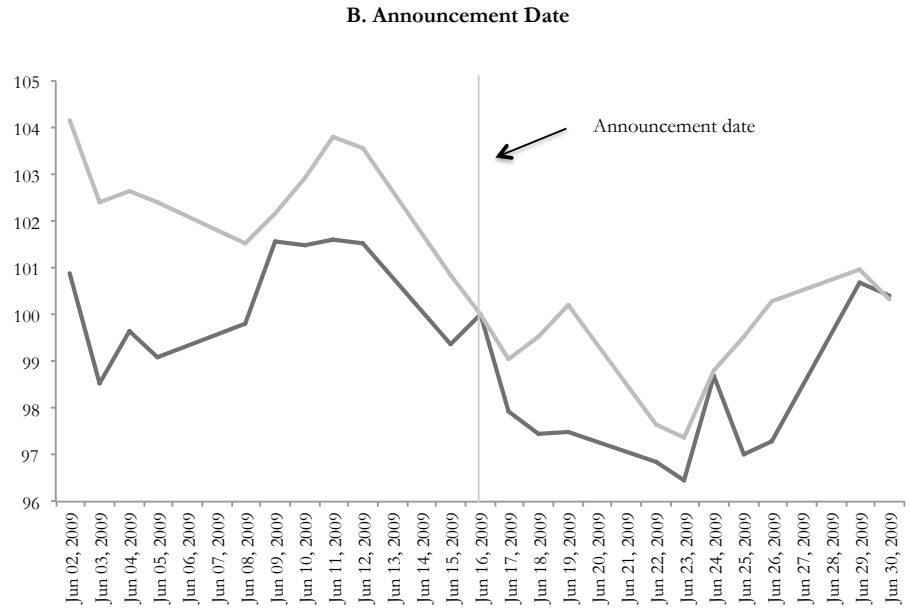
Notes: This figure shows the mean mutual fund and the benchmark weight around the upgrade of Israel from emerging to developed market in the MSCI indexes in May 2010. The mean weight in Israel is the weighted (by TNAs) average across funds for each type of fund. The left panels show the funds following the MSCI Emerging Markets index. The right panels show the funds following the MSCI World index. In each case we include the correspondent benchmark weight (MSCI Emerging Markets or MSCI World). The first grey bar indicates the month of the announcement and the second grey bar indicates the month the upgrade took place.

Figure 1.3 Panel A: Benchmark Effect: Israel MSCI Upgrade



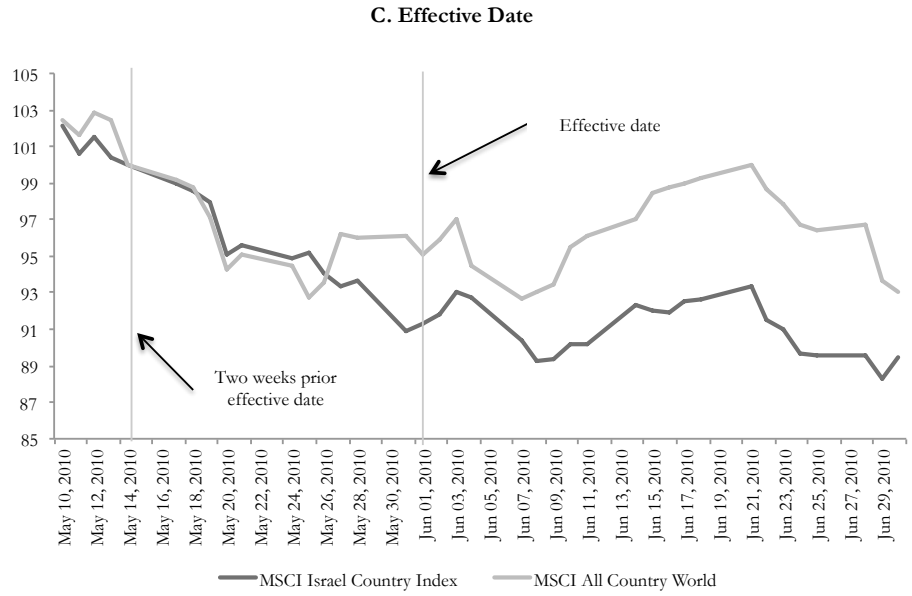
Notes: This figure shows the evolution of aggregate variables around Israel's upgrade. Panel A shows data for portfolio equity liability flows and portfolio debt liability flows for Israel quarterly between 2007 and 2011. Panel B shows the prices around the announcement date and Panel C around the effective date. Index returns is the Israel MSCI Country Index.

Figure 1.3 Panel B: Benchmark Effect: Israel MSCI Upgrade



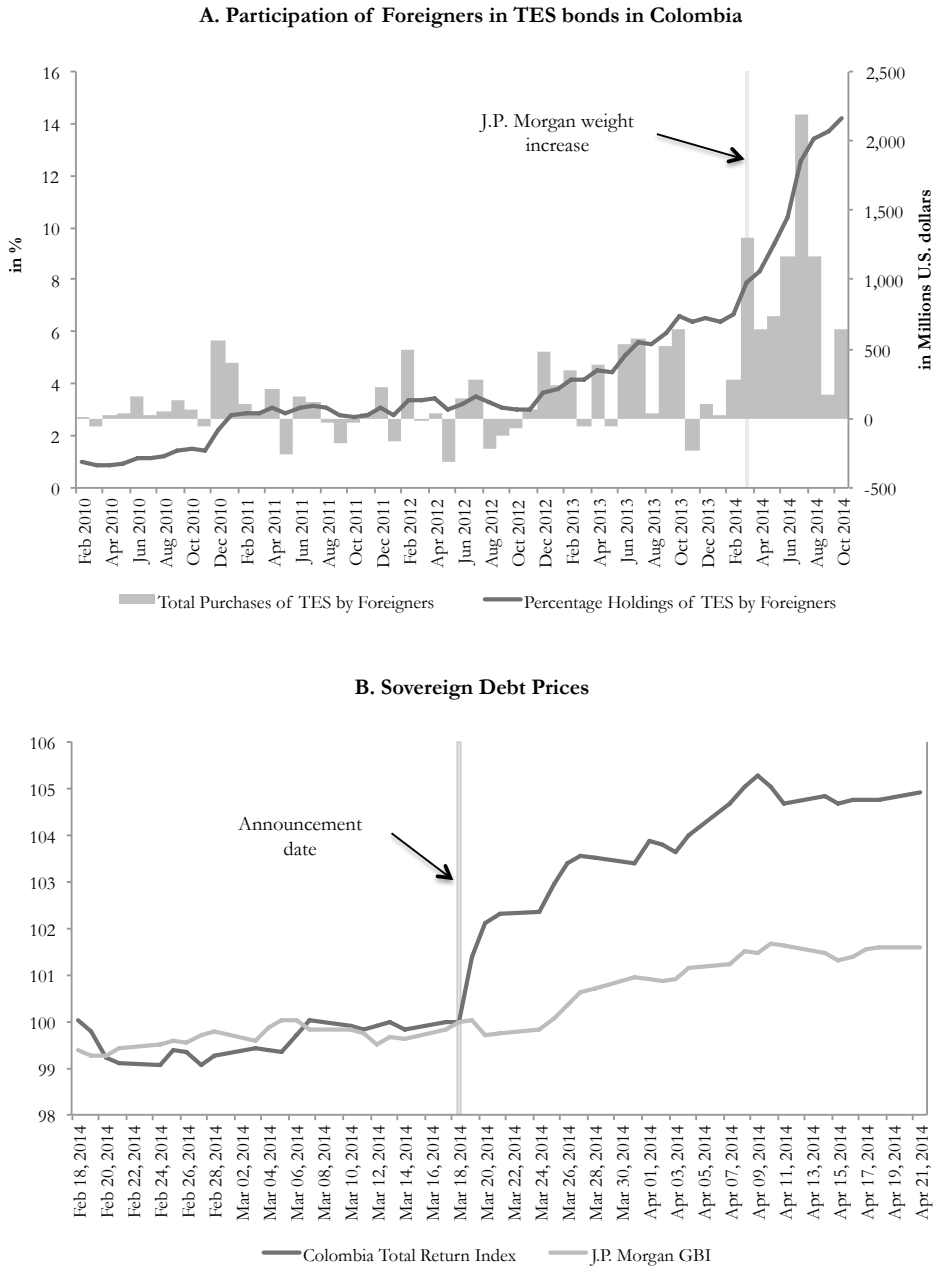
Notes: This figure shows the evolution of aggregate variables around Israel's upgrade. Panel A shows data for portfolio equity liability flows and portfolio debt liability flows for Israel quarterly between 2007 and 2011. Panel B shows the prices around the announcement date and Panel C around the effective date. Index returns is the Israel MSCI Country Index.

Figure 1.3 Panel C: Benchmark Effect: Israel MSCI Upgrade



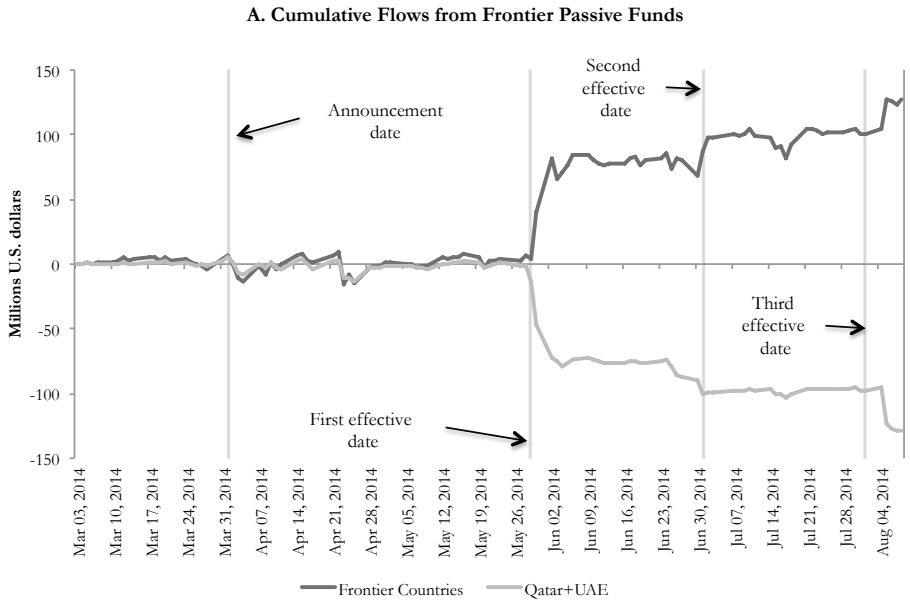
Notes: This figure shows the evolution of aggregate variables around Israel's upgrade. Panel A shows data for portfolio equity liability flows and portfolio debt liability flows for Israel quarterly between 2007 and 2011. Panel B shows the prices around the announcement date and Panel C around the effective date. Index returns is the Israel MSCI Country Index.

Figure 1.4: Benchmark Effect: Colombia Sovereign Debt Market



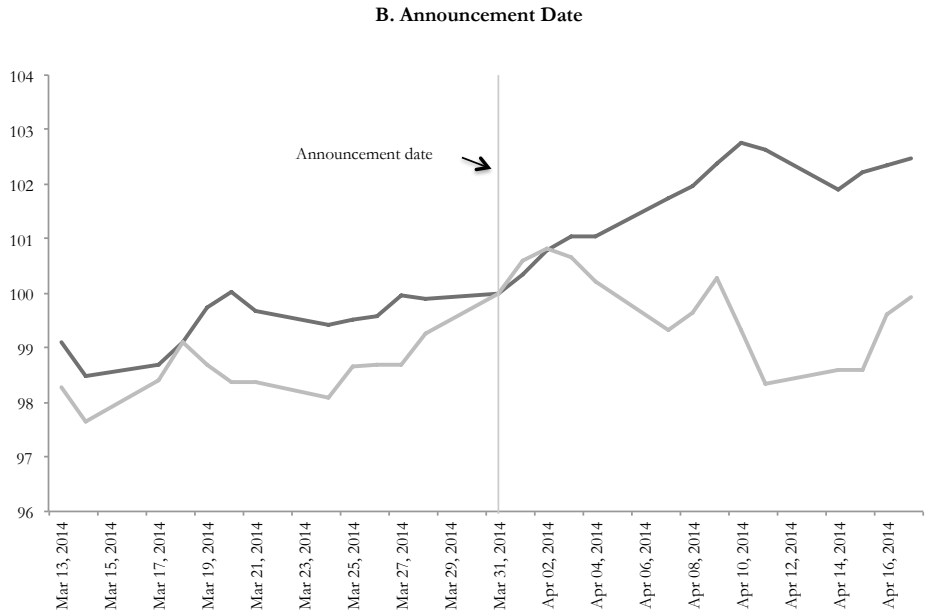
Notes: This figure displays the reaction of Colombia's sovereign debt market to a change in benchmarks from J.P. Morgan. Panel A presents the percentage and purchases of TES bond holdings belonging to foreigners in Colombia after J.P. Morgan's announcement about Colombia's increase in the local debt benchmark weight. Panel B shows the debt market for Colombia during the J.P. Morgan increase in weight for Colombia in its local currency denominated sovereign debt index. Indexes are the total return index (in local currency).

Figure 1.5, Panel A: Contagion in Frontier Markets



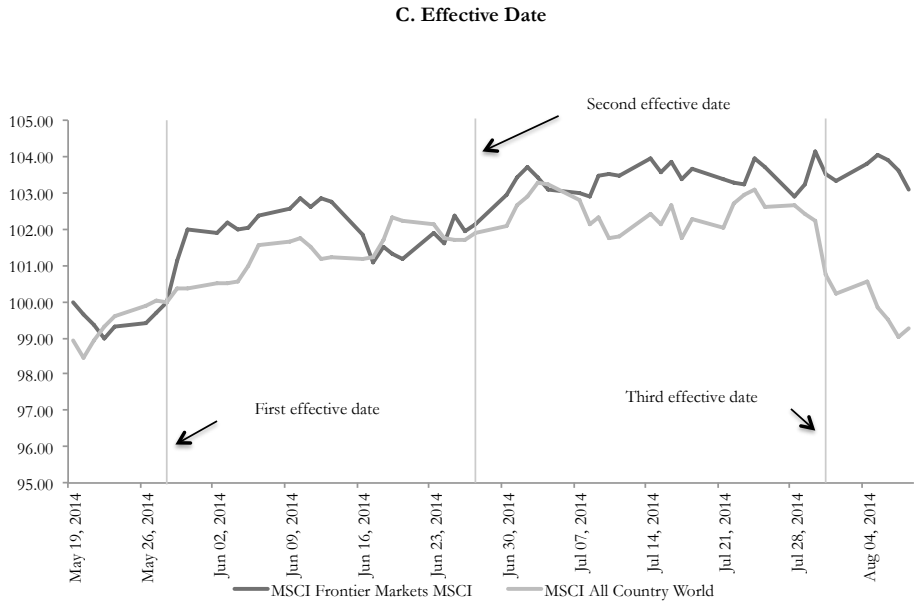
Notes: This figure shows the impact on other frontier countries of the MSCI upgrade of Qatar and United Arab Emirates. Panel A depicts the the total cumulative flows (starting in March 2014) due to reallocation in millions U.S. dollars. The figure is divided into all frontier countries after the upgrade and Qatar plus United Arab Emirates. Panels B and C present the announcement date for the stocks included in the frontier market indexes and a global factor. Panel B presents the effective date of the first rebalancing. Panel C shows the evolution of price for the same two groups for the effective date.

Figure 1.5, Panel B: Contagion in Frontier Markets



Notes: This figure shows the impact on other frontier countries of the MSCI upgrade of Qatar and United Arab Emirates. Panel A depicts the the total cumulative flows (starting in March 2014) due to reallocation in millions U.S. dollars. The figure is divided into all frontier countries after the upgrade and Qatar plus United Arab Emirates. Panels B and C present the announcement date for the stocks included in the frontier market indexes and a global factor. Panel B presents the effective date of the first rebalancing. Panel C shows the evolution of price for the same two groups for the effective date.

Figure 1.5, Panel C: Contagion in Frontier Markets



Notes: This figure shows the impact on other frontier countries of the MSCI upgrade of Qatar and United Arab Emirates. Panel A depicts the the total cumulative flows (starting in March 2014) due to reallocation in millions U.S. dollars. The figure is divided into all frontier countries after the upgrade and Qatar plus United Arab Emirates. Panels B and C present the announcement date for the stocks included in the frontier market indexes and a global factor. Panel B presents the effective date of the first rebalancing. Panel C shows the evolution of price for the same two groups for the effective date.

Table 1.1, Panel A: Weights vs. Benchmark Weights

Explanatory Variables	Total Sample	Active Share Classification: Explicit Indexing	Closet Indexing	Mildly Active	Truly Active
A. Equity Funds					
Dependent Variable: Weights					
Benchmark Weights	0.773 ***	0.921 ***	0.919 ***	0.819 ***	0.499 ***
	(0.008)	(0.013)	(0.011)	(0.010)	(0.009)
Fund-Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Fund-Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
Country-Time Fixed Effects	No	No	No	No	No
Number of Observations	2,524,798	42,029	577,241	988,198	917,330
R-Squared	0.912	0.989	0.966	0.907	0.842
Dependent Variable: Weights					
Benchmark Weights	0.673 ***	0.846 ***	0.890 ***	0.648 ***	0.347 ***
	(0.011)	(0.018)	(0.012)	(0.014)	(0.011)
Industry Weights	0.358 ***	0.196 ***	0.168 ***	0.444 ***	0.497 ***
	(0.011)	(0.023)	(0.017)	(0.013)	(0.011)
Fund-Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Fund-Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
Country-Time Fixed Effects	No	No	No	No	No
Number of Observations	2,524,798	42,029	577,241	988,198	917,330
R-Squared	0.914	0.989	0.967	0.910	0.845
Dependent Variable: Weights					
Benchmark Weights	0.743 ***	0.981 ***	0.928 ***	0.680 ***	0.423 ***
	(0.010)	(0.018)	(0.009)	(0.017)	(0.014)
Fund-Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Fund-Time Fixed Effects	No	No	No	No	No
Country-Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
Number of Observations	1,665,785	37,764	458,745	657,672	511,604
R-Squared	0.929	0.997	0.976	0.922	0.864
Dependent Variable: Changes in Weights					
Changes in Benchmark Weights	0.679 ***	0.792 ***	0.787 ***	0.726 ***	0.522 ***
	(0.011)	(0.016)	(0.015)	(0.014)	(0.011)
Fund-Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Fund-Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
Number of Observations	2,166,004	35,647	483,721	858,626	788,010
R-Squared	0.113	0.481	0.162	0.108	0.089

Notes: This table presents OLS regressions of mutual fund country weights against benchmark country weights with different sets of fixed effects and control variables. Panel A displays results for equity funds and Panel B for bond funds. Funds are divided by their active share classification. Results are presented in levels. Estimations in levels do not contain observations where both weights and benchmark weights are zero. The industry weights are the median weight in a certain country at a certain point in time for different segments of the mutual funds industry. Standard errors are in parenthesis and clustered at the benchmark-time level. *, **, and *** denote statistical significance at 10, 5, and 1 percent, respectively.

Table 1.1, Panel B: Weights vs. Benchmark Weights

Explanatory Variables	Total Sample	Active Share Classification: Explicit Indexing	Closet Indexing	Mildly Active	Truly Active
B. Bond Funds					
Dependent Variable: Weights					
Benchmark Weights	0.697 ***	0.424 ***	0.935 ***	0.843 ***	0.223 ***
	(0.022)	(0.032)	(0.015)	(0.023)	(0.040)
Fund-Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Fund-Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
Number of Observations	153,402	723	57,338	57,335	38,006
R-Squared	0.750	0.991	0.834	0.741	0.689
Dependent Variable: Weights					
Benchmark Weights	0.369 ***	0.466 ***	0.552 ***	0.328 ***	0.027
	(0.025)	(0.075)	(0.034)	(0.035)	(0.053)
Industry Weights	0.378 ***	0.133 ***	0.349 ***	0.430 ***	0.348 ***
	(0.018)	(0.030)	(0.022)	(0.026)	(0.039)
Fund-Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Fund-Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
Number of Observations	76,405	606	31,835	28,851	15,113
R-Squared	0.752	0.983	0.778	0.732	0.745
Dependent Variable: Weights					
Benchmark Weights	0.412 ***	-	0.737 ***	0.053	0.718 ***
	(0.038)	-	(0.052)	(0.050)	(0.085)
Macro Variables as Controls	No	-	No	No	No
Fund-Country Fixed Effects	Yes	-	Yes	Yes	Yes
Fund-Time Fixed Effects	No	-	No	No	No
Country-Time Fixed Effects	Yes	-	Yes	Yes	Yes
Number of Observations	88,918	-	37,132	33,577	17,533
R-Squared	0.770	-	0.849	0.780	0.726
Dependent Variable: Changes in Weights					
Changes in Benchmark Weights	0.517 ***	0.347 ***	0.576 ***	0.499 ***	0.421 ***
	(0.038)	(0.054)	(0.053)	(0.047)	(0.102)
Fund-Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Fund-Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
Number of Observations	77,386	635	32,409	29,076	15,266
R-Squared	0.156	0.241	0.116	0.142	0.196

Notes: This table presents OLS regressions of mutual fund country weights against benchmark country weights with different sets of fixed effects and control variables. Panel A displays results for equity funds and Panel B for bond funds. Funds are divided by their active share classification. Results are presented in levels. Estimations in levels do not contain observations where both weights and benchmark weights are zero. The industry weights are the median weight in a certain country at a certain point in time for different segments of the mutual funds industry. Standard errors are in parenthesis and clustered at the benchmark-time level. *, **, and *** denote statistical significance at 10, 5, and 1 percent, respectively.

Table 1.2: Log Difference Country Benchmark Weights

Explanatory Variables	Dependent Variable: Log Difference Country Benchmark Weights							
	Monthly					Semiannual	Annual	Biannual
A. Equity Benchmarks								
Relative Returns	0.959 ***	0.960 ***	0.960 ***	0.961 ***	0.932 ***	0.865 ***	0.830 ***	0.760 ***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.020)	(0.017)	(0.014)	(0.013)
Benchmark-Time Fixed Effects	No	Yes	No	Yes	No	No	No	No
Benchmark-Country Fixed Effects	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Country-Time Fixed Effects	No	No	No	No	Yes	Yes	Yes	Yes
Number of Observations	98,549	98,549	98,549	98,549	98,549	93,704	88,751	79,687
R-Squared	0.307	0.366	0.321	0.379	0.600	0.665	0.766	0.900
B. Bond Benchmarks								
Relative Returns	1.024 ***	1.022 ***	1.028 ***	1.027 ***	0.731 ***	1.065 ***	1.444 ***	1.778 ***
	(0.035)	(0.032)	(0.034)	(0.031)	(0.020)	(0.160)	(0.143)	(0.126)
Benchmark-Time Fixed Effects	No	Yes	No	Yes	No	No	No	No
Benchmark-Country Fixed Effects	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Country-Time Fixed Effects	No	No	No	No	Yes	Yes	Yes	Yes
Number of Observations	10,076	10,076	10,076	10,076	10,076	9,430	8,689	7,331
R-Squared	0.184	0.204	0.204	0.224	0.915	0.941	0.958	0.970

Notes: This table shows the results of ordinary least squares regressions of the log difference of country benchmark weights on relative returns. Panel A shows results for equity benchmarks and Panel B for bond benchmarks. Relative returns are the difference between country net returns and benchmark net returns, expressed as decimals. Estimations are performed at different frequencies and include different combinations of fixed effects. Only countries in the benchmark are considered for each estimation. Standard errors are in parenthesis and clustered at the benchmark-time level. *, **, and *** denote statistical significance at 10, 5, and 1 percent, respectively.

Table 1.3, Panel A: Weights vs. Benchmark Weights: Exogenous Events

Explanatory Variables	Total Sample	Active Share Classification: Explicit Indexing	Closet Indexing	Mildly Active	Truly Active
A. Equity Funds					
Dependent Variable: Changes in Weights					
Change in Buy-and-Hold Benchmark Weight	0.707 ***	0.816 ***	0.847 ***	0.712 ***	0.511 ***
	(0.016)	(0.029)	(0.023)	(0.023)	(0.015)
Change in Exogenous Component	0.378 ***	0.505 ***	0.477 ***	0.371 ***	0.253 ***
	(0.034)	(0.034)	(0.050)	(0.042)	(0.025)
Fund-Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Fund-Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
Number of Observations	2,092,625	34,739	479,150	834,466	744,270
R-Squared	0.086	0.237	0.157	0.080	0.055
Dependent Variable: Change in Weights					
Change in Benchmark Weights*Normal Times	0.720 ***	0.923 ***	0.851 ***	0.740 ***	0.557 ***
	(0.030)	(0.083)	(0.048)	(0.043)	(0.042)
Change in Benchmark Weights*Event Times	0.651 ***	0.731 ***	0.746 ***	0.625 ***	0.526 ***
	(0.022)	(0.030)	(0.028)	(0.029)	(0.022)
Fund-Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Fund-Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
Number of Observations	1,583,029	36,498	443,711	627,069	475,751
R-Squared	0.925	0.995	0.969	0.910	0.867
Test of Difference in Coefficients	0.069 **	0.192 **	0.105 *	0.115 **	0.031
Dependent Variable: Changes in Weights					
Changes in Buy-and-Hold Benchmark Weight	0.707 ***	-	0.837 ***	0.709 ***	0.644 ***
	(0.093)	-	(0.116)	(0.217)	(0.182)
Changes in Exogenous Component	0.904 ***	-	1.081 ***	1.022 ***	0.483 ***
	(0.248)	-	(0.303)	(0.367)	(0.118)
Fund-Country Fixed Effects	Yes	-	Yes	Yes	Yes
Fund-Time Fixed Effects	Yes	-	Yes	Yes	Yes
Number of Observations	3,387	-	934	1,553	885
R-Squared	0.701	-	0.665	0.717	0.739

Notes: The top part of each panel in this table presents OLS regressions of mutual fund country weights against benchmark country weights and the residual between benchmark weights and buy-and-hold benchmark weights (exogenous component), with different sets of fixed effects. The middle (bottom) part for equity (bond) funds shows regressions dividing the coefficients between no-event and exogenous event times. Exogenous event times are those beyond the 25th and 75th tails of the distribution of the sample during the months that MSCI revises the indexes. No-event times are observations within those tails plus all the months with no revisions. Test difference coefficients is a linear tests with the difference of coefficients for normal and event times. All regressions are estimated in differences. The bottom part for equity funds reports OLS regressions for equity funds of the changes in mutual fund country weights against the changes in buy-and-hold benchmark weights and the changes in the exogenous component, with different sets of fixed effects. The estimations are only for December 2001-June 2002, when MSCI conducted changes in the construction of its equity indexes. Panel A displays results for equity funds and Panel B for bond funds. Funds are divided by their active share classification. Results are presented in levels and in differences. Estimations in levels do not contain observations where both weights and benchmark weights are zero. Standard errors are in parenthesis and clustered at the benchmark-time level.*, **, and *** denote statistical significance at 10, 5, and 1 percent, respectively.

Table 1.3, Panel B: Weights vs. Benchmark Weights: Exogenous Events

Explanatory Variables	Total Sample	Active Share Classification: Explicit Indexing	Closet Indexing	Mildly Active	Truly Active
B. Bond Funds					
Dependent Variable: Change in Weights					
Change in Buy-and-Hold Benchmark Weight	0.477 ***	-	0.598 ***	0.428 ***	0.290 *
	(0.051)	-	(0.060)	(0.053)	(0.155)
Change in Exogenous Component	0.409 ***	-	0.542 ***	0.385 ***	0.142
	(0.048)	-	(0.059)	(0.051)	(0.133)
Fund-Country Fixed Effects	Yes	-	Yes	Yes	Yes
Fund-Time Fixed Effects	Yes	-	Yes	Yes	Yes
Number of Observations	70,924	-	29,603	26,552	14,165
R-Squared	0.298	-	0.115	0.134	0.450
Dependent Variable: Change in Weights					
Change in Benchmark Weights*Normal Times	0.758 ***	-	0.960 ***	0.835 ***	0.319
	(0.148)	-	(0.167)	(0.237)	(0.292)
Change in Benchmark Weights*Event Times	0.320 ***	-	0.489 ***	0.233 ***	0.064
	(0.052)	-	(0.061)	(0.051)	(0.178)
Fund-Country Fixed Effects	Yes	-	Yes	Yes	Yes
Fund-Time Fixed Effects	Yes	-	Yes	Yes	Yes
Number of Observations	84,913	-	35,594	32,058	16,621
R-Squared	0.227	-	0.199	0.119	0.299
Test of Difference in Coefficients	0.438 ***	-	0.471 ***	0.602 **	0.255

Notes: The top part of each panel in this table presents OLS regressions of mutual fund country weights against benchmark country weights and the residual between benchmark weights and buy-and-hold benchmark weights (exogenous component), with different sets of fixed effects. The middle (bottom) part for equity (bond) funds shows regressions dividing the coefficients between no-event and exogenous event times. Exogenous event times are those beyond the 25th and 75th tails of the distribution of the sample during the months that MSCI revises the indexes. No-event times are observations within those tails plus all the months with no revisions. Test difference coefficients is a linear tests with the difference of coefficients for normal and event times. All regressions are estimated in differences. The bottom part for equity funds reports OLS regressions for equity funds of the changes in mutual fund country weights against the changes in buy-and-hold benchmark weights and the changes in the exogenous component, with different sets of fixed effects. The estimations are only for December 2001-June 2002, when MSCI conducted changes in the construction of its equity indexes. Panel A displays results for equity funds and Panel B for bond funds. Funds are divided by their active share classification. Results are presented in levels and in differences. Estimations in levels do not contain observations where both weights and benchmark weights are zero. Standard errors are in parenthesis and clustered at the benchmark-time level.*, **, and *** denote statistical significance at 10, 5, and 1 percent, respectively.

Table 1.4: Capital Flows Variance Descomposition

Sample	Benchmark Flows	Active Flows	Benchmark Reallocation	Active Reallocation	Total Benchmark (1)+(3)	Total Active (2)+(4)
A. Total Sample						
All Funds	16.1	4.6	22.6	56.7	38.7	61.3
Explicit Indexing	50.7	3.7	17.1	28.5	67.8	32.2
Closet Indexing	21.1	1.8	15.0	62.0	36.1	63.9
Mildly Active	12.7	3.2	21.0	63.2	33.7	66.3
Truly Active	7.9	9.0	12.3	70.8	20.2	79.8
B. Normal Times						
All Funds	9.4	7.5	4.9	78.2	14.3	85.7
Explicit Indexing	49.6	5.3	13.3	31.8	62.9	37.1
Closet Indexing	8.1	2.2	4.5	85.2	12.6	87.4
Mildly Active	4.6	6.0	6.9	82.6	11.4	88.6
Truly Active	1.5	15.4	2.3	80.9	3.8	96.2
C. Event Times						
All Funds	48.6	3.1	24.1	24.2	72.7	27.3
Explicit Indexing	62.6	0.5	15.1	21.8	77.7	22.3
Closet Indexing	22.6	2.2	18.8	56.4	41.4	58.6
Mildly Active	13.6	3.0	23.6	59.7	37.2	62.8
Truly Active	8.9	8.8	14.0	68.3	22.9	77.1
D. MSCI Index Rebalancing						
All Funds	5.8	3.7	32.7	57.8	38.5	61.5
Explicit Indexing	8.3	1.1	34.8	55.7	43.1	56.9
Closet Indexing	5.7	0.8	27.9	65.6	33.6	66.4
Mildly Active	8.6	4.8	33.4	53.1	42.0	58.0
Truly Active	1.3	3.6	19.0	76.1	20.3	79.7

Notes: This table presents the variance descomposition of capital flows from mutual funds into four components. Benchmark flows is the estimated alpha times benchmark weight multiplied by fund flows. Active flows is the difference between the weight and benchmark weight multiplied by the estimated alpha, times fund flows. Benchmark reallocation is the past assets multiplied by fund returns times the estimated alpha multiplied by the difference between the benchmark weight and the buy-and-hold benchmark weight. Active reallocation is the difference between the active weight and the active buy-and-hold weight multiplied by lagged assets times fund returns. For each exercise, we construct the total capital flows (and components) within each country-date. Then, we obtain the variance at the country level, imputing equally the covariances across the four components and we present the average and median share explained by each component. Panel A presents results for the total sample. Panel B shows results for normal times. Panel C displays results for months with index rebalancing. Panel D depicts results for the months of the MSCI methodological change during 2001 and 2002.

Table 1.5: Event Study Analysis - Cumulative Returns - Asset Prices

	Asset Prices		
Time	Raw Returns	Excess Returns	Abnormal Returns
A. Announcement (T_A) and Effective Date (T_E)			
Returns on (T_A-2) and Returns on (TE-12)	0.05	-0.339	-0.223
	(0.261)	(0.242)	(0.211)
Cumulative Returns between (T_A-2) and (T_A) and Cumulative Returns between (T_E-12) and (T_E-10)	0.788 ***	0.205	0.431 **
	(0.262)	(0.214)	(0.220)
Cumulative Returns between (T_A-2) and (T_A+5) and Cumulative Returns between (T_E-12) and (T_E-5)	1.244 ***	0.583 **	0.745 ***
	(0.307)	(0.276)	(0.274)
Cumulative Returns between (T_A-2) and (T_A+10) and Cumulative Returns between (T_E-12) and (T_E)	2.356 ***	1.932 ***	1.884 ***
	(0.430)	(0.384)	(0.408)
Cumulative Returns between (T_A-2) and (T_A+15) and Cumulative Returns between (T_E-12) and (T_E+5)	2.621 ***	1.521 ***	1.833 ***
	(0.507)	(0.502)	(0.522)
Cumulative Returns between (T_A-2) and (T_A+20) and Cumulative Returns between (T_E-12) and (T_E+15)	2.224 ***	1.325 ***	1.34 **
	(0.544)	(0.583)	(0.655)
Number of Observations	79	79	79
B. Announcement Date (T_A)			
Returns on (T_A-2)	-0.025	-0.346	-0.155
	(0.193)	(0.187)	(0.179)
Cumulative Returns between (T_A-2) and (T_A)	1.27 ***	0.613 ***	0.925 ***
	(0.278)	(0.239)	(0.222)
Cumulative Returns between (T_A-2) and (T_A+5)	1.43 ***	1.073 ***	1.048 ***
	(0.340)	(0.315)	(0.317)
Cumulative Returns between (T_A-2) and (T_A+10)	1.709 ***	1.686 ***	1.167 **
	(0.592)	(0.490)	(0.520)
Cumulative Returns between (T_A-2) and (T_A+15)	2.302 ***	1.678 ***	1.587 **
	(0.647)	(0.609)	(0.662)
Cumulative Returns between (T_A-2) and (T_A+20)	1.94 ***	1.431 **	1.176 *
	(0.637)	(0.684)	(0.742)
Number of Observations	47	47	47
C. Effective Date (T_E)			
Returns on (T_E-12)	-0.045	-0.266	-0.377
	(0.363)	(0.319)	(0.317)
Cumulative Returns between (T_E-12) and (T_E-10)	0.082	-0.369	-0.278
	(0.483)	(0.371)	(0.401)
Cumulative Returns between (T_E-12) and (T_E-5)	0.974 **	-0.104	0.31
	(0.574)	(0.474)	(0.483)
Cumulative Returns between (T_E-12) and (T_E)	4.348 ***	3.174 ***	3.543 ***
	(0.893)	(1.008)	(1.074)
Cumulative Returns between (T_E-12) and (T_E+5)	3.090 ***	1.301 *	2.185 ***
	(0.820)	(0.862)	(0.856)
Cumulative Returns between (T_E-12) and (T_E+10)	2.64 ***	1.174	1.576 *
	(0.972)	(1.034)	(1.203)
Number of Observations	32	32	32

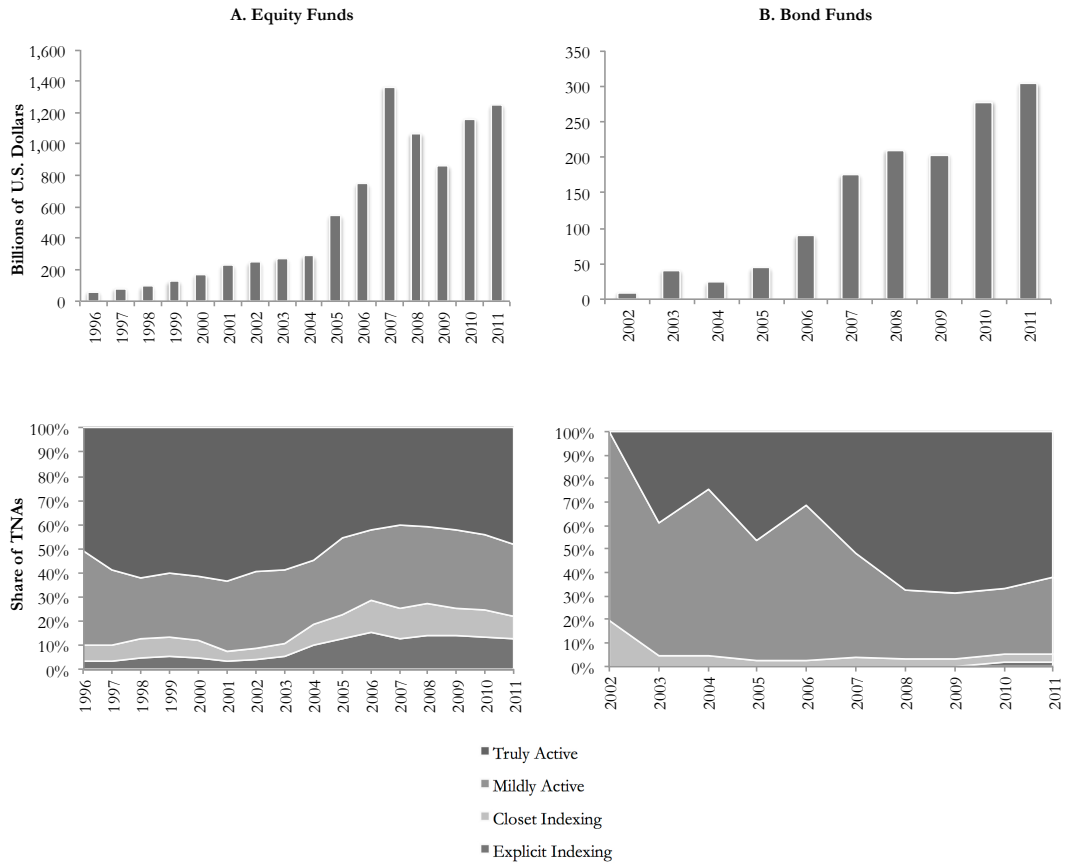
Notes: This table presents the results from an event study large benchmark changes. All returns are cumulative returns starting at the first day presented in the table. Raw returns are the net returns of the stock/debt market index or the exchange rate. Excess returns are returns minus a global factor. Abnormal returns are residuals of a one factor CAPM model. The global factors used are the MSCI All Country World for equity, the J.P. Morgan GBI for local currency bonds, the J.P. Morgan EMBI for investment/non-investment grade, and the average currency return for the exchange rate. Announcement date and effective date are denoted by TA and TE, respectively. Positive currency returns denote a depreciation. Standard errors are in parentheses. *, **, and *** denote statistical significance at 10, 5, and 1 percent, respectively.

Table 1.5: Event Study Analysis - Cumulative Returns - Exchange Rates

	Exchange Rate		
Time	Raw Returns	Excess Returns	Abnormal Returns
A. Announcement (T_A) and Effective Date (T_E)			
Returns on (T_A-2) and Returns on (TE-12)	0.04	0.063	0.172
	(0.110)	(0.071)	(0.194)
Cumulative Returns between (T_A-2) and (T_A) and			
Cumulative Returns between (T_E-12) and (T_E-10)	-0.266 ***	-0.292 ***	-0.326 ***
	(0.103)	(0.091)	(0.102)
Cumulative Returns between (T_A-2) and (T_A+5) and			
Cumulative Returns between (T_E-12) and (T_E-5)	-0.274 **	-0.204 **	-0.247 **
	(0.125)	(0.107)	(0.119)
Cumulative Returns between (T_A-2) and (T_A+10) and			
Cumulative Returns between (T_E-12) and (T_E)	-0.610 ***	-0.529 ***	-0.51 ***
	(0.199)	(0.166)	(0.191)
Cumulative Returns between (T_A-2) and (T_A+15) and			
Cumulative Returns between (T_E-12) and (T_E+5)	-0.489 **	-0.358 **	-0.319
	(0.249)	(0.219)	(0.261)
Cumulative Returns between (T_A-2) and (T_A+20) and			
Cumulative Returns between (T_E-12) and (T_E+15)	-0.141	-0.184	-0.229
	(0.254)	(0.231)	(0.274)
Number of Observations	65	65	65
B. Announcement Date (T_A)			
Returns on (T_A-2)	-0.006	0.004	-0.041
	(0.093)	(0.073)	(0.057)
Cumulative Returns between (T_A-2) and (T_A)	-0.329 **	-0.394 ***	-0.447 ***
	(0.150)	(0.130)	(0.144)
Cumulative Returns between (T_A-2) and (T_A+5)	-0.245 *	-0.171	-0.273 *
	(0.178)	(0.153)	(0.176)
Cumulative Returns between (T_A-2) and (T_A+10)	-0.59 ***	-0.413 **	-0.457 **
	(0.233)	(0.171)	(0.217)
Cumulative Returns between (T_A-2) and (T_A+15)	-0.513 **	-0.411 **	-0.465 *
	(0.271)	(0.239)	(0.309)
Cumulative Returns between (T_A-2) and (T_A+20)	-0.206	-0.218	-0.383
	(0.345)	(0.313)	(0.361)
Number of Observations	39	39	39
C. Effective Date (T_E)			
Returns on (T_E-12)	-0.063	0.035	0.307
	(0.079)	(0.057)	(0.231)
Cumulative Returns between (T_E-12) and (T_E-10)	-0.172 *	-0.141	-0.142
	(0.127)	(0.116)	(0.132)
Cumulative Returns between (T_E-12) and (T_E-5)	-0.317 **	-0.252 **	-0.208 *
	(0.167)	(0.140)	(0.139)
Cumulative Returns between (T_E-12) and (T_E)	-0.608 **	-0.679 **	-0.54 **
	(0.354)	(0.305)	(0.296)
Cumulative Returns between (T_E-12) and (T_E+5)	-0.452	-0.279	-0.097
	(0.479)	(0.419)	(0.465)
Cumulative Returns between (T_E-12) and (T_E+10)	-0.043	-0.134	0.021
	(0.375)	(0.343)	(0.425)
Number of Observations	26	26	26

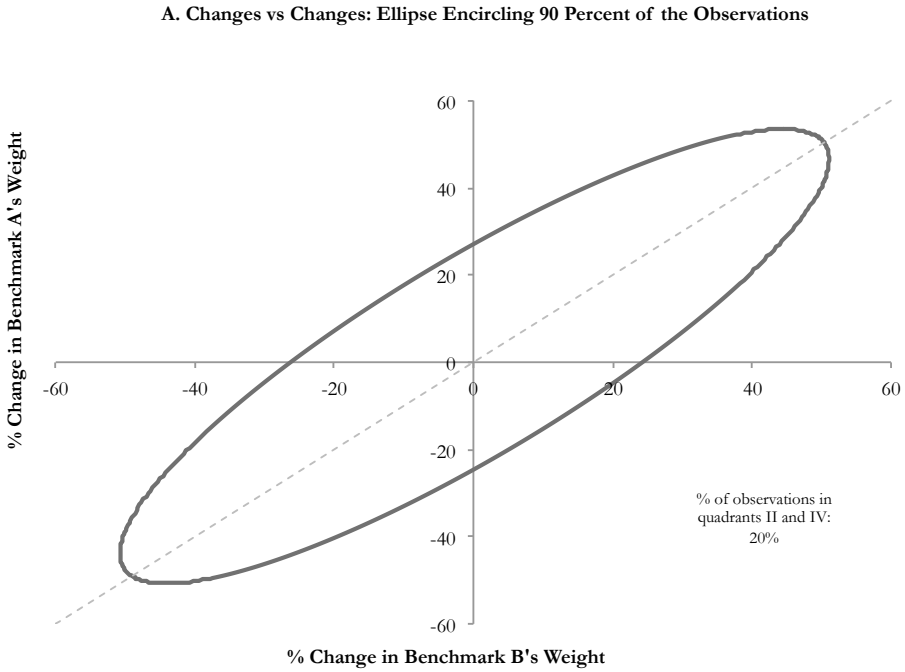
Notes: This table presents the results from an event study large benchmark changes. All returns are cumulative returns starting at the first day presented in the table. Raw returns are the net returns of the stock/debt market index or the exchange rate. Excess returns are returns minus a global factor. Abnormal returns are residuals of a one factor CAPM model. The global factors used are the MSCI All Country World for equity, the J.P. Morgan GBI for local currency bonds, the J.P. Morgan EMBI for investment/non-investment grade, and the average currency return for the exchange rate. Announcement date and effective date are denoted by TA and TE, respectively. Positive currency returns denote a depreciation. Standard errors are in parentheses. *, **, and *** denote statistical significance at 10, 5, and 1 percent, respectively.

Appendix Figure 1.1: Total Net Assets



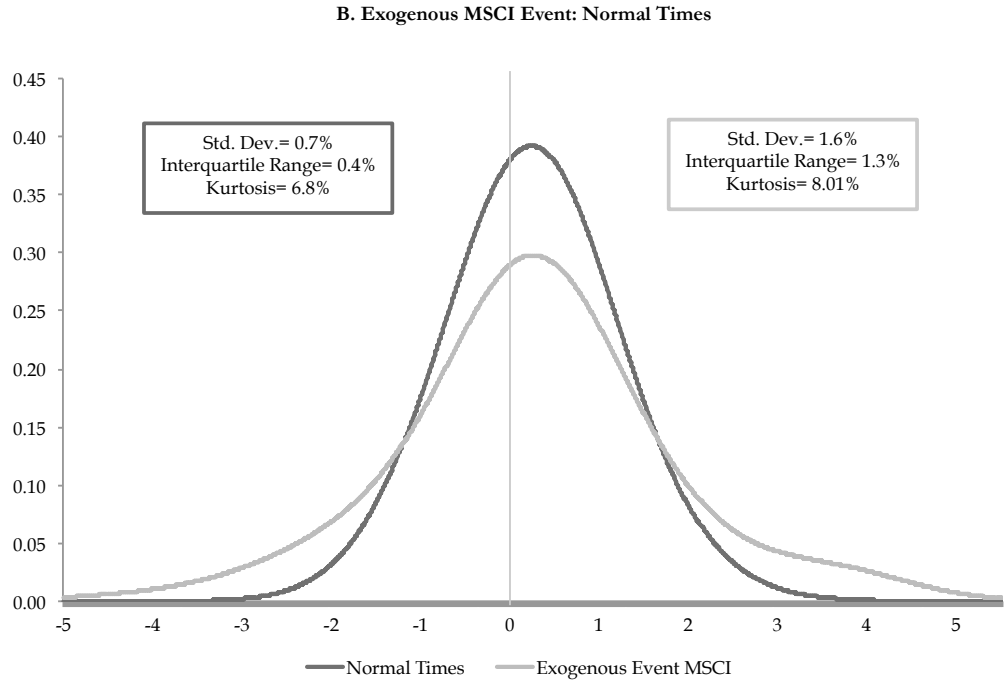
Notes: This figure shows the average total net assets (TNAs) per year in the database and how these total net assets (TNAs) are distributed among funds with different degree of activism. Panel A shows these figures for equity funds and Panel B for bond funds. Although our data on bond funds start in 1997, for this figure we exclude the years up to 2001 due to the few observations available.

Appendix Figure 1.2, Panel A: Identification through Benchmarks



Notes: This figure shows different illustrations of benchmark changes. Panel A shows an ellipse containing 90 percent of the observations of all the pairwise combinations for two different benchmarks for the same country at the same time for annual changes in benchmark weights. Panel B shows the estimated kernel distribution of the change in exogenous component for December 2001 and June 2002 (Exogenous Event MSCI) versus the rest of the sample between 2000 and 2002 (Normal Times). Kernel estimates are Gaussian with a bandwith of 0.85.

Appendix Figure 1.2, Panel B: Identification through Benchmarks



Notes: This figure shows different illustrations of benchmark changes. Panel A shows an ellipse containing 90 percent of the observations of all the pairwise combinations for two different benchmarks for the same country at the same time for annual changes in benchmark weights. Panel B shows the estimated kernel distribution of the change in exogenous component for December 2001 and June 2002 (Exogenous Event MSCI) versus the rest of the sample between 2000 and 2002 (Normal Times). Kernel estimates are Gaussian with a bandwith of 0.85.

Appendix Table 1.1: Mutual Fund Summary Statistics

A. Summary Statistics

Type of Fund	Number of Funds	Number of Observations (Fund-Month)	First Available Date	Last Available Date	Median Observations per Fund (Months)
Equity	2,837	156,253	January 1996	July 2012	70
Bond	838	35,219	March 1997	June 2012	54

B. Number of Funds and Observations by Different Attributes

Degree of Activism	Number of Funds	Number of Observations (Fund-Month)	Type of Fund	Number of Funds	Number of Observations (Fund-Month)
Equity Funds					
Explicit Indexing	85	3,420	Global	569	29,037
Closet Indexing	939	50,906	Global Emerging	594	32,950
Mildly Active	994	58,960	Regional	1,674	94,266
Truly Active	819	42,967			
Bond Funds					
Explicit Indexing	21	588	Global	554	22,958
Closet Indexing	54	2,851	Global Emerging	220	8,568
Mildly Active	714	29,768	Regional	64	3,693
Truly Active	49	2,012			

C. Number of Funds and Observations by Domicile

Domicile	Number of Funds	Number of Observations (Fund-Month)	Domicile	Number of Funds	Number of Observations (Fund-Month)
Equity Funds					
Belgium	51	2,495	Luxembourg	348	22,360
Canada	349	22,225	United Kingdom	225	16,615
Denmark	85	4,995	United States	495	25,887
France	158	6,206	Others	917	44,588
Ireland	209	10,882			
Bond Funds					
Denmark	40	2,002	Luxembourg	31	1,700
Germany	35	1,421	United Kingdom	36	2,008
Ireland	56	2,314	United States	85	4,725
Israel	43	1,367	Others	479	18,720
Italy	33	953			

Notes: This table shows summary statistics of equity and bond mutual funds from the joint Morningstar Direct/EPFR database. Funds are divided by degree of activism, type of fund, and according to the country in which the fund is based (domicile). When divided by domicile the category Others includes Andorra, Australia, Austria, Bahrain, Bermuda, British Virgin Islands, Cayman Islands, Estonia, Finland, Germany, Greece, Guernsey, Hong Kong, India, Isle of Man, Israel, Italy, Japan, Jersey, Liechtenstein, Lithuania, Mauritius, Netherlands, Netherlands Antilles, Norway, Portugal, Singapore, Slovenia, South Africa, South Korea, Spain, Sweden, Switzerland, the United Arab Emirates, and funds with unassigned domicile.

Appendix Table 1.2: List of Benchmarks Used

Equity and Bond Benchmarks

25% MSCI Brazil+25% MSCI Russia+25% MSCI India+25% MSCI China	MSCI AC ASIA Pacific	MSCI Europe Small Cap
50% MSCI AC Far East + 50% MSCI AC Far East ex-Japan	MSCI AC Asia Pacific Ex-Japan	MSCI Frontier Markets
50% MSCI Japan + 50% MSCI AC Asia-Pacific Free ex-Japan	MSCI AC Europe	MSCI GCC Ex Saudi Arabia
60% MSCI AC Asia Pacific ex-Japan + 40% MSCI Japan	MSCI AC Far East	MSCI Pacific
75% MSCI AC Far East Free ex-Japan + 25% MSCI Japan	MSCI AC Far East Ex-Japan	MSCI Pacific Ex-Japan
75% MSCI Arabian Markets ex Saudi Arabia + 25% MSCI Saudi Arabian Domestic	MSCI AC Pacific	MSCI World
87% MSCI Eastern Europe + 13% MSCI Russia	MSCI AC Pacific Ex-Japan	MSCI World Small Cap
Citigroup World Ex-US Extended	MSCI AC World	S&P Asia 50 TR
DJ Asia Pac Select Dividend 30	MSCI AC World Ex-US	S&P BRIC 40
DJ Asia Pacific Selected Div 30	MSCI AC World Investable Mkt	S&P Citi BMI Emerging Markets
DJ Asian Titans	MSCI Arabian Markets Ex-Saudi Arabia	S&P Citi BMI European Em Capped
DJ Global Titans 50	MSCI BRIC	S&P Citi EM EPAC
Euro Stoxx	MSCI EAFE	S&P Citi EMI Global
Euro STOXX 50	MSCI EAFE Small Cap	S&P Citi PMI Eurozone Growth
FTSE AW Eastern Europe	MSCI EM Asia	S&P Citi PMI World Value
FTSE RAFI Emerging Markets	MSCI EM Eastern Europe	S&P Europe 350
FTSE World	MSCI EM Eastern Europe ex Russia	S&P Global 100
FTSE World Asia Pacific	MSCI EM EMEA	S&P IFC Investable
FTSE World Eurobloc	MSCI EM Europe	S&P IFC Investable Composite
FTSE World Europe	MSCI EM Far East	S&P IFCG Asia
FTSE World Europe ex-UK	MSCI EM Latin America	S&P IFCG Latin America
FTSE World Pacific ex-Japan	MSCI Emerging Markets	S&P IFCG Middle East & Africa
J.P. Morgan EMBI Global	MSCI Emerging Markets Europe+Middle East	S&P IFCI Composite
J.P. Morgan EMBI Global Diversified	MSCI EMU	S&P IFC Investable Latin America
J.P. Morgan EMBI+	MSCI Europe	S&P IFCI Latin America
MSCI AC Asia Ex-Japan	MSCI Europe Ex-UK	S&P Latin America 40

Notes: This table presents the complete list of equity and bond benchmarks in our database using the following abbreviations: AC (All Country), EM (Emerging Markets), EAFE (Europe, Australasia, and Far East), EMU (European Monetary Union), and EMEA (Emerging Markets Europe, Middle East, and Africa). EMBI+, EMBI Global, and EMBI Global Diversified are bond benchmarks.

Appendix Table 1.3: Capital Flows Variance Descomposition by Country

Sample	Benchmark Flows	Active Flows	Benchmark Reallocation	Active Reallocation	Total Benchmark (1)+(3)	Total Active (2)+(4)
			A. Argentina			
All Funds	6.8	2.3	35.5	55.4	42.3	57.7
Explicit Indexing	17.2	0.6	47.5	34.8	64.7	35.3
Closet Indexing	10.3	1.2	26.1	62.5	36.4	63.6
Mildly Active	8.4	3.4	41.4	46.8	49.8	50.2
Truly Active	0.9	6.7	3.4	89.0	4.3	95.7
			B. Colombia			
All Funds	12.6	5.4	27.5	54.5	40.1	59.9
Explicit Indexing	23.4	6.0	22.9	47.7	46.3	53.7
Closet Indexing	13.6	5.4	18.4	62.6	32.0	68.0
Mildly Active	7.1	3.6	19.6	69.8	26.7	73.3
Truly Active	11.6	8.3	10.4	69.7	22.0	78.0
			C. Israel			
All Funds	3.6	1.2	62.9	32.3	66.5	33.5
Explicit Indexing	4.6	0.7	88.7	6.0	93.3	6.7
Closet Indexing	6.6	1.7	54.6	37.0	61.2	38.8
Mildly Active	7.4	3.3	43.9	45.3	51.4	48.6
Truly Active	3.0	2.4	44.3	50.4	47.3	52.7
			D. Venezuela			
All Funds	7.5	2.6	39.1	50.7	46.7	53.3
Explicit Indexing	0.8	0.4	45.0	53.8	45.8	54.2
Closet Indexing	12.6	3.8	37.1	46.5	49.7	50.3
Mildly Active	9.7	3.2	31.6	55.5	41.3	58.7
Truly Active	1.4	15.9	10.2	72.5	11.6	88.4

Notes: This table presents the variance descomposition of capital flows from mutual funds into four components for different countries that were downgraded or upgraded from a benchmark index. Benchmark flows is the estimated alpha times benchmark weight multiplied by fund flows. Active flows is the difference between the weight and benchmark weight multiplied by the estimated alpha, times fund flows. Benchmark reallocation is the past assets multiplied by fund returns times the estimated alpha multiplied by the difference between the benchmark weight and the buy-and-hold benchmark weight. Active reallocation is the difference between the active weight and the active buy-and-hold weight multiplied by lagged assets times fund returns. For each exercise, we construct the total capital flows (and components) within each country-date. Then, we obtain the variance at the country level, imputing equally the covariances across the four components and we present the average and median share explained by each component.

Appendix Table 1.4: List of Direct Benchmark Effect Episodes

Country	Equity/Debt	Announcement Date	Effective Date	Change Type	From	To	Company
A. Equity Upgrades/Downgrades							
Argentina	Equity	02/19/2009	06/01/2009	Downgrade	EM	FM	MSCI
Greece	Equity	06/12/2013	12/01/2013	Downgrade	DM	EM	MSCI
Israel	Equity	06/16/2009	06/01/2010	Upgrade	EM	DM	MSCI
Jordan	Equity	06/19/2008	12/01/2008	Downgrade	EM	FM	MSCI
Morocco	Equity	06/12/2013	12/01/2013	Downgrade	EM	FM	MSCI
Qatar	Equity	06/12/2013	06/01/2014	Upgrade	FM	EM	MSCI
U.A.E.	Equity	06/12/2013	06/01/2014	Upgrade	FM	EM	MSCI
B. Contagion Episode Qatar/UAE							
Argentina	Equity	04/01/2014	06/01/2014	Upweight	FM	FM	MSCI
Bahrain	Equity	04/01/2014	06/01/2014	Upweight	FM	FM	MSCI
Bangladesh	Equity	04/01/2014	06/01/2014	Upweight	FM	FM	MSCI
Estonia	Equity	04/01/2014	06/01/2014	Upweight	FM	FM	MSCI
Jordan	Equity	04/01/2014	06/01/2014	Upweight	FM	FM	MSCI
Kazakhstan	Equity	04/01/2014	06/01/2014	Upweight	FM	FM	MSCI
Kenya	Equity	04/01/2014	06/01/2014	Upweight	FM	FM	MSCI
Kuwait	Equity	04/01/2014	06/01/2014	Upweight	FM	FM	MSCI
Mauritius	Equity	04/01/2014	06/01/2014	Upweight	FM	FM	MSCI
Morocco	Equity	04/01/2014	06/01/2014	Upweight	FM	FM	MSCI
Nigeria	Equity	04/01/2014	06/01/2014	Upweight	FM	FM	MSCI
Oman	Equity	04/01/2014	06/01/2014	Upweight	FM	FM	MSCI
Pakistan	Equity	04/01/2014	06/01/2014	Upweight	FM	FM	MSCI
Romania	Equity	04/01/2014	06/01/2014	Upweight	FM	FM	MSCI
Slovenia	Equity	04/01/2014	06/01/2014	Upweight	FM	FM	MSCI
Sri Lanka	Equity	04/01/2014	06/01/2014	Upweight	FM	FM	MSCI
Vietnam	Equity	04/01/2014	06/01/2014	Upweight	FM	FM	MSCI
Qatar	Equity	04/01/2014	06/01/2014	Downweight	FM	FM	MSCI
U.A.E.	Equity	04/01/2014	06/01/2014	Downweight	FM	FM	MSCI
C. Episodes for Local Currency Denominated Debt							
Hungary	Debt	11/05/2013	11/05/2013	Downgrade	Barclays GAI	Standalone	Barclays
Israel	Debt	10/03/2011	01/01/2012	Upgrade	Standalone	Barclays GAI	Barclays
Malaysia	Debt	11/04/2014	03/31/2015	Upgrade	Standalone	Barclays GAI	Barclays
Russia	Debt	11/05/2013	03/31/2014	Upgrade	Standalone	Barclays GAI	Barclays
Taiwan	Debt	10/03/2011	01/01/2012	Downgrade	Barclays GAI	Standalone	Barclays
Turkey	Debt	11/05/2013	03/31/2014	Upgrade	Standalone	Barclays GAI	Barclays
Mexico	Debt	03/31/2010	10/01/2010	Upgrade	Standalone	WGBI	Citigroup
South Africa	Debt	06/10/2012	10/01/2012	Upgrade	Standalone	WGBI	Citigroup
Colombia	Debt	03/19/2014	10/01/2014	Upweight	GBI	GBI	J.P. Morgan
Nigeria	Debt	08/15/2012	12/01/2012	Upgrade	Standalone	GBI	J.P. Morgan
Peru	Debt	08/03/2015	11/30/2015	Downgrade	GBI	Standalone	J.P. Morgan
Romania	Debt	01/15/2013	05/01/2013	Upgrade	Standalone	GBI	J.P. Morgan
Thailand	Debt	10/12/2010	09/01/2011	Downweight	GBI	GBI	J.P. Morgan
D. Investment and Non-Investment Grade Episodes							
Brazil	Debt	-	04/29/2008	Upgrade	Non-Investment Grade	Investment Grade	S&P
Bulgaria	Debt	-	06/24/2004	Upgrade	Non-Investment Grade	Investment Grade	S&P
Colombia	Debt	-	08/10/1999	Downgrade	Investment Grade	Non-Investment Grade	Fitch
Colombia	Debt	-	03/16/2011	Upgrade	Non-Investment Grade	Investment Grade	S&P
Hungary	Debt	11/11/2011	12/21/2011	Downgrade	Investment Grade	Non-Investment Grade	S&P
Indonesia	Debt	-	12/15/2011	Upgrade	Non-Investment Grade	Investment Grade	Fitch
Mexico	Debt	-	01/15/2000	Upgrade	Non-Investment Grade	Investment Grade	Fitch
Peru	Debt	-	04/02/2008	Upgrade	Non-Investment Grade	Investment Grade	Fitch
Philippines	Debt	-	03/26/2013	Upgrade	Non-Investment Grade	Investment Grade	Fitch
Russia	Debt	07/28/2003	10/08/2003	Upgrade	Non-Investment Grade	Investment Grade	Moody's
South Korea	Debt	12/21/1998	01/19/1999	Upgrade	Non-Investment Grade	Investment Grade	Fitch
Thailand	Debt	-	06/24/1999	Upgrade	Non-Investment Grade	Investment Grade	Fitch
Turkey	Debt	-	11/05/2012	Upgrade	Non-Investment Grade	Investment Grade	Fitch
Uruguay	Debt	-	04/03/2012	Upgrade	Non-Investment Grade	Investment Grade	S&P

Notes: This table details all the episodes with significant benchmark changes due to upgrades/downgrades of countries. Panel A presents episodes from MSCI with upgrades and downgrades. Panel B shows all countries affected by the upgrade of Qatar and United Arab Emirates. Panel C details debt upgrades and downgrades from Barclays, Citigroup and J.P. Morgan. Panel D shows upgrades and downgrades from rating agencies.

Appendix 1: Benchmark and Portfolio Choice

This appendix briefly summarizes the determinants of the relation between benchmarks and actual portfolios, starting from the literature on portfolio allocations under benchmark or tracking error constraints. This framework might help understand and interpret the results presented in the paper.

Consider the problem faced by the manager of fund i that is deciding his portfolio allocation across a set of N assets, in our case N different countries. The manager's performance is measured against that of a benchmark index, whose portfolio allocation across the N countries is given by $w_i^B \in \mathbb{R}^N$, such that $w_{ic}^B \in [0,1], c = \{1,...,N\}, \sum_{c=1}^{N} w_{ic}^B = 1$. The subscript i is used to indicate that the benchmark index corresponds to that tracked by fund i and the subscript c denotes the elements of w_i^B that index different countries. These properties mean that the benchmark is a long-only portfolio (no short-long strategies are allowed) and that the allocations exhaust all the resources available.

Roll (1992) and Brennan (1993), among others, have shown that a manager with mean-variance preferences relative to the benchmark will choose a portfolio allocation w_i that can be expressed as

$$w_{ic} = w_{ic}^B + w_{ic}^h \tag{1.8}$$

where w_i^h is a hedge portfolio that is proportional to the difference between the minimum variance portfolio and the portfolio where a line through the minimum variance portfolio intersects the efficient portfolio frontier. For a manager that is constrained to follow long-only portfolios, the hedge portfolio must hold

$$-w_{ic}^B \leq w_{ic}^h \leq 1 - w_{ic}^B \qquad c = \{1,...,N\} \tag{1.9}$$

$$\sum_{j=1}^{N} w_{ic}^h = 0 \tag{1.10}$$

The relative importance of the hedge portfolio depends on the manager's risk aversion, or alternatively on the amount of tracking error (maximum difference between the return of the manager's portfolio and that of the benchmark) that he

is allowed (Roll (1992)). Intuitively, the less risk averse the manager, or the larger the tracking error, the more relevant is the hedge portfolio and the less relevant is the benchmark for the manager's portfolio.

Assume now that we fit a linear regression by OLS to the relation between the manager's and the benchmark portfolio allocations

$$w_{ic} = \alpha + \beta w_{ic}^{B} = \varepsilon_{ic} \tag{1.11}$$

As it is well known, the estimated coefficient β is given by

$$\hat{\beta} = \frac{Cov\left(w_{ic}^{B}, w_{ic}\right)}{Var\left(w_{ic}^{B}\right)} = 1 + \frac{Cov\left(w_{ic}^{B}, w_{ic}^{h}\right)}{Var\left(w_{ic}^{B}\right)} \tag{1.12}$$

So, the coefficient will be larger or smaller than one depending on whether the covariance between the benchmark and the hedge portfolio is positive or negative. For instance, if the manager tends to overweight (underweight) the countries with the highest benchmark weights the covariance will be positive (negative) and the coefficient will be larger (smaller) than one.

The long-only constraint imposed on the hedge portfolio biases this covariance to be negative. In fact, assume that the manager chooses the hedge portfolio randomly from a distribution that is symmetric around zero (so that the extent of under or overweighting of a country is unrelated to the benchmark weight), but keeps the draw only if it satisfies the feasibility constraints described in Equation (1.10). The higher (lower) the benchmark weight of a country, the higher the probability that a random draw that overweighs (underweights) the country will hit the upper (lower) constraint and has to be replaced. This random selection process will result in draws that make more likely to underweight (overweight) countries with higher (lower) benchmark weights.

The extent of the negative bias depends on the degree that fund managers are active. Following Cremers and Petajisto (2009), we define how active fund managers are by the sum of the absolute value of the portfolio deviations from the benchmark:

$$AS_i = \frac{1}{2}\sum_{c=1}^{N}|w_{ic} - w_{ic}^{B}| = \frac{1}{2}\sum_{c=1}^{N}|w_{ic}^{h}| \tag{1.13}$$

Equation (1.13) can be interpreted as the source of a constraint imposed on the manager or as a result of his willingness to deviate from the benchmark, determined by his degree of risk aversion or tracking error constraint. A less risk averse manager or one allowed more tracking error will deviate more from the benchmark and have a higher measured active component. The more the manager tries to deviate from the benchmark, the more likely he will hit one side of the constraints, forcing him to tilt his behavior and inducing a more negative bias. On the contrary, one could always draw the hedge portfolio of a distribution with a variance that is small enough such that the probability of hitting a constraint is negligible, resulting in an estimated coefficient close to one. Such manager will have a very small active component and behave as an index fund.

The coefficient will be zero only when the covariance between the hedge and benchmark portfolios equals minus the variance of the benchmark weight. This means that the linear projection of the hedge portfolio on the benchmark portfolio has a slope equals to negative one. In this sense, the hedge portfolio undoes what the benchmark portfolio does and is a situation akin to having an allocation that does not follow the benchmark.

In the paper, we estimate a series of regressions similar to that presented in Equation (1.11), albeit in a panel setting and controlling for many other determinants in a parametric and non-parametric fashion. The coefficient of that regression tells us, on average, how much the weight of a country in a fund portfolio increases when its weight on the benchmark increases, taking into account the correlation between the benchmark and hedge portfolios present in the data. This is the relation of interest from a forecasting perspective, despite the fundamental relation given by Equation (1.8).

Appendix 2: The proliferation of benchmark indexes

As of May of 2012, there were 267,415 active equity indexes and 63,616 active bond indexes in Datastream, including the many indexes focused on single markets and different industrial sectors. While the number is high, most mutual funds are benchmarked against few and very popular indexes. For instance, the S&P 500 is the most popular index for U.S. funds, while the MSCI World or MSCI

EAFE (Europe, Australasia, and, Far East) are the most prevalent indexes among international funds investing in developed markets.

While there are approximately 18 companies producing bond indexes, many more companies are involved in the production of equity indexes, including the large international indexing companies (such as, FTSE, MSCI, and S&P), and the national producers of indexes and national stock exchanges. As of December 2012, the largest producer of equity indexes was MSCI with 126,821 indexes, then FTSE with 39,738 indexes, Russell with 27,826 indexes, S&P 17,723 with indexes, and, Dow Jones with 14,771 indexes. The largest producer of bond indexes was J.P. Morgan with 20,390 indexes, followed by Merrill Lynch with 18,897 indexes, Citigroup with 10,281 indexes, and Barclays Capital with 3,963 indexes. Despite the apparent diversity of indexes, the popularity of indexes is highly skewed, with a few indexes being followed by many investors.

While there are broad indexes such as those focused in world markets, advanced (or developed) markets, emerging markets, frontier markets, or country specific, these are further subdivided by different characteristics. For instance, MSCI has different indexes according to the currency of denomination (e.g., U.S. dollar, euro, local), returns (e.g., net returns, gross returns, total returns), industry, size (e.g., large cap, medium cap, small cap), and style (e.g., value, growth). This generates a wide diversity among indexes, which has been increasing over time.

Benchmark weights are assembled with the portfolio weights of individual securities included in a benchmark index, aggregated at the country level according to the market where the security was issued. That is, international benchmark indexes are typically constructed using a bottom-up approach and consist of composite stock (or bond) market indexes that include securities from many countries as constituents. The following example from MSCI, the provider of the most prevalent equity indexes, illustrates more details on how benchmarks are assembled (other companies use a similar approach).

MSCI first defines the main scope of a benchmark index (such as, geography, industry, and type of firms) and in which category each country is classified at each point in time (developed, emerging, or frontier). Then, it selects a number of securities that fall within the scope and meet the size, market capitalization, liquidity, and other requirements. Each of these securities gets a loading (or inclu-

sion factor) in the index portfolio assigned by the index producer according to how much it meets the index-construction criteria and how accessible it is to investors (given by the free-float market capitalization, restrictions to foreign investors, and so forth). The return of the index consists of the returns of its constituent securities, using various approaches to aggregate fluctuations in individual instruments (e.g., Laspeyres, chain-weighting). Namely, each index captures the market capitalization weighted returns of all constituents included in the index. The indexes are periodically rebalanced to ensure their continuity and representativeness. The inclusion/exclusion of a country in an index and its average benchmark weight is correlated with the relative size of the stock market and the economy, plus other institutional factors.

Chapter 2

CAPITAL INFLOWS, SOVEREIGN DEBT AND BANK LENDING: MICRO-EVIDENCE FROM AN EMERGING MARKET

2.1 Introduction

How do public and private access to credit interact? Economic theory suggests that when governments borrow from domestic institutions this may lead to a crowding out of private debt.[1] This crowding out depends crucially on public access to foreign funding. When there is little access to foreign investors, governments rely heavily on domestic institutions to absorb the issuance of debt. If foreign investors become willing to purchase sovereign debt, this reliance on local financial institutions may be reduced, freeing resources for the private sector. As a result, local firms may be able to finance investment projects and boost economic activity.

Although intuitive, there is no clear evidence on this topic because sovereign risk, sovereign bond holdings of banks and foreigners, and loans to the private sector are all jointly determined. For instance, an improvement in local eco-

[1] See for instance Diamond (1965).

nomic conditions may increase both foreign investor demand for sovereign debt and credit demand from local firms. In such a case, one would observe both an increase in the share of sovereign debt held by foreign investors and an increase in private credit, but this correlation would not imply causation. This common problem illustrates the difficulty of finding causal evidence on this issue.

The main contribution of this paper is using a novel episode to overcome the identification problems previously encountered in the literature. By doing so, I provide clear evidence that government access to foreign funding increases private access to credit and boosts economic activity. I exploit a sudden, unanticipated and exogenous shock that triggered the entrance of foreign investors to the local currency sovereign debt market in Colombia.[2] In March 2014, J.P. Morgan announced the inclusion of several Colombian treasury bonds into its emerging markets local currency government debt index. J.P. Morgan explained that the index rebalancing was due to an increased transparency and efficiency in the sovereign debt market and thus, exogenous to the economic conditions in Colombia. Since many international mutual funds track their performance against this index, they changed their portfolio suddenly, directing capital flows to the Colombian local currency sovereign debt market.

Besides exogeneity, this shock had a number of appealing features. First, it was sizable: the share of debt held by foreigners in this market went from 8.5 to 19 percent in only 7 months (Figure 2.1). Second, it appears to have been unanticipated. Third, provided that the index is specific to government debt, it does not directly affect flows to the private sector.

I find that the entrance of foreign investors had sizable effects on commercial banks. Moreover, it had heterogenous effects on banks according to their participation in the local currency sovereign debt market. In Colombia, the Ministry of Finance selects financial institutions to act as market makers or official intermediaries in the treasury market. Each of the intermediaries participating in the program is obliged to absorb 4.5 percent of the total debt issued by the government in the primary market. I find that market maker banks reduced their domestic

[2]As shown by Du et al. (2016) and Du and Schreger (2016) most of the local (foreign) currency sovereign bonds in emerging markets are issued under domestic (foreign) law, and traded in domestic (foreign) markets. Thus, the terms domestic sovereign debt and local currency sovereign debt will be used interchangeably throughout the paper.

sovereign debt holdings by 4.2 percentage points of assets, compared to the rest of the banks. Using data either at the city-zone or industry level, I also show that they increased differentially their commercial credit supply by 3.9 percentage points of their assets. Results show an almost complete substitution between sovereign debt and commercial credit. This effect is also economically significant, around 2 percent of Colombia's GDP.

I analyze whether the shock had real effects in two different ways. First, I look at the balance sheet of firms in Colombia during this period using data from Superintendencia de Sociedades. I construct a proxy for the exposure to market maker banks at the industry level, and show that firms in industries with more exposure to market makers increased both their financial debt and investments during this period. Second, I obtain data on monthly employment, production and sales from the Monthly Manufacturing Polls conducted by the Departamento Administrativo Nacional de Estadistica (DANE). Using this data, I find that industries more exposed to market makers had higher growth of employment, production and sales during this period.[3]

I conduct several robustness checks to confirm the results. I try a placebo test for the same period a year before, confirming that the effect is not present during this other period. Moreover, I estimate the cross-sectional coefficients of a regression of credit growth on a dummy variable indicating whether a bank is a market maker or not. I find that the coefficients are only statistically significant during the rebalancing, showing an important support for the identification strategy. I discard several alternative hypotheses. Most importantly, the effect on credit growth is not driven by valuation effects on the balance sheet of banks.

The evidence is consistent with the following narrative. Before the entrance of foreign investors, there was a crowding out of private credit. The domestic sovereign debt market was dominated by local participants and the investor base was undiversified. Therefore, the government used market makers to absorb debt issued in the primary market. Since the secondary market was less liquid, market makers kept part of the issued debt in their balance sheet because it was difficult

[3]Unfortunately, I do not have access to the credit registry in Colombia, which provides information at the bank-firm level, which would facilitate the analysis for the real effects on firms.

to find investors to offload this debt.[4] As foreign institutional investors entered the domestic sovereign debt market, they sold the excess of debt that could not offload before and used the proceeds to extend credit.

This paper contributes to two broad strands of literature. From a macroeconomic perspective, it is related to the literature on the interrelationship between the supply of credit to public and private sectors. This line of research has received a lot of attention during the recent European Sovereign Debt Crisis, emphasizing two different mechanisms. On the one hand, there is a line of research highlighting that an increase in the home bias of sovereign debt holdings crowds out private credit. For instance, Broner et al. (2014) propose a model with creditor discrimination and crowding out effects that accounts for the reallocation of credit from the private to the public sector observed in the euro zone periphery during the European Sovereign Debt crisis. Becker and Ivashina (2014) and Altavilla et al. (2015) also provide empirical evidence consistent with this reallocation channel. On the other hand, there is a part of the literature that emphasizes how shifts in sovereign risk affect the balance sheets of banks. For example, Bolton and Jeanne (2011), Gennaioli et al. (2014) and Perez (2015) propose models in which sovereign defaults hurt the balance sheet of banks and reduce private credit. From an empirical point of view, Bofondi et al. (2013), Acharya et al. (2014), Gennaioli et al. (2014), and Baskaya and Kalemli-Ozcan (2016) present evidence consistent with this channel.[5] Most of these papers have problems identifying an exogenous shock that exclusively affects foreign demand for sovereign debt. I provide such a shock and to the best of my knowledge this paper is the first to use this type of event and separate between the two channels highlighted by the literature.

Second, from a finance perspective, this paper contributes to a growing literature on the aggregate effects of institutional investors. Since the Global Financial Crisis, there has been an increased interest in the activities of financial interme-

[4] As defined by Reinhart and Sbrancia (2011) this could be an implicit form of financial repression.

[5] This empirical literature is closely related to the growing literature on the real effects from credit supply changes. See among others Gan (2007), Ivashina and Scharfstein (2010), Iyer and Peydro (2011), Jimenez et al. (2012), Jimenez et al. (2014), Iyer et al. (2014). Within this literature my paper is more related to several papers studying the effect of international shocks to emerging markets and lending by banks. See Khwaja and Mian (2008), Paravisini (2008), and Schnabl (2012) for episodes in Pakistan, Argentina and Peru, respectively.

diaries other than traditional banks. Investment activities by mutual funds have been at the core of the discussion and index-tracking funds have received special attention because of their exponential growth in size.[6] There have been several studies analyzing the consequences on financial markets of the presence of these funds. For instance, Chang et al. (2014) and Raddatz et al. (2015) document the price effects generated by these funds during index rebalancing periods. Sullivan and Xiong (2012), Bhattacharya et al. (2013), Ben-David et al. (2014), and Israeli et al. (2015) show that index-tracking investors increase market vulnerability and volatility.[7] However, the evidence on the possible economic consequences of index-tracking investors is slim as highlighted by Wurgler (2010).[8] To the best of my knowledge, this paper is the first attempt to document that international capital flows by index-tracking investors have effects on the real economy.

More broadly, this paper contributes to the literature on the relationship between international capital flows, credit booms and economic activity. On the one hand, there are several studies analyzing whether capital inflows lead to higher credit growth and an increase in economic activity.[9] On the other hand, there are several studies analyzing the relationship between large capital inflows and the consequences for the economy.[10] Most of these studies have problems addressing

[6]This phenomenon is the consequence of a large switch of investor funds from active to passive funds and a documented movement of active funds into more passive investment strategies. See among others Cremers and Petajisto (2009).

[7]More broadly, there is a large literature on the aggregate effects of international mutual funds on financial markets. See among others Broner et al. (2006), Jotikasthira et al. (2012), Levy-Yeyati and Williams (2012) and Raddatz and Schmukler (2012).

[8]There has been a recent literature focusing on the real effects of institutional investors flows in general. Chernenko and Sunderam (2012) analyze how flows into high-yield mutual funds have effects on the issuance of firms and their investments. Adelino et al. (2014) document how changes in credit ratings by Municipalities in the United States have consequences for public financing and for economic activity. Almeida et al. (2015) and Adelino and Ferreira (2015) document how credit ratings upgrades and downgrades affect firms' real investment decisions and banks' credit supply.

[9]For instance, Mendoza and Terrones (2012) find that credit booms are positively correlated with net capital inflows. Calderon and Kubota (2012) suggest that private capital inflows are good predictors of credit booms. In a more granular approach, Lane and McQuade (2014) argue that only net debt inflows generate domestic credit growth in European countries. In a related theoretical and empirical work, Blanchard et al. (2015) find that only equity inflows are correlated to credit expansions.

[10]Reinhart and Reinhart (2009) study how capital flow bonanzas affect the likelihood of economic crises. Caballero (2016) shows that capital inflows bonanzas increase the probability of banking crises. Kalantzis (2015) and Benigno et al. (2015) study the changes in the sectorial allocation of resources due to large capital inflows.

endogeneity issues, since capital flows are almost always related to local economic conditions. I contribute to this literature by using an exogenous increase in capital inflows for identification. Thus, I provide evidence that capital inflows to the sovereign debt market cause an increase in credit growth and an expansion in economic activity.

The rest of the paper is organized as follows. Section 2.2 provides the empirical setting, with a detailed account of the index rebalancing and sovereign debt market in Colombia. Section 2.3 presents the identification strategy and empirical analysis for the results on bank lending. Section 2.4 shows the results for the real economic activity. Section 2.5 concludes.

2.2 Empirical Setting

2.2.1 Indexing in International Markets

International indexes (or international benchmarks) are broad market indexes of different assets that involve several countries. They are constructed by different companies (index providers) such as Morgan Stanley Capital International (MSCI) for international equities or J.P. Morgan for international debt securities. The former constructs, for instance, the MSCI Emerging Markets Index and, the latter, the J.P. Morgan Emerging Markets Bond Index (EMBI), two of the most recognized indexes in the world for emerging countries.

The construction process for these indexes involves different broad steps that are used by almost all index providers. They first define the main scope of a benchmark index (such as, geography, industry, and type of firms) and in which category each country is classified at each point in time (developed, emerging, or frontier). Then, they select a number of securities that fall within the scope and meet the size, market capitalization, liquidity, and other requirements. Each of these securities gets a loading (or inclusion factor) in the index portfolio assigned by the index producer according to how much it meets the index-construction criteria and how accessible it is to investors (given by the free-float market capitalization, restrictions to foreign investors, and so forth). The return of the index consists of the returns of its constituent securities, using various approaches to aggregate

fluctuations in individual instruments (e.g., Laspeyres, chain-weighting). Namely, each index captures the market capitalization weighted returns of all constituents included in the index.[11] The indexes are periodically rebalanced to ensure their continuity and representativeness.

Countries' weights in a specific index are assembled with the portfolio weights of individual securities included in a benchmark index, aggregated at the country level according to the market where the security was issued. That is, international benchmark indexes are typically constructed using a bottom-up approach and consist of composite stock or bond market indexes that include securities from many countries as constituents.

The market for local currency sovereign debt indexes is mainly dominated by the World Government Bond Index (WGBI) by Citigroup and the Government Bond Index Emerging Markets (GBI-EM) by J.P. Morgan. The former is a local currency government bond index that includes securities mainly from developed markets. The latter only includes emerging market government debt in local currency.[12] While many more funds track the WGBI (approximately 1.5 trillions U.S. dollars) than the GBI-EM (200 billions U.S. dollars), the weights of emerging countries significantly differ in both indexes. For instance, Mexico (one of the few emerging countries included in both indexes) has a weight of around 0.7 percent in the WGBI and of 10 percent in the GBI-EM. Thus, the exposure of emerging markets is generally lower in the WGBI.

These indexes have become popular and are frequently used as benchmarks by international mutual funds, which manage a significant part of international assets. By helping alleviate agency problems, benchmarks allow the underlying investors and supervisors to evaluate and discipline fund managers on a short-run basis using, for example, the tracking error of the fund (the deviation of its returns from the benchmark returns). To the extent that the investment strategy of these funds is pinned down by the composition of their benchmark indexes, changes in the weights that a popular benchmark gives to different countries can trigger a

[11] More recently, index providers have focused on constructing alternative indexes not based on market capitalization (such as GDP-weighted indexes or fundamentals based indexes).

[12] J.P. Morgan also constructs the Emerging Markets Bond Index (EMBI) which is a foreign currency sovereign debt index. Since emerging markets governments shifted their preference towards local currency debt, this index has been steadily declining in popularity.

similar rebalancing among the funds that track it and result in sizeable movements in international portfolio allocations, capital flows and asset prices.

2.2.2 Benchmark Change in Colombia

On March 19th 2014, J.P. Morgan announced the inclusion of five Colombian bonds into its benchmark indexes. J.P. Morgan constructs three type of major international indexes: (i) foreign currency denominated sovereign debt; (ii) local currency denominated sovereign debt and; (iii) corporate debt. The addition of these bonds involved only local currency sovereign debt indexes, namely the Government Bond Emerging Markets Indexes (GBI-EM). The securities introduced were treasury bonds (named TES) issued by the Colombian government with maturities in 2016, 2018, 2022, 2024 and 2028. The process was done in a phased approach starting at the end of May 2014 and finishing at the end of September 2014. The most popular index, the GBI-EM Global Diversified saw a large rebalancing of Colombia's benchmark weight.[13] It went from 3 to 8 percent, representing the largest restructuring by J.P. Morgan in one of its indexes. At the time of the announcement there were estimations of 10 billions U.S. dollars in inflows into the Colombian government debt market with an estimated outstanding debt of 90 billions U.S. dollars.[14]

The reason for Colombia's inclusion in the index revolves around an improvement in market access. The note provided to investors by J.P. Morgan stated: "As a result of improved transparency and accesibility for international investors in the local TES market, Colombia sufficiently meets inclusion requirements for complete GBI-EM inclusion." This note did not mention a specific policy change as the trigger for this inclusion. However, many newspapers highlighted that this decision could have been motivated by Law 1607 of January 2013, which reduced taxes on foreign investors' earnings from domestic securities from 33 to 14 percent.

Around the years 2013-2014 there were many events affecting Colombia as

[13]The benchmark weight of a country is defined as the sum of the market capitalization of all securities issued in a country divided by the total market capitalization of all the securities included in the benchmark index.

[14]Reuters (2014).

a country. Then, it is useful to observe the evolution of the price of domestic sovereign bonds in Colombia. (Figure 2.2, Panel A). The tax reform seems to have a positive impact on the price of these bonds (while part of this upward trend was due to a global factor driving up bond prices of emerging markets during large part of 2012). Not long after the tax reform, the Federal Reserve of the United States started considering unwinding quantitative easing (Taper Tantrum). The beginning of this event was marked by the Federal Reserve Chairman Ben Bernanke's suggestion of this unwinding in his testimony before Congress on May 22, 2013. Bond prices of emerging markets dropped sharply around that period, and Colombia's bonds were not an exception as they experienced a drop of nearly 12 percent during that summer. Prices remained low during the rest of 2013, mostly due to the uncertainty generated by Taper Tantrum talks. Upon the announcement by J.P. Morgan in March, Colombian bonds increased in price by almost 5 percent in two weeks. Most of this gain was reversed by the end of the rebalancing in October. The pattern in the price of these bonds suggests two things. First, the event was unexpected and sizable as there was a sharp and sudden increase upon its announcement. Second, most of the effect was temporary, probably induced by the increased demand by funds that track J.P. Morgan's indexes.[15]

Figure 2.2, Panel B shows a proxy for the liquidity in secondary markets. It shows the bid-ask spread index constructed by Thomson Reuters Pricing Source of the affected bonds. For most of the period until the announcement the index is relatively stable. After the announcement there is a reduction, and, coincidental with the first effective date, there is a large drop in the index of almost 60 percent. Evidence suggests that there was a large increase in market liquidity, triggered by the entrance of foreign investors. This effect seems permanent as opposed to the change in prices around the rebalancing.

Institutional investors that track these indexes closely were forced to rebalance their portfolio. These portfolio changes had aggregate consequences for Colombia in terms of capital flows to local currency sovereign debt as shown in Figure 2.3, Panel A. This figure presents the net purchases of TES securities by foreigners and

[15]Section 3.4.3 provides an account of the exchange rate evolution during this period. Since there were large capital inflows, the exchange rate appreciated considerably during the first part of the rebalancing.

commercial banks. Prior to the announcement by J.P. Morgan there were some capital inflows to domestic sovereign debt. However, after the announcement, foreigners started massively buying local currency sovereign debt in Colombia. Purchases made between the end and the beginning of the rebalancing were 8 percent of the total outstanding local currency sovereign debt securities.[16] During the same period, foreigners more than doubled their participation in the affected local currency sovereign debt market (Figure 2.3, Panel B). Furthermore, by the end of 2014 they were the largest holders of the affected bonds.

Another interesting feature of Figure 2.3 is the different agents that were on the other side of the purchases of domestic sovereign debt by foreigners. Commercial banks, with relatively stable purchases before the announcement, started selling treasury securities in an image that mirrors the one by foreigners (Panel A). Compared to the rest of the agents in the economy, commercial banks were the main providers of liquidity during the rebalancing (Panel B). Out of the 10 percentage point increase in the participation of foreigners in this market, 7 were accomodated by banks (almost a 30 percent decline in their participation in the TES market). Alternatively, pension funds, insurance companies and domestic mutual funds only reduced their participation by 0.3 percentage points (1 percent decline), while public institutions reduced their share in this market by 2.5 percentage points (7 percent decline). Both of these figures suggest that commercial banks in Colombia reduced their holdings of affected bonds by much more than the rest of the agents in the economy.

On the macroeconomic front, the rebalancing by J.P. Morgan did not bring a renewed appetite to issue more debt by the government. During the period under analysis, the Colombian government maintained a relatively constant growth of its local currency debt securities.[17] Another potential consequence from the event could be an added appetite by foreigners for domestic private assets. Foreign direct investment and private portfolio flows only experienced a slight increase in inflows relative to GDP. Instead, public debt securities had gross inflows of 0.7 percent of GDP on average before the rebalancing. This number increased to 2.9

[16]This number increases to 10.3 percent if we consider the March-December 2014 period, accounting for the fact that some funds slowly change their positions.

[17]See Appendix Figure 2.1, Panel A.

percent during 2014, indicating an increase of almost 400 percent. The evidence suggest that the event generated a sudden and large increase in capital inflows that was exclusive to domestic sovereign debt markets in Colombia.[18]

2.2.3 Market Makers in TES bonds

In Colombia, commercial banks are important participants in the sovereign debt market. Before the benchmark change, banks were the largest participant in the TES market that was affected by the rebalancing. They held collectively around 25 percent of government issued bonds. Moreover, around 11 percent of their assets were local currency sovereign bonds as of December 2013. As noted above, commercial banks were on the other side of the transactions from foreigners in the market for TES bonds during the rebalancing. This suggest that there might be a special feature about commercial banks that may have generated this large response.

One noticeable feature of the market for TES in Colombia is that the Finance Ministry designates official market makers in this market. By law, these market makers are within the set of commercial banks, financial corporations and brokerage firms. The objective of this program is to promote adequate conditions for the financing of the government in capital markets by developing the domestic sovereign debt market. Every year, each institution decides whether it wants to participate in the program or not. In order to participate, they need to fulfil a minimum net worth and corporate rating criteria. Then, the Finance Ministry ranks institutions according to their activity in primary and secondary debt markets and designates the official market makers. At the end of every year, a maximum of 20 entities are designated as such. There are two main obligations for these institutions. First, they need to absorb at least 4.5 percent of all primary market debt issuances during the year. Second, they need to quote permanently and simultaneously bid and ask prices in secondary markets subject to a maximum bid-ask price determined by the government.[19] On the other hand, designated market makers benefit from having special access to debt issuances from the government,

[18] See Appendix Figure 2.1, Panel B.

[19] The other two obligations are to construct monthly reports about the state of the domestic sovereign debt market and to inform of any mergers/sales to the treasury department.

constant access to officials from the Ministry of Finance, and access to a liquidity window in case of problems.[20] Under this program, at the end of 2013, 9 commercial banks in Colombia were designated as market makers among 14 participants in the program.

2.2.4 Conceptual Framework

The difference between commercial banks that are designated official market makers and those that are not could be insightful to understand the channel at work during the benchmark rebalancing. These financial institutions are obliged to absorb certain amount of debt issued by the government in the primary market. Every institution by law has to be awarded at least 4.5 percent of total debt issued by the government during the year. In the case of both frequent auctions and the absence of a diversified investor base in the secondary market, these banks have a lower probability of offloading this debt to other investors. As a result, they keep a considerable amount of it in their balance sheet. After the entrance of foreign investors, these banks can offload debt absorbed in the primary auction more easily and can use the proceeds for other purposes.

The type of foreign institutional investors that enter the market is also important. In this episode, these were index-tracking investors. Moreover, the indexes affected (GBI-EM) are market capitalization weighted indexes. As such, every time the government issues this type of debt, it gets included into these indexes, and index-tracking investors have to inmediately buy it, creating an almost certain demand in the secondary market for this debt. This increases the probability that market maker banks offload the debt from the primary market. Therefore, after the benchmark change they should reduce their holdings of sovereign debt.[21]

Figure 2.4 presents evidence in this direction. Before the rebalancing, average

[20] y Credito Publico (2010)

[21] Anecdotal evidence from several people working in banks around the period suggest that the reduction in sovereign debt from market makers was due to the entrance of foreign investors. Furthermore, monthly average net issuances during 2013 amounted to 0.25 percent of the initial assets of market makers. A back of the envelope calculation shows that if they can offload 90% of this amount, the stock that would remain in their balance sheet would be 0.3 percent of their assets in a year. Since the birth of the program was in 1999, in 14 years this would amount to 4.3 percent of their assets. These simple calculations show how market makers could end up with a large stock of debt if they cannot offload it quickly in secondary markets.

holdings of market makers were considerably higher than those of the rest of the banks. Between the announcement and the end of J.P. Morgan's index rebalancing, the ratio of local currency sovereign debt to total assets decreases 28 percent for commercial banks that are market makers, while it is almost the same for the rest of the banks. This effect is driven entirely by reductions in sovereign debt positions.[22] With this figure I compute the reduction in local public debt by market maker banks, which is 4.2 percentage points of assets relative to the rest of the banks.[23][24]

2.3 Bank Lending

2.3.1 Data and Identification

In the previous section, I established that commercial banks that were market makers sold a sizable amount of their positions in local currency government bonds. This section presents the data and methodology to understand whether the proceeds from these sales resulted in an increase in credit by these banks. I use the following baseline specification:

$$\Delta L_{ibt} = \theta_{it} + \theta_b + \beta_1 \mathbb{1}_b^{\text{MM 2013}} \mathbb{1}_t^{\text{Rebalancing}} + \beta_2 X_b \mathbb{1}_t^{\text{Rebalancing}} + \varepsilon_{ibt} \tag{2.1}$$

where L_{ijt} is the log of credit to total assets for a city-zone or an industry i, bank b at time t. θ_{it} are fixed effects at the city-zone-time or at the industry-time level. X_b is a set of observable variables at the bank-level. $\mathbb{1}_b^{\text{MM 2013}}$ is a dummy variable that indicates whether a commercial bank was a market maker at the end of 2013 or not. $\mathbb{1}_t^{\text{Rebalancing}}$ is a dummy variable that takes the value 1 from March until the end of September 2014. The identification comes from the difference-in-difference estimation of credit growth for market maker and non market maker

[22] More strikingly, all market maker banks were net sellers of sovereign debt during the event, and half of the banks among non market makers were net sellers of government bonds.

[23] This number is computed from the difference-in-difference between the holdings at the end of September 2014 versus February 2014 for the two groups of banks.

[24] Appendix Table 2.1 presents the estimates for the differential effect of being a market maker during this period. Results are very similar to those in the picture.

banks. During the rebalancing, market makers were more affected than the rest of the banks, since they could sell domestic sovereign debt more easily. The rest of the banks should not be affected by this channel. Therefore, as long as the evolution of credit for both groups before the rebalancing was similar, we can use $\mathbb{1}_b^{\text{MM 2013}}\mathbb{1}_t^{\text{Rebalancing}}$ as a treatment variable and analyze whether the entrance of index-tracking investors in the sovereign debt market had an effect on bank lending through this channel. β_1 identifies this by comparing the differential average growth in credit between market maker and non market maker banks during the rebalancing within a city-zone or industry. By comparing observations within a city-zone or an industry I can partially control for any concerns that credit demand may be affecting this estimation.[25] For all the estimations, I use standard errors bootstrapped clustered at the bank-time level.[26]

I use data from Colombia's banking system. I gather data from Superintendencia Financiera de Colombia on credit by banks. The main database consists on different types of credit to a specific city-zone (for instance Bogota-Centro Internacional) at the bank level. I match this data on credit with balance sheet data for each bank to use different bank-level variables. I complement data with the official designation of market makers by the Finance Ministry. Data is on a quarterly basis for the 2011-2014 period and contains data for 24 commercial banks on 86 city-zones (with 10 zones). While most of the results use the city-zone credit database, I rely on an alternative database at the industry level for robustnes. This database contains information for 94 industries. [27] Table 2.1 presents a list of all the commercial banks with their classification into market makers at the end of 2013, and whether they are domestic or foreign banks.

Table 2.2 shows the descriptive statistics of the balance sheet structure divided by whether a bank was an official market maker at the end of 2013 or not. There are substantial observable differences between the two type of banks. Market

[25] As explained by Adelino et al. (2015) this might not be a perfect control for credit demand. However, I will try to present suggestive evidence on the unlikely possibility that this shock is coming through credit demand. While a more sound strategy would be controlling at the firm level, I do not have data on the credit register of Colombia. In some cases, even data at the bank-firm level might not capture perfectly credit demand as suggested by Paravisini et al. (2015).

[26] Alternative clustering at the bank-time level do not alter the results.

[27] Throughout the paper I mainly rely on the city-zone database due to its balance among different banks and for brevity. Results are qualitatively similar at the industry level.

makers are larger both in assets and liabilities than non market maker banks. Market makers hold more investments and more local public debt, and thus less total credit in their asset side. On average, market makers hold 15.4 percent of their assets in local public debt, while non market makers hold 8.9 percent of their assets in local currency sovereign debt. Within credit, they seem more exposed to commercial credit, while non market makers lean more to consumer credit. Regarding balance sheet health, all Colombian banks are above the minimum solvency ratio (9 percent for the total solvency ratio) and non market maker banks have a larger solvency ratio than market-maker banks.

2.3.2 Empirical Analysis

Before going in-depth into the full formal analysis, I start by estimating Equation (2.1) at the aggregate bank level from balance sheet monthly data in Table 2.3 for the period 2013-2014. Market maker banks significantly increased their total credit growth during J.P. Morgan's rebalancing. This increase is exclusively driven by commercial credit, rather than by consumer credit. A possible explanation is that banks usually have a relationship established with firms, and this type of credit provides the next best substitute to sovereign debt in Colombia. In the rest of the paper, I will only look at commercial credit growth, since it is the driver large differential in credit between market maker and non market makers.

Table 2.4 presents the results from the main empirical specification. When I control only for time fixed effects, there is a positive and significant differential credit growth of 5.6 percent during the rebalancing (Column 1). The coefficient and standard errors are almost the same when I include city-zone-time fixed effects (Column 2). Moreover, the R-squared goes from 4.3 percent to 17.2 percent indicating that these fixed effects are capturing an important amount of the credit demand varying at the city-zone-time level. This lends support to the hypothesis that this effect is coming from an increase in credit supply rather than by changes in credit demand.[28] When I include bank fixed effects, which control for any un-

[28] Another way to partially rule out a demand-based hypothesis is to analyze the interest rates on commercial credit. For this to be supply driven I should observe that quantities and prices go in opposite directions. During the period between September 2014-March 2014, the average interest rates on commercial credit for market makers went down by almost 2 percent. In the

observed fixed bank characteristics, there is a differential average growth of 5.4 percent for market makers (Column 3). Effects estimated at the city-zone level are qualitatively similar when I use the industry database. The coefficients are statistically similar, and the analysis mirrors the one at the geographical level. One thing to notice is that by using the industry database I partially control for any credit demand shock that may affect tradable and non-tradable industries differently due to the exchange rate changes during the rebalancing.

The economic size of these estimations are also meaningful. The results in Column 3 suggest that the differential average growth for market makers versus non market makers during the period was close to 11 percent. This implies an increase in commercial credit of 3.9 percentage points of assets. Using the total assets of market maker banks, this amounts to a differential growth in commercial credit of 12.8 trillions of Colombian Pesos.[29] These numbers suggest that the shock induced an increase in commercial credit of 2.25 percent of GDP. Moreover, the estimations suggest almost a full substitution between local public debt and commercial credit. The increase in commercial credit was only 0.3 percentage points lower, in absolute terms, than the decrease in sovereign debt. This small difference could be explained by regulatory purposes. If banks do not want to change their risk profile, they would need to increase credit by less than the decrease in sovereign debt since government debt is zero-risk weighted for regulatory purposes.

2.3.3 Threats to Identification

There are important identification threats that I address in this section. More specifically, the presence of differential credit growth between market maker and non market maker banks in other time periods. Table 2.5 runs a placebo test, by creating a dummy that equals 1 during the same period of the rebalancing but one

same period, the average rate for non market makers increased by almost 5 percent, showing a differential evolution between the two that is not present before the rebalancing (Appendix Figure 2.2).

[29] These numbers are obtained by using the estimated differential credit growth during the period multiplied by the commercial credit for market makers in February 2014. After this, I multiply it by the total assets of market makers in February 2014 to obtain the differential growth in commercial credit.

year before, from March to September 2013. This test has two advantages. First, that by using a different time dummy I control for capturing non-effects in the baseline estimation. Second, that I also test for the possibility of the tax reform being the true trigger of capital inflows. The table shows that both in the city-zone and industry databases, the treatment variable loses its signficance in all the specifications. Therefore, it is hard to argue both that the effect is present in other periods and that was not created by the index rebalancing event.

Along the lines of this test, I also estimate a cross-sectional version of Equation (2.1). More specifically, I run the following regression:

$$\Delta L_{ibt} = \theta_i + \beta_1 \mathbb{1}_b^{\text{Market Maker 2013}} + \varepsilon_{ib} \tag{2.2}$$

where I use bootstrapped errors clustered at the bank level. I do this for every quarter from 2013-2014 and plot this time series in Figure 2.5. The evidence shows that the market maker dummy is only positive and significant during the rebalancing, giving further support to the identification strategy.

Another possible threat to identification is the existence of a differential prior evolution of the outcome variable. While the placebo test and plot are partially showing this, I present a figure with the actual evolution of commercial credit over assets during the period of study. Figure 2.6 presents these trends, and shows that the evolution of credit between market makers and the rest of the banks before the rebalancing is quite similar, and it differs considerably afterwards.[30]

2.3.4 Alternative Hypotheses

Sovereign Debt Exposure

The above mentioned results show a direct relationship between credit growth and market makers during the benchmark rebalancing. However, market makers are significantly different from non market maker banks. One considerable difference

[30]Upon announcement, there is both an increase in commercial credit for market makers and a decrease in commercial credit by the rest of the banks. One concern in the identification strategy is that the increase in credit by market makers increase competition for non market makers and reallocate credit within the two types of banks. Appendix Table 2.2 shows evidence against this hypothesis by using a competition measure at the city-zone-time level interacted with the treatment variable.

is that they hold more local currency government bonds. In principle, since market makers had more debt to begin with, they could have experienced a greater net worth increase due to a price effect, and extended more credit. Then, the effect captured in Table 2.4 would be driven by the holdings of local public debt by commercial banks. Interestingly, there is variation across the sovereign debt holdings of debt that I can exploit to rule out this potential explanation. Figure 2.7, Panel A shows the local public debt to assets ratio. On average, market makers hold more debt, but the correlation is not perfect. Some banks that are not market makers, have more debt than some market maker banks. Therefore, I am able to use this variable to understand whether the effect on credit is coming from the fact that a bank is a market maker or that it holds more sovereign debt. Since there was a considerable price increase after the announcement of the rebalancing, there are two straightforward predictions to test. First, that banks with more holdings of local public debt should have a larger increase in credit. Second, that this effect should be more pronnounced for banks with lower balance sheet health.

I test these two predictions in Table 2.6. The estimations confirm that the effect is coming from the nature of being a market maker. Once I introduce sovereign debt to total assets (Column 1), this variable is positive but not significant at the 10 percent level. When I add the treatment variable the coefficient for local public debt is significantly reduced (Column 2). Also, controlling for the different fixed effects does not alter the results (Columns 3 to 4). In Column 5, I test the second prediction and find that banks that had more local public debt and were more constrained did not change significantly their credit. These estimations show that the effect on credit is not coming through the holdings of sovereign debt and due to a potential balance sheet channel.

The estimations in Table 2.6 may suffer from a data problem since I do not observe the actual holdings of local public debt. Therefore, some banks may have government debt that was not affected by the rebalancing and this might by affecting this regression. To control for this, I use the profits over assets during March 2014 as a proxy for banks' valuation gains (Table 2.7). The results are qualitatively similar to the ones using the local public debt exposure. Furthermore, the treatment variable is still significant and the coefficient is very similar to the one estimated in Table 2.6.

Bank Size

Another important difference between market maker and non market maker banks is their size. The former are much larger than the latter when we look at the total banking system, the average and the median. A valid hypothesis is that these banks have more resources, a larger network of contacts compared to non market makers and thus can contact foreign investors more easily and sell them more bonds than non market makers. I control for this possibility by interacting the log of initial assets with the rebalancing dummy in Columns 1-4 in Table 2.8. While positive, this variable is not statistically significant. Therefore it is hard to argue that size is behind the differential credit growth. Still, there could be a few very large or very small banks that could be affecting this estimation. Figure 2.7, Panel B shows the average assets in 2013 for all Colombian banks and shows that this could be a possibility. To perform a more stringent test of whether assets are driving results, I keep only banks with less than 25 or more than 5 trillions Colombian pesos. Therefore, I am using banks that are very close to the threshold in Figure 2.7, Panel B. Columns 5-7 in Table 2.8 show that the main results are not affected when using only these banks. Moreover, both the coefficient and significance levels are very similar to the ones in Table 2.4.

Exchange Rate Exposure

Capital inflows usually involve the entrance of foreign currency into the country. Therefore, in times where there are large capital inflows, such as during the rebalancing, the pressure for an exchange rate appreciation is also at play. Figure 2.8, Panel A shows the evolution of the exchange rate during the period of study. After the announcement there is a sharp appreciation of almost 10 percent until July 2014. Afterwards, there was an important depreciation of almost 8 percent until the end of the rebalancing. This coincides with an official intervention in the exchange rate market by the central bank around July 2014. Then, towards the end of the year, it coincides with falling oil prices worldwide. These amplified movements during the event could suggest that the exposure to the exchange rate in the balance sheet of banks could be an important explanatory variable of credit growth during the event. I collect data on the exchange rate exposure on Figure

2.8, Panel B. This plot shows the assets denominated in foreign currency minus the liabilities denominated in foreign currency divided by banks' net worth. It is a proxy for the currency mismatch of banks. A lower (or negative) value indicates that a currency depreciation could hurt the banks' balance sheet more than a larger value in this proxy.

Table 2.9 shows the results from adding the exchange rate exposure and interacting it with the rebalancing dummy. Surprisingly, Column 1 shows a positive and statistically significant coefficient. However, when I add the treatment variable, this variable loses its significance. When I control with bank fixed effects, the coefficient is negative but still not significant. In the last column, I interact the exposure to the exchange rate with balance sheet health, but the evidence suggests that the exchange rate exposure did not play a role during the rebalancing for banks.[31]

2.3.5 Robustness Tests

While I have tested the main alternative hypotheses to the market making channel, there could be other variables affecting the baseline specification. In Table 2.10, Columns 1-3 I present three different tests. First, I remove the only state-owned bank (Banagrario) from the regression. The results show that there is no difference in the results from excluding this bank (Column 1). Second, the appetite of investors for sovereign bonds could spillover to corporate bonds, reducing the cost of financing for banks that use this instrument for funding. In Column 2 I include the outstanding debt securities issued by each bank normalized by total liabilities, which does not alter the main results. Third, foreign banks have a tighter relationship with international mutual funds. Thus, I introduce a dummy indicating the origin of the bank (Column 3). Again, this variable does not affect the coefficient of the treatment variable which still signals an average differential credit growth around 5.4 percent.

There is also the possibility that market maker banks have trading expertise and the results capture a similar channel to that in Abbassi et al. (2016). As

[31] These results are qualitatively similar when I use external credit over liabilities by a certain bank as a proxy for the funding they receive in foreign currency.

the affected bonds increase in price, banks with expertise reduce their holdings since these securities are overvalued, and thus increase the credit supply. For the evidence to be consistent with this channel, I should observe that after an initial overvaluation of the bonds' price, the banks return to a similar level of ex-ante holdings of debt. However, the evidence is not consistent with a reversal of sovereign debt holdings. The price of sovereign bonds have a maximum peak the first week of April 2014. After that, these bonds suffer a 3 percent decrease in their price until the end of July. However, the average holdings of sovereign debt by market makers have a constanst decrease with a minimum at the end of July. This suggests that the evidence is not consistent with the channel presented by Abbassi et al. (2016) in the case of Germany.

I also perform a robustness test using the commercial credit growth (not normalized by assets) in Table 2.10, Columns 5 to 8. The results are quantitatively similar to when I do normalize credit by assets. [32]

During all these estimations I choose to maintain a parsimonious specification, adding only the relevant variables to test for alternative hypothesis. Table 2.11 presents the baseline specification but using all the observable variables interacted with the rebalancing dummy. Results are qualitatively similar and suggest a causal link from being a market maker during the rebalancing period.

2.4 Real Effects

2.4.1 Balance Sheet Data

Until now I have shown that the entrance of foreign investors had consequences for the extension of private credit in Colombia. However, it remains to be seen whether this credit shock had consequences for the real economy. A problem towards this end is that I do not have access to the information at the bank-firm level such as the ones provided by the credit registry of each country. Therefore I

[32]The city-zone database also has data on deposits that I use to investigate whether the effect was only a substitution on the asset side of the balance sheet or whether it had consequences for the liability side. In Appendix Table 2.3, I estimate equation (2.1) but using total deposits instead of commercial credit. Again, there seems to be no effect from being a market maker during the event on the total deposits growth.

need to rely on alternative data to gain understanding of the impact of the shock on the real economy. For this purpose, I collect balance sheet data on Colombian firms from Superintendencia de Sociedades. Data is yearly from 2011-2014. This organization provides the balance sheet of the population of Colombian firms, namely 7928 firms with complete information on financial debt and investments. Additionally, data contains the industry each single firm belongs to. Then, I can construct a proxy of the exposure to market maker banks at the industry level. More specifically,

$$Exp^{MM}_{i,2013} = \frac{\sum_{b \in MM} C_{ib,2013}}{\sum_{b \in B} C_{ib,2013}} \tag{2.3}$$

where $Exp^{MM}_{i,2013}$ is the exposure of industry i to market makers at the end of 2013. The numerator indicates the total credit extended by market makers to industry i at the end of 2013. The denominator contains the total credit extended by all banks to industry i. This information is helpful to understand whether a firm in a given industry was more likely to be exposed to these banks before the benchmark change.

Appendix Tables 2.4 and 2.5 show the 86 industries that I was able to match between the two databases, along with the specific exposure at the end of 2013. This exposure is also presented graphically in Figure 2.9. Two things are worth noticing: First, there is a large degree of specifity in each industry included in the database. For instance, there is a category named Coking, Refined Petroleum Product Production and Fuel Blending Activity and another one for the Extraction of Crude Petroleum and Natural Gas. Second, there is a good amount of variation in the exposure to market makers. For example these two industries have a very different degree of exposure to market makers, with the former having a 59.3 percent, and the latter 96.6 percent. Still, the exposure to market makers from most of the industries is high, probably a consequence of these banks having a sizable part of the total assets in the banking system in Colombia. The median exposure is 81.6. The lowest industry has close to 11 percent exposure (Building Management Services and Landscaping), and the largest only received credit from market maker banks (Social work Activities without Accommodation).

With this variable, I estimate the following specification for the period 2011-

2014,

$$\Delta y_{jt} = \theta_t + \theta_j + \alpha_1 Exp^{MM}_{i,2013} \mathbb{1}^{2014}_t + \alpha_2 Z_{jt-1} + \varepsilon_{jt} \tag{2.4}$$

where y_{jt} is the log variable of interest from the balance sheet for firm j and time $t.\theta_t$ and θ_j are fixed effects at the time and firm level respectively which captures aggregate time trends and unobservable fixed characteristics of firms. $Exp^{MM}_{i,2013} \mathbb{1}^{2014}_t$ is the treatment variable that identifies the exposure to market makers for the period of interest. I use the year 2014 since data is at yearly frequency. Z_{jt} is a vector of time-varying firm controls and ε_{jt} is the error term. I cluster errors at the industry level. I am specifically interested in two variables for y_{jt}. The first one is the financial debt of firms, which indicates the debt from financial institutions. If the shock was transmitted from banks to firms, then firms more likely to be exposed to market makers should have increased their financial debt. Second, I am also interested in the possible use of these funds. Therefore, I look at investments in these firms and how it was related to the industry exposure to market makers. As control variables I use assets, cash over assets, cash flow over assets, leverage, net worth and a dummy indicating whether a firm has access to corporate debt markets. All of these variables are lagged one period. I look only at firms that are at least 0.1 percent of the total credit given by banks within an industry in 2013. This reduces the sample from the initial 7928 to 2561 firms, but these firms only account for 2.6 percent of total assets and close to 6.8 percent of the total sales in Colombia. This sample cleaning serves two purposes. First, it reduces the volatility that small firms introduce. Second, it allows me to concentrate only on firms that were more likely affected by the change in commercial credit.

Table 2.12 presents the results for firms balance sheet data. Financial debt growth is positively correlated with exposure to market makers at the industry level during the rebalancing (Column 1). When I include firm controls, the coefficient is statistically similar and significant at the 1 percent level (Column 2). Results for investment growth are qualitatively similar (Columns 3 and 4). The economic size is also significant. An interquartile movement in the exposure to market makers is close to an 18 percentage point change in exposure. This implies a differential growth of 6 and 8 percentage points in financial debt and in-

vestments, respectively.[33]

2.4.2 Manufacturing Data

To complement balance sheet data results, I gather data for a subsample of industries from the Monthly Manufacturing Polls conducted by the Departamento Administrativo Nacional de Estadistica (DANE) in Colombia. This database contains the yearly growth at monthly level of employment, production and sales for each manufacturing industry. I match this information with the exposure to market makers as calculated in Equation (2.3). Information on all the industries in this database and their exposure is presented in Appendix Table 2.6. While this is a subsample of 21 industries, there is still significant variation in the exposure to market makers, with a median exposure of 82.4 percent.

To analyze whether the shock to credit had an impact on the real variables for these industries, I estimate the following specification:

$$\Delta y_{it} = \theta_t + \theta_i + \gamma_1 Exp^{MM}_{i,2013} \mathbb{1}_t^{\text{Rebalancing}} + \varepsilon_{it} \tag{2.5}$$

This estimation is very similar to the one in Equation (2.4), but at the industry level. y_{it} is either employment, production or sales. θ_t and θ_i are time and industry fixed effects, respectively. $Exp^{MM}_{i,2013} \mathbb{1}_t^{\text{Rebalancing}}$ is the treatment variable, with the exposure to market makers interacted with a time dummy for the period of the rebalancing. The estimation is a classical differences-in-differences approach, and γ_1 captures the differential effect on real variables of being more exposed to the credit shock. Errors are bootstrapped clustered at the industry level.[34]

Results show that being more exposed to a market maker bank led to a statistically significant increase in employment, production and sales during the rebalancing period (Table 2.14). The economic size of the effect is important. For example, consider an interquartile movement for an industry in the exposure to market makers, which implies an almost 10 percentage point increase in the exposure to market makers. This would have implied an increase in the average

[33]Table 2.13 presents the results for the parallel trends assumption test. The exposure to market makers at the industry level is not statistically significant for the previous year.

[34]Results are very similar when using cluster at the industry-rebalancing level.

yearly growth of 1.2, 1.7, and 2.4 percentage points for employment, production and sales, respectively. Overall, there were important effects for economic activity from the credit shock.

I also check whether the assumption of parallel trends holds for the different industries. Figure 2.10 presents the average growth for each real variable divided into two groups: low and high exposure to market makers, according to whether they are below or above the median exposure to market makers in the sample. The figure indicates that before the rebalancing, yearly growth for each of the variables had a similar pattern for the two groups, and this changes after the start of the rebalancing by J.P. Morgan.

2.5 Conclusions

In this paper, I exploit a sudden and unanticipated shock that triggered the entrance of foreign investors to the local currency sovereign debt market in an emerging market. I use an episode in which J.P. Morgan introduced several Colombian bonds in its local currency governemnt debt indexes in emerging markets. Since foreign institutional investors often use benchmark-tracking strategies, they rebalanced their portfolio towards Colombia increasing capital inflows to the domestic sovereign debt market. As foreign investors purchased this debt, banks officially designated as market makers in the sovereign debt market decreased their exposure to these securities. On average, they reduced their local public debt over total assets by 4.2 percentage points, compared to the rest of the banks. This shock, that was originated on the government debt market, spillovered to the credit market. Market maker banks increased their commercial credit to total assets ratio by 3.9 percentage points on average, relative to the rest of the banks. This transmission channel is not found during other periods and is not driven by other observable differences between market and non market maker banks. The differential commercial credit growth amounts to 2.25 percent of Colombia's GDP during the period. The evidence suggests that the shock had an impact on the real economy. I construct a proxy for the exposure to market maker banks at the industry level and find that firms in industries with more exposure to market makers had a higher growth of both their financial debt and investments during this period. Moreover,

I use the same proxy and find that manufacturing industries with more exposure to market makers had a higher growth in employment, production and sales during this period.

The evidence is consistent with a crowding out of private credit before the entrance of foreign investors. Because of the illiquidity of the sovereign debt market, the government used market makers to absorb debt issued in the primary market. As foreign institutional investors entered the domestic sovereign debt market, these domestic financial institutions were able to sell the excess of debt that they could not offload before and used the proceeds to extend credit.

There are two possible extensions for this study. First, in this paper, I use data from Colombia for mainly two reasons: (i) the size of the shock, and; (ii) the availability of detailed credit data across geographical areas and industries. However, several other countries have received upgrades/downgrades from index providers in their local government bond indexes (Mexico, South Africa, Romania and Nigeria for instance). As long as there is data availability, one possible avenue of future research is to extend this study for other countries to understand the external validity of these results. Another potential interesting question is whether capital outflows in sovereign debt markets have a symmetrical effect. During these episodes, banks could be prompt to hold more sovereign debt and decrease credit supply, transmitting financial cycles into the domestic economic.

Second, data in this paper has variation at the geographical and industry level. The use of the credit registry data for Colombia would be beneficial. By using this data, I could quantify in more detail the real effects of the entrance of foreign investors to the domestic sovereign debt market. Such an analysis would improve this paper by having a look at whether market maker banks increase credit supply based on maturity, risk, interest rate, collateral type. While I have not had access to this data, such an analysis is ear-marked for future inspection.

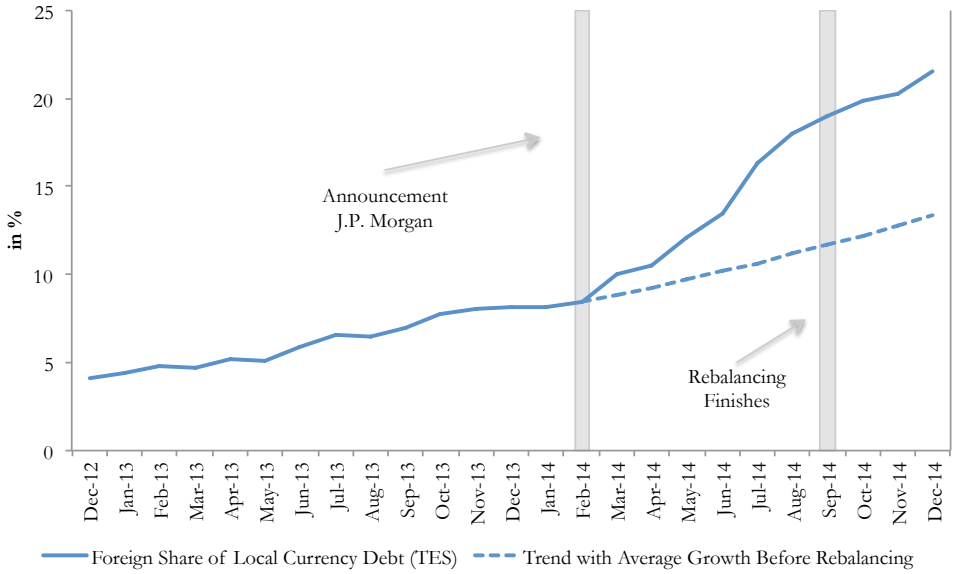
The evidence in this paper has implications from a policy-making perspective for a number of reasons. For instance, large countries such as China and India still have less than 2 percent of their local currency debt in the hands of foreign investors. This study sheds light on the possible consequences of using policies to increase the share of foreign investors in domestic sovereign debt markets. Moreover, on March 2016, J.P. Morgan included China on a watchlist to

enter the GBI-EM. The evidence suggests that the confirmation of this process could lead to a boost in private credit for the Chinese economy. Another consideration is that China would have the largest weight in the index (10 percent). As a consequence, its introduction to the index could lead to a decrease in the weights of the rest of the countries. This might ultimately lead to negative spillovers to the other constituents of the GBI-EM.

Furthermore, this study contributes to the ongoing policy debate on the effects of capital flows. A recent discussion by Blanchard et al. (2015) suggests that there is a disconnection between the academic and the policy view on the effects of capital inflows. The former argues that capital inflows are contractionary and the latter that they are expansionary. Since capital inflows are endogenous to local economic conditions, is hard to come up with evidence to enlighten the debate. Using an exogenous shock to capital inflows, the results in this paper show that even capital inflows to sovereign debt lead to credit booms and an increase in economic activity.

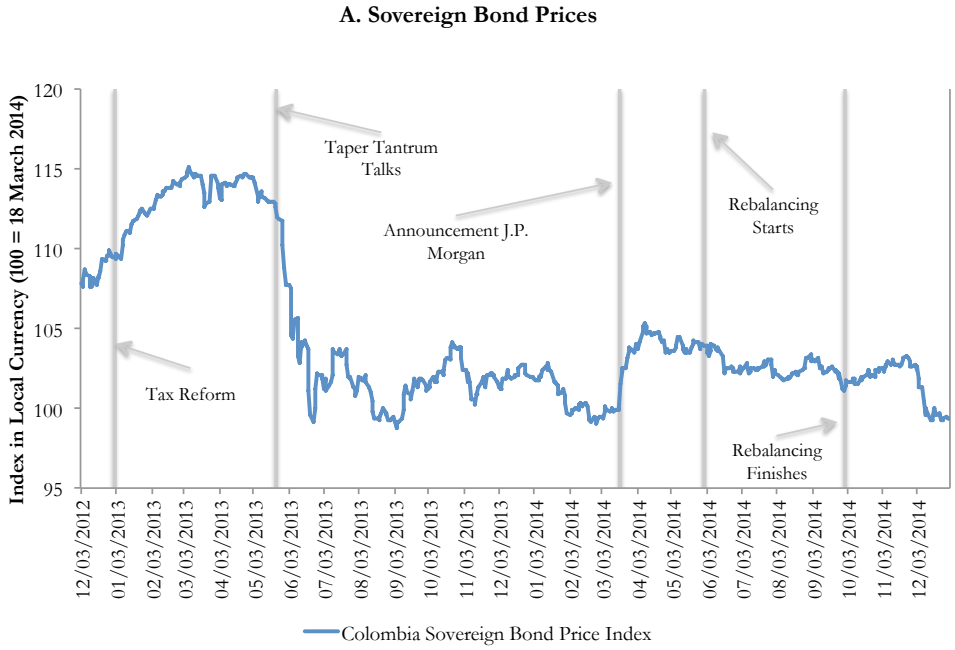
Finally, results also suggest that sovereign debt index rebalancing can have effects on the economy beyond the usual price effects found in the literature. Thus, one policy concern is related to the regulation of activities of both institutional investors with index-tracking strategies and index providers. Ultimately, the effects documented in this paper were started by a decision made by a single index provider. Is this desirable? Should there be regulation on the construction of benchmark indexes and their reconstitutions? Moreover, a decision to remove Colombia from the index may produce the opposite effect. The evidence suggests that activities by index-tracking investors and index providers should be followed more closely by policy makers.

Figure 2.1: Foreign Share of Domestic Government Debt Securities



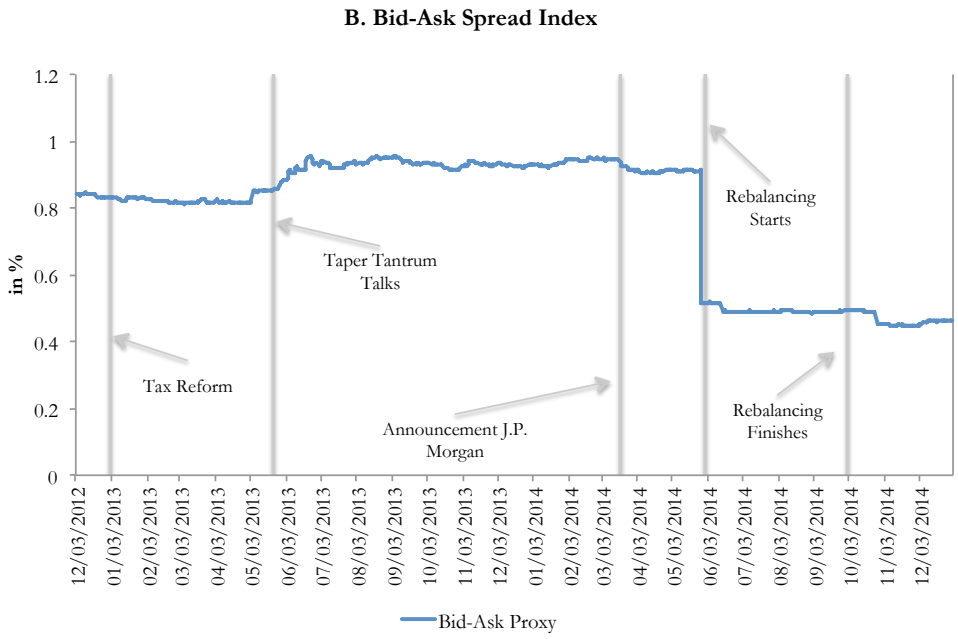
Notes: This figure presents the evolution of the share of domestic government debt securities (TES) held by foreigners. The dashed line shows a linear trend using the average growth during the 12 months prior to the announcement of the change in the index by J.P. Morgan. The grey bar represents the announcement of the rebalancing by J.P. Morgan.

Figure 2.2, Panel A: Domestic Sovereign Bonds Index



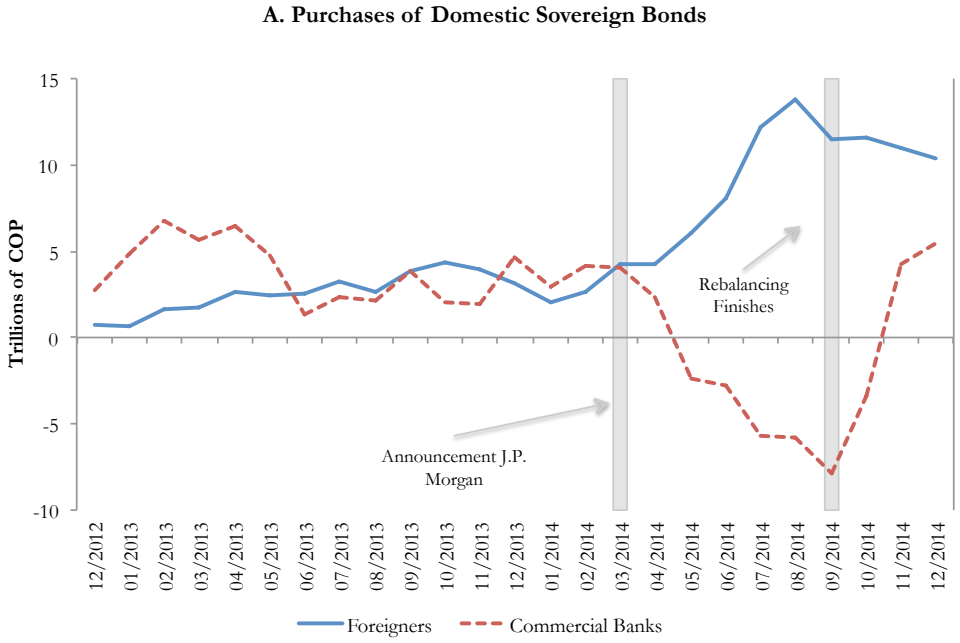
Notes: This figure presents the price and bid-ask spread evolution of the domestic sovereign bonds in Colombia. Panel A shows the bond prices and Panel B depicts the bid-ask spread. The bond price index weights the price return of each bond by its outstanding amount. Only the bonds included in the index rebalancing by J.P. Morgan are included and the index equals 100 at the day before the announcement of the rebalancing (18 March 2014).. The bid-ask spread is from data from Thomson Reuters Pricing Service and is presented as a percentage of the price. Each grey bar represents the events denoted in the picture.

Figure 2.2, Panel B: Domestic Sovereign Bonds Index



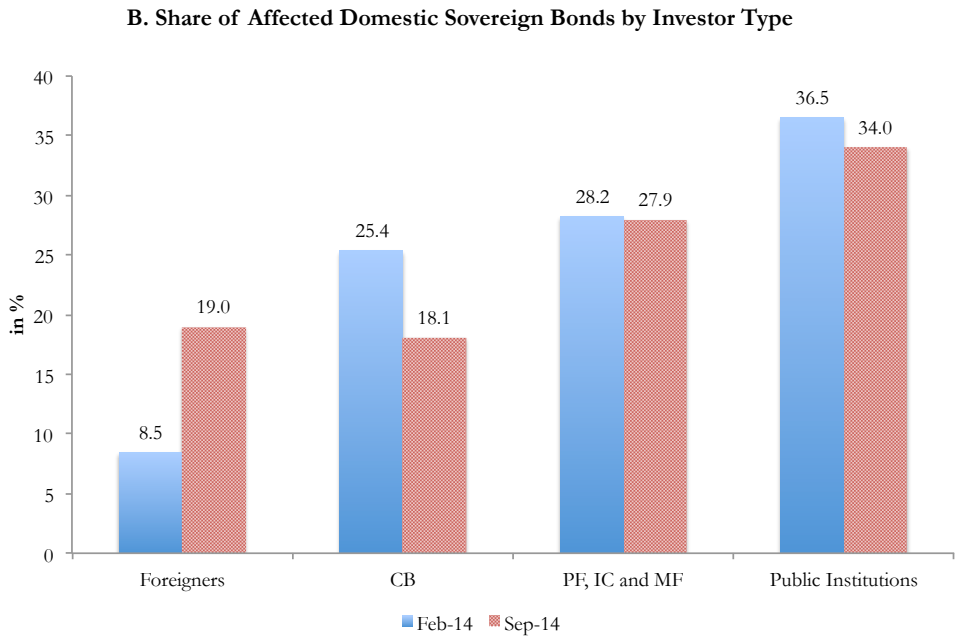
Notes: This figure presents the price and bid-ask spread evolution of the domestic sovereign bonds in Colombia. Panel A shows the bond prices and Panel B depicts the bid-ask spread. The bond price index weights the price return of each bond by its outstanding amount. Only the bonds included in the index rebalancing by J.P. Morgan are included and the index equals 100 at the day before the announcement of the rebalancing (18 March 2014).. The bid-ask spread is from data from Thomson Reuters Pricing Service and is presented as a percentage of the price. Each grey bar represents the events denoted in the picture.

Figure 2.3, Panel A: Holdings of Domestic Sovereign Bonds



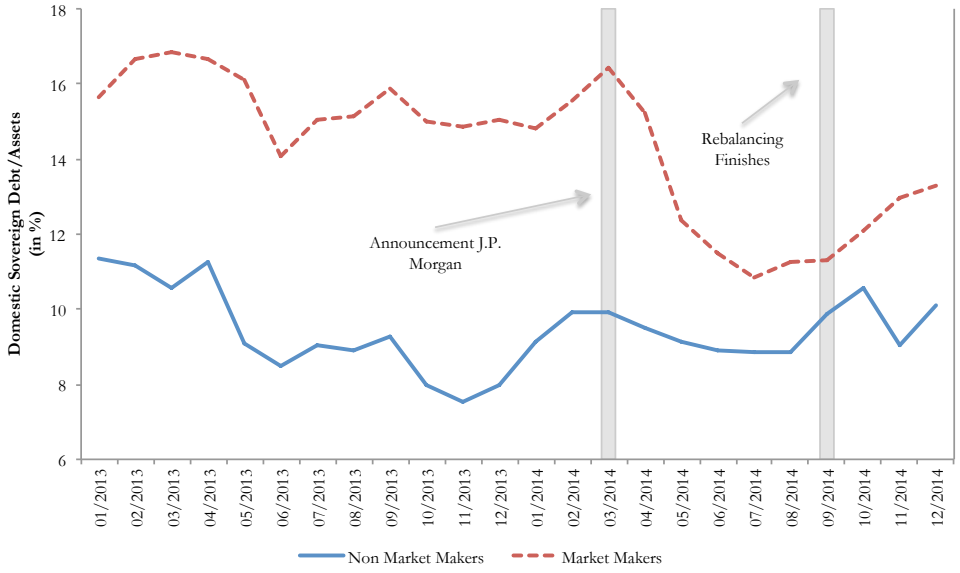
Notes: This figure presents the net purchases of domestic sovereign bonds in Colombia around the index rebalancing by J.P. Morgan. Panel A depicts 6-month rolling purchases by foreigners and commercial banks. The grey bars indicate the events described in the picture. Panel B shows the percentage of TES bonds held by the different economic agents in the economy before and after the rebalancing. PF, IC and MF are pension funds, insurance companies and domestic mutual funds respectively.

Figure 2.3, Panel B: Holdings of Domestic Sovereign Bonds



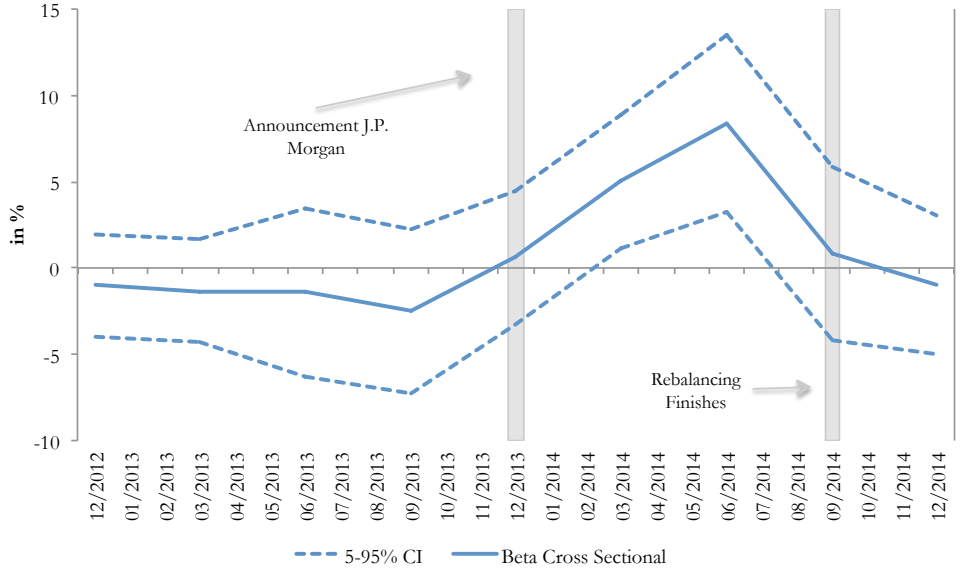
Notes: This figure presents the net purchases of domestic sovereign bonds in Colombia around the index rebalancing by J.P. Morgan. Panel A depicts 6-month rolling purchases by foreigners and commercial banks. The grey bars indicate the events described in the picture. Panel B shows the percentage of TES bonds held by the different economic agents in the economy before and after the rebalancing. PF, IC and MF are pension funds, insurance companies and domestic mutual funds respectively.

Figure 2.4: Domestic Sovereign Debt Exposure in Commercial Banks



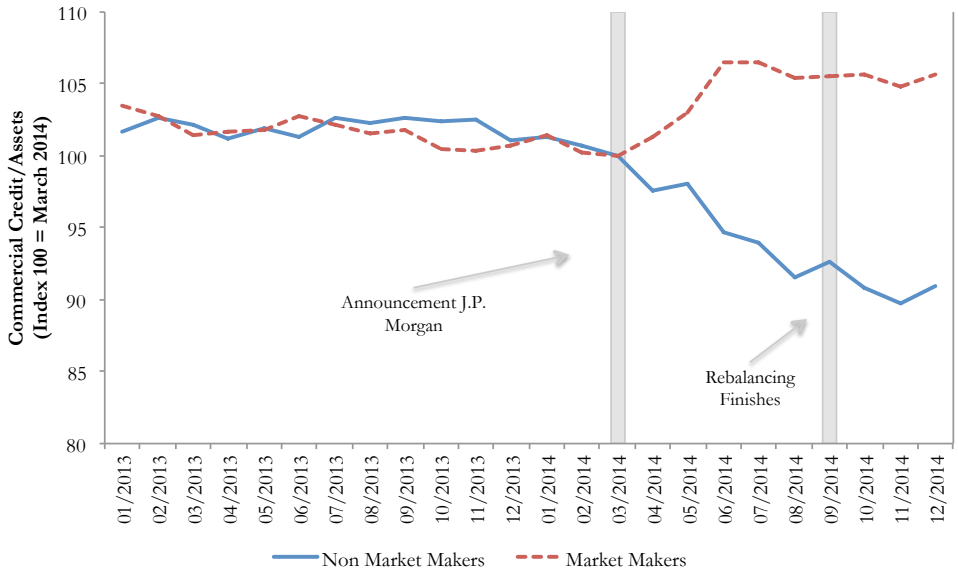
Notes: This figure shows the evolution of sovereign debt over assets dividing by market maker and non market maker banks at the end of 2013. The index is constructed by averaging the growth of domestic debt over total assets at each point in time. The index is normalized to the average holdings of sovereign debt over assets for the two groups in February 2014. The grey bars indicate the events described in the picture.

Figure 2.5: Cross-Sectional Estimation Betas



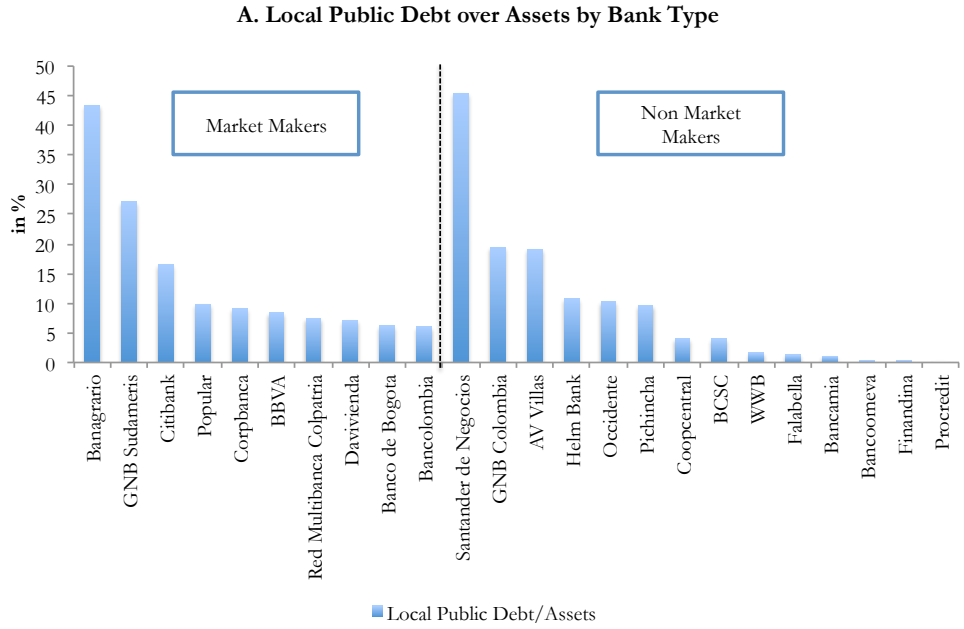
Notes: This figure presents the coefficient from an estimation of the growth of commercial credit over assets to a market maker dummy with city-zone fixed effects. Errors are constructed with bootstrapping and are clustered at the bank level. The dashed lines indicate the 5-95% confidence interval. The grey bars indicate the events described in the picture.

Figure 2.6: Commercial Credit Evolution



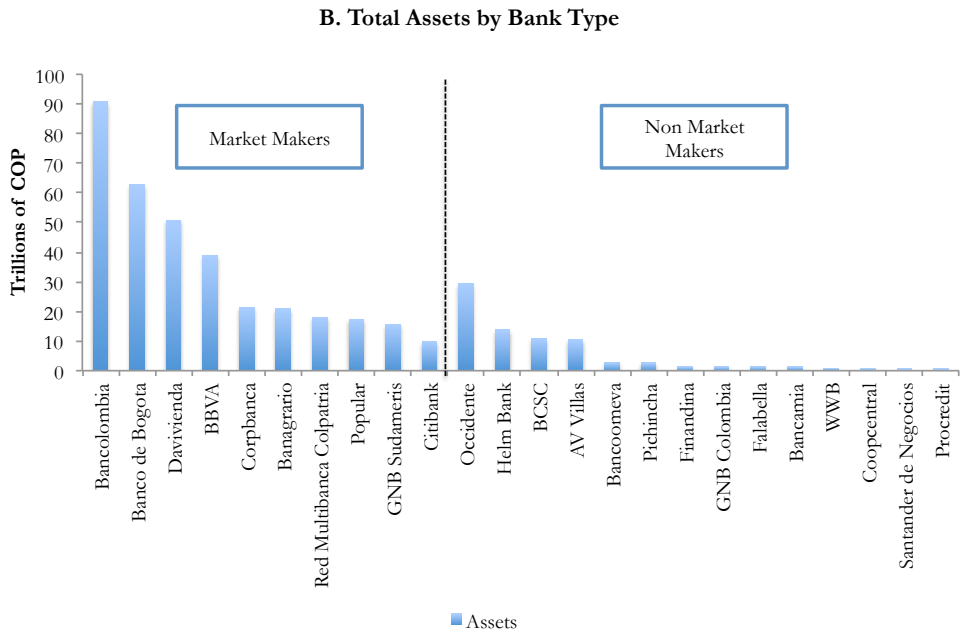
Notes: This figure shows the evolution of commercial credit over total assets dividing by market maker and non market maker banks at the end of 2013. The index is constructed by averaging the growth of commercial credit over total assets at each point in time. The index is normalized to 100 for March 2014. The grey bars indicate the events described in the picture.

Figure 2.7, Panel A: Assets and Domestic Sovereign Debt in Commercial Banks



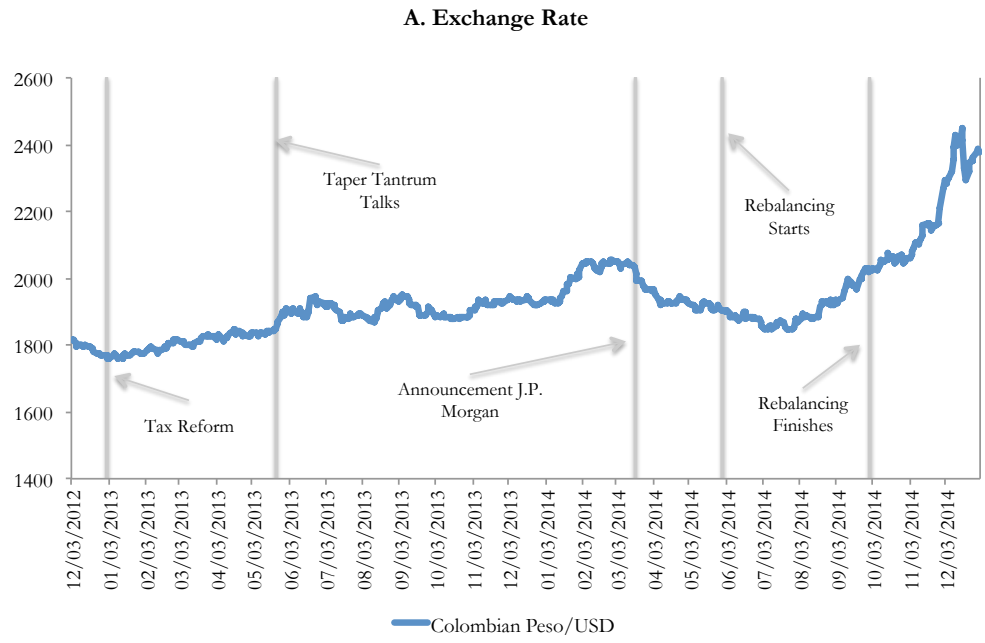
Notes: This figure presents the total assets and domestic sovereign debt exposure dividing by market maker and non market maker banks at the end of 2013. Panel A depicts the local public debt divided by total assets. Panel B shows the total assets. Each bar is constructed by averaging the positition of each bank during 2013.

Figure 2.7, Panel B: Assets and Domestic Sovereign Debt in Commercial Banks



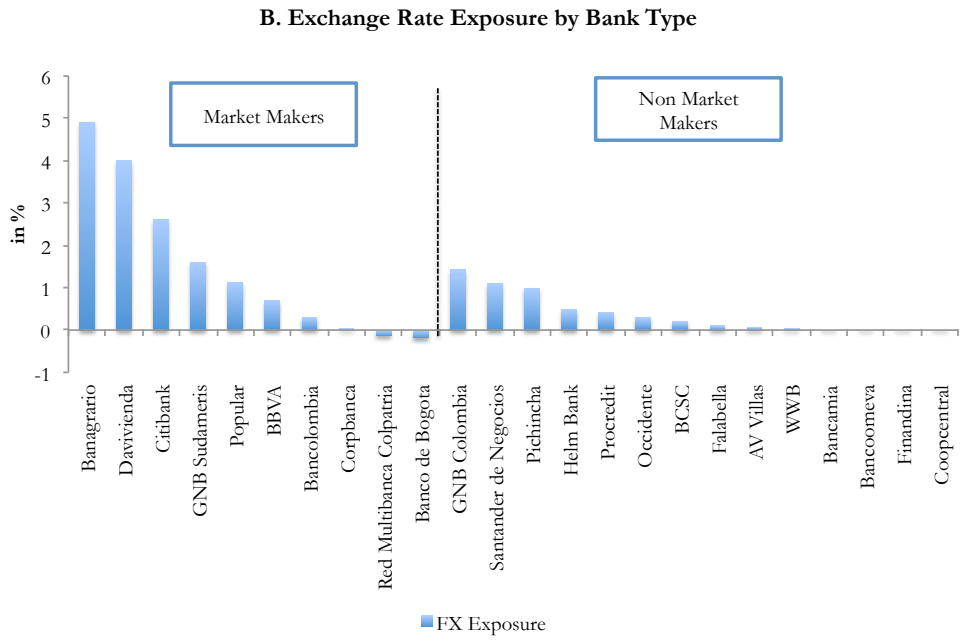
Notes: This figure presents the total assets and domestic sovereign debt exposure dividing by market maker and non market maker banks at the end of 2013. Panel A depicts the local public debt divided by total assets. Panel B shows the total assets. Each bar is constructed by averaging the positition of each bank during 2013.

Figure 2.8, Panel A: Exchange Rate



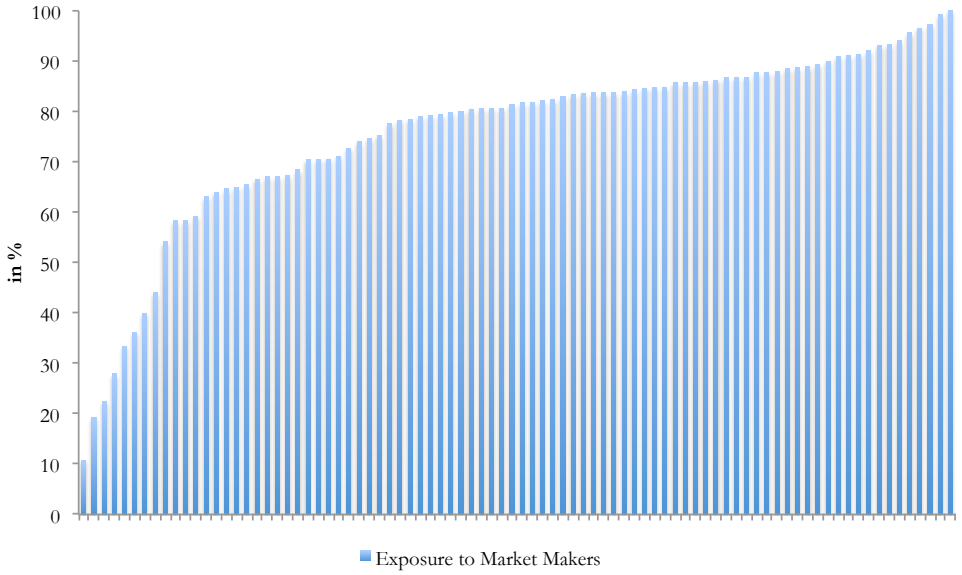
Notes: This figure presents the evolution of the exchange rate and the exchange rate exposure dividing by market maker and non market maker banks at the end of 2013. Panel A shows the time series of the exchange rate defined as local currency per US dollars. Each grey bar represents the events denoted in the picture. Panel B depicts the total assets minus total liabilities denominated in foreign currency divided by the net worth. Each bar is constructed by averaging the positition of each bank during 2013.

Figure 2.8, Panel B: Exchange Rate



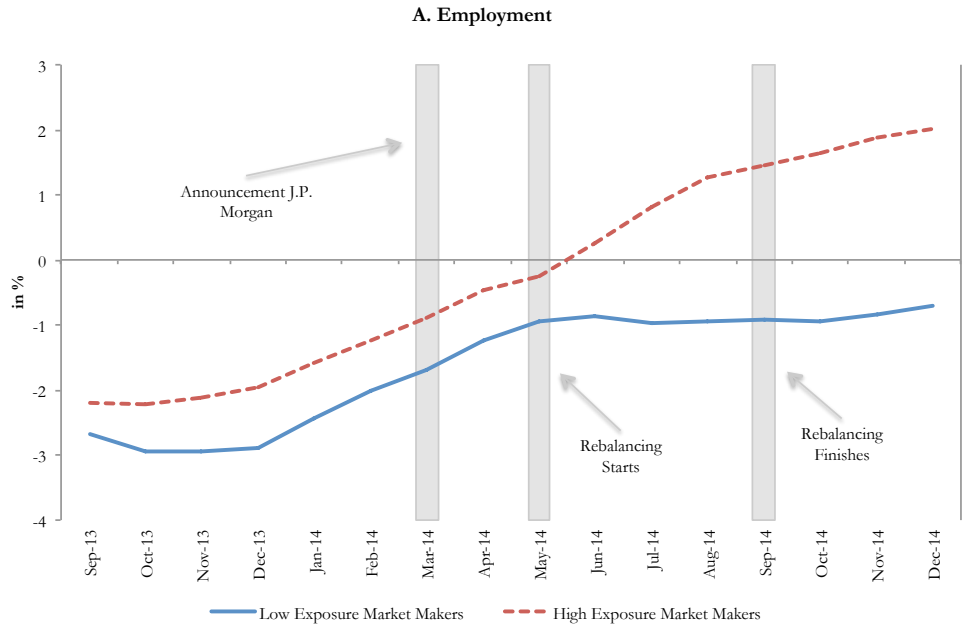
Notes: This figure presents the evolution of the exchange rate and the exchange rate exposure dividing by market maker and non market maker banks at the end of 2013. Panel A shows the time series of the exchange rate defined as local currency per US dollars. Each grey bar represents the events denoted in the picture. Panel B depicts the total assets minus total liabilities denominated in foreign currency divided by the net worth. Each bar is constructed by averaging the positition of each bank during 2013.

Figure 2.9: Exposure to Market Makers Across Industries



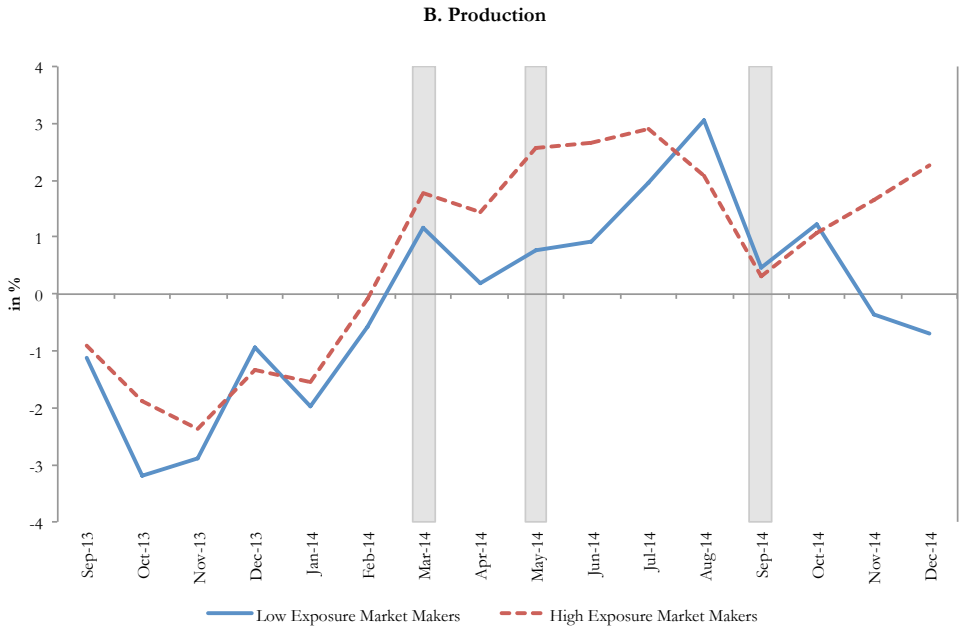
Notes: This figure presents the exposure of each industry to market maker banks at the end of 2013. The exposure is constructed by summing the commercial credit of market maker banks to each industry and dividing it by the total credit to the same industry by all commercial banks.

Figure 2.10, Panel A: Real Effects: Employment, Production and Sales



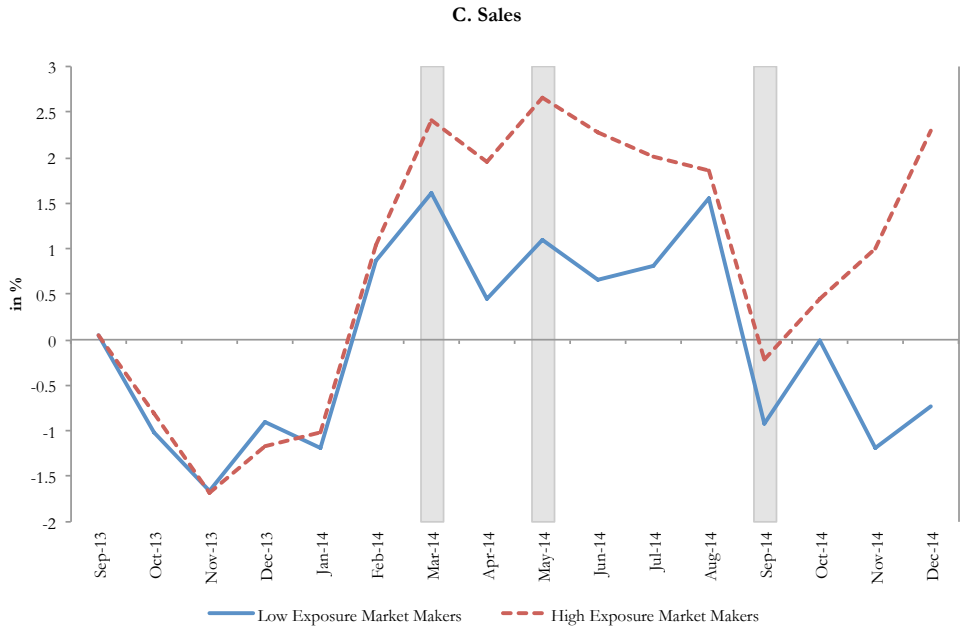
Notes: This figure presents the evolution of the growth in employment, real production and real sales from the manufacturing industries in Colombia. The figure shows the 6-month rolling average of yearly growth for industries with low and high exposure to market makers after removing industry fixed effects. Industries are separated into the low (high) category if it is below (above) the median exposure in the sample. The grey bars indicate the events described in the picture.

Figure 2.10, Panel B: Real Effects: Employment, Production and Sales



Notes: This figure presents the evolution of the growth in employment, real production and real sales from the manufacturing industries in Colombia. The figure shows the 6-month rolling average of yearly growth for industries with low and high exposure to market makers after removing industry fixed effects. Industries are separated into the low (high) category if it is below (above) the median exposure in the sample. The grey bars indicate the events described in the picture.

Figure 2.10, Panel C: Real Effects: Employment, Production and Sales



Notes: This figure presents the evolution of the growth in employment, real production and real sales from the manufacturing industries in Colombia. The figure shows the 6-month rolling average of yearly growth for industries with low and high exposure to market makers after removing industry fixed effects. Industries are separated into the low (high) category if it is below (above) the median exposure in the sample. The grey bars indicate the events described in the picture.

Table 2.1: Commercial Banks in Colombia

Bank Name	**Market Maker**	**Foreign**
Banagrario	Yes	No
Banco de Bogota	Yes	No
Bancolombia	Yes	No
BBVA	Yes	Yes
Citibank	Yes	Yes
Corpbanca	Yes	Yes
Davivienda	Yes	No
GNB Sudameris	Yes	Yes
Popular	Yes	No
Red Multibanca Colpatria	Yes	Yes
AV Villas	No	No
Bancamia	No	No
Bancoomeva	No	No
BCSC	No	No
Coopcentral	No	No
Falabella	No	Yes
Finandina	No	No
GNB Colombia	No	Yes
Helm Bank	No	No
Occidente	No	No
Pichincha	No	Yes
Procredit	No	Yes
Santander de Negocios	No	Yes
WWB	No	No

Notes: This table shows the commercial banks in Colombia during 2013-2014 and their classification into market makers in 2013 and into foreign or domestic banks.

Table 2.2: Balance Sheet Structure of Commercial Banks (December 2013)

	Total Sum		Average		Median	
Variable	Non Market Makers	Market Makers	Non Market Makers	Market Makers	Non Market Makers	Market Makers
A. Assets						
Total Assets (in Trillions COP)	72.3	328.8	5.2	29.9	1.3	16.6
Liquid Assets	8.7	8.8	9.9	8.2	8.8	7.2
Investments	14.6	20.3	12.5	23.3	6.2	19.2
Local Public Debt	8.2	11.5	8.9	15.4	2.3	10.8
Total Credit	63.5	63.8	70.3	62.8	75.4	64.8
Commercial Credit	31.5	37.7	25.5	32.5	19.0	35.1
Consumer Credit	22.6	18.2	27.8	22.8	19.4	20.4
Microcredit	3.0	1.7	12.4	2.4	0.0	0.0
Mortgages	6.4	6.2	4.5	5.1	0.0	4.6
Public Credit	2.7	3.0	1.5	2.8	0.2	3.0
Other Assets	6.3	7.3	6.8	6.5	5.7	5.8
ROA	1.0	1.4	0.4	1.2	0.9	1.2
B. Liabilities						
Total Liabilities (in Trillions COP)	62.3	281.5	4.4	25.6	1.1	14.9
Total Deposits	79.5	76.6	65.5	77.0	75.6	73.1
Credit Other Institutions	9.3	10.7	20.4	11.5	11.7	11.8
External Credit	2.5	4.3	0.7	3.4	0.0	3.0
Debt	7.6	8.8	8.2	7.3	2.7	5.6
C. Other Variables						
Exchange Rate Exposure	0.2	1.0	0.3	0.9	0.1	0.9
Solvency Ratio	15.1	14.7	28.5	15.6	15.5	13.4

Notes: This table presents the structure of the balance sheet for commercial banks before Colombia's benchmark rebalancing by J.P. Morgan. Panel A depicts the asset structure, with all variables in percentage of total assets unless indicated. Panel B shows the liability structure with all variables in percentage of total liabilities unless indicated. Panel C presents other relevant variables. The exchange rate exposure is the total assets minus total liabilities denominated in foreign currency divided by the net worth. The solvency ratio is the tier 1 capital divided by risk-weighted assets and market risk.

Table 2.3: Credit Growth and Market Makers

	Total Credit	Commercial Credit	Consumer Credit
Explanatory Variables	**Dependent Variable: Growth Credit/Assets**		
Market Maker*Rebalancing$_{\text{Mar 2014-Sep 2014}}$	0.011 **	0.020 **	0.009
	(0.005)	(0.008)	(0.008)
Time Fixed Effects	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes
Observations	429	429	429
R-Squared	0.103	0.129	0.150

Notes: This table presents OLS estimations of the growth of credit to total assets against a treatment variable using balance sheet monthly data. The growth of the dependent variable is constructed as the difference in logs. The treatment variable is a market maker dummy multiplied by a dummy indicating the period of the index rebalancing by J.P. Morgan. Consumer credit includes housing credit. All estimations are for the period 2013-2014. The dependent variable is winsorized at the 5th and 95th percent level. Errors are bootstrapped clustered at the bank level. *, **, and *** denote 10, 5 and 1 percent level of significance respectively.

Table 2.4: Commercial Credit and Market Makers

	City-Zone Database			Industry Database		
Explanatory Variables	**Dependent Variable: Growth Commercial Credit/Assets (2013-2014)**					
Market Maker*Rebalancing$_{\text{Mar 2014-Sep 2014}}$	0.056 ***	0.057 ***	0.054 ***	0.079 ***	0.077 ***	0.075 ***
	(0.017)	(0.018)	(0.015)	(0.023)	(0.022)	(0.022)
Time Fixed Effects	Yes	No	No	Yes	No	No
City-Zone-Time Fixed Effects	No	Yes	Yes	No	No	No
Industry-Time Fixed Effects	No	No	No	No	Yes	Yes
Bank Fixed Effects	No	No	Yes	No	No	Yes
Observations	4,571	4,571	4,571	6,402	6,402	6,402
R-Squared	0.044	0.176	0.224	0.026	0.153	0.168

Notes: This table presents OLS estimations of the growth of commercial credit to total assets against different explanatory variables for commercial banks and a treatment variable. The growth of the dependent variable is constructed as the difference in logs. The treatment variable is a market maker dummy multiplied by a dummy indicating the period of the index rebalancing by J.P. Morgan. All estimations are for the period 2013-2014. The dependent variable is winsorized at the 5th and 95th percent level. Errors are bootstrapped clustered at the bank level. *, **, and *** denote 10, 5 and 1 percent level of significance respectively.

Table 2.5: Commercial Credit and Market Makers: Placebo Test

	City-Zone Database			Industry Database		
Explanatory Variables	**Dependent Variable: Growth Commercial Credit/Assets (2012-2013)**					
Market Maker*Placebo$_{\text{Mar 2013-Sep 2013}}$	0.009	0.006	0.008	-0.010	-0.013	-0.016
	(0.026)	(0.026)	(0.024)	(0.020)	(0.021)	(0.020)
Time Fixed Effects	Yes	No	No	Yes	No	No
City-Zone-Time Fixed Effects	No	Yes	Yes	No	No	No
Industry-Time Fixed Effects	No	No	No	No	Yes	Yes
Bank Fixed Effects	No	No	Yes	No	No	Yes
Observations	5,051	5,051	5,051	5,858	5,858	5,858
R-Squared	0.036	0.141	0.171	0.008	0.163	0.170

Notes: This table presents OLS estimations of the growth of commercial credit to total assets against different explanatory variables for commercial banks and a treatment variable. The growth of the dependent variable is constructed as the difference in logs. The treatment variable is a market maker dummy multiplied by a dummy indicating the period March 2013-September 2013. All estimations are for the period 2012-2013. The dependent variable is winsorized at the 5th and 95th percent level. Errors are bootstrapped clustered at the bank level. *, **, and *** denote 10, 5 and 1 percent level of significance respectively.

Table 2.6: Commercial Credit and Market Makers: Domestic Sovereign Debt Exposure

	City-Zone Database				
Explanatory Variables	**Dependent Variable: Growth Commercial Credit/Assets (2013-2014)**				
Market Maker*Rebalancing$_{\text{Mar 2014-Sep 2014}}$		0.055 ***	0.057 ***	0.054 ***	0.054 ***
		(0.017)	(0.018)	(0.016)	(0.017)
Domestic Sovereign Debt Exposure*Rebalancing$_{\text{Mar 2014-Sep 2014}}$	0.200	0.016	0.003	-0.006	-0.132
	(0.124)	(0.084)	(0.086)	(0.091)	(0.649)
Domestic Sovereign Debt Exposure*Solvency Ratio*Rebalancing$_{\text{Mar 2014-Sep 2014}}$					0.007
					(0.036)
Solvency Ratio*Rebalancing$_{\text{Mar 2014-Sep 2014}}$					-0.001
					(0.001)
Time Fixed Effects	Yes	Yes	No	No	No
City-Zone-Time Fixed Effects	No	No	Yes	Yes	Yes
Industry-Time Fixed Effects	No	No	No	No	No
Bank Fixed Effects	No	No	No	Yes	Yes
Observations	4,571	4,571	4,571	4,571	4,571
R-Squared	0.031	0.044	0.176	0.224	0.224

Notes: This table presents OLS estimations of the growth of commercial credit to total assets against different explanatory variables for commercial banks and a treatment variable using the city-zone database. The growth of the dependent variable is constructed as the difference in logs. The treatment variable is a market maker dummy multiplied by a dummy indicating the period of the index rebalancing by J.P. Morgan. All estimations are for the period 2013-2014. Domestic sovereign debt exposure is the initial local public debt divided by assets. Solvency ratio is the initial tier 1 capital divided by risk-weighted assets and market risk. The dependent variable is winsorized at the 5th and 95th percent level. Errors are bootstrapped clustered at the bank level. *, **, and *** denote 10, 5 and 1 percent level of significance respectively.

Table 2.7: Commercial Credit and Market Makers: Valuation Effect

	City-Zone Database				
Explanatory Variables	**Dependent Variable: Growth Commercial Credit/Assets (2013-2014)**				
Market Maker*Rebalancing$_{\text{Mar 2014-Sep 2014}}$		0.060 ***	0.061 ***	0.054 ***	0.056 ***
		(0.018)	(0.019)	(0.017)	(0.016)
Profits March 2014*Rebalancing$_{\text{Mar 2014-Sep 2014}}$	0.010	-0.042	-0.038	-0.002	0.231
	(0.052)	(0.053)	(0.055)	(0.062)	(0.324)
Profits March 2014*SR*Rebalancing$_{\text{Mar 2014-Sep 2014}}$					-0.015
					(0.019)
SR*Rebalancing$_{\text{Mar 2014-Sep 2014}}$					0.005
					(0.007)
Time Fixed Effects	Yes	Yes	No	No	No
City-Zone-Time Fixed Effects	No	No	Yes	Yes	Yes
Industry-Time Fixed Effects	No	No	No	No	No
Bank Fixed Effects	No	No	No	Yes	Yes
Observations	4,571	4,571	4,571	4,571	4,571
R-Squared	0.027	0.045	0.177	0.224	0.224

Notes: This table presents OLS estimations of the growth of commercial credit to total assets against different explanatory variables for commercial banks and a treatment variable using the city-zone database. The growth of the dependent variable is constructed as the difference in logs. The treatment variable is a market maker dummy multiplied by a dummy indicating the period of the index rebalancing by J.P. Morgan. All estimations are for the period 2013-2014. Profits March 2014 are the profits during the month of the announcement by J.P. Morgan over assets. Solvency ratio (named SR) is the initial tier 1 capital divided by risk-weighted assets and market risk. The dependent variable is winsorized at the 5th and 95th percent level. Errors are bootstrapped clustered at the bank level. *, **, and *** denote 10, 5 and 1 percent level of significance respectively.

Table 2.8: Commercial Credit and Market Makers: Bank Size

	City-Zone Database						
Explanatory Variables	**Dependent Variable: Growth Commercial Credit/Assets (2013-2014)**						
Market Maker*Rebalancing$_{\text{Mar 2014-Sep 2014}}$	0.066 ***	0.065 ***	0.064 ***	0.065 ***	0.061 ***	0.060 ***	0.055 ***
	(0.018)	(0.019)	(0.009)	(0.009)	(0.021)	(0.022)	(0.021)
Assets*Rebalancing$_{\text{Mar 2014-Sep 2014}}$	0.008	0.008	-0.005	-0.011			
	(0.007)	(0.007)	(0.004)	(0.009)			
Assets*SR*Rebalancing$_{\text{Mar 2014-Sep 2014}}$				0.000			
				(0.001)			
SR*Rebalancing$_{\text{Mar 2014-Sep 2014}}$				-0.004			
				(0.007)			
Time Fixed Effects	No	No	No	No	Yes	No	No
City-Zone-Time Fixed Effects	Yes	Yes	Yes	Yes	No	Yes	Yes
Industry-Time Fixed Effects	No	No	No	No	No	No	No
Bank Fixed Effects	No	Yes	Yes	Yes	No	No	Yes
Observations	4,571	4,571	4,571	4,571	3,048	3,048	3,048
R-Squared	0.055	0.185	0.224	0.224	0.042	0.237	0.265

Notes: This table presents OLS estimations of the growth of commercial credit over total assets against different explanatory variables for commercial banks and a treatment variable. The growth of the dependent variable is constructed as the difference in logs. The treatment variable is a market maker dummy multiplied by a dummy indicating the period of the index rebalancing by J.P. Morgan. Estimations in Columns 6-9 are for the period 2013-2014 and only includes banks with average assets in 2013 between 25 and 5 trillions of COP. Assets is the initial log of assets. Solvency ratio (named SR) is the initial tier 1 capital divided by risk-weighted assets and market risk. The dependent variable is winsorized at the 5th and 95th percent level. Errors are bootstrapped clustered at the bank level. *, **, and *** denote 10, 5 and 1 percent level of significance respectively.

Table 2.9: Commercial Credit and Market Makers: Exchange Rate Exposure

	City-Zone Database				
Explanatory Variables	**Dependent Variable: Growth Commercial Credit/Assets (2013-2014)**				
Market Maker*Rebalancing$_{\text{Mar 2014-Sep 2014}}$		0.051 **	0.054 **	0.073 ***	0.073 ***
		(0.022)	(0.023)	(0.022)	(0.022)
Exchange Rate Exposure*Rebalancing$_{\text{Mar 2014-Sep 2014}}$	0.023 **	0.005	0.003	-0.024	-0.033
	(0.010)	(0.014)	(0.015)	(0.015)	(0.067)
Exchange Rate Exposure*Solvency Ratio*Rebalancing$_{\text{Mar 2014-Sep 2014}}$					0.001
					(0.004)
Solvency Ratio*Rebalancing$_{\text{Mar 2014-Sep 2014}}$					-0.000
					(0.001)
Time Fixed Effects	Yes	Yes	No	No	No
City-Zone-Time Fixed Effects	No	No	Yes	Yes	Yes
Industry-Time Fixed Effects	No	No	No	No	No
Bank Fixed Effects	No	No	No	Yes	Yes
Observations	4,571	4,571	4,571	4,571	4,571
R-Squared	0.037	0.046	0.177	0.227	0.227

Notes: This table presents OLS estimations of the growth of commercial credit to total assets against different explanatory variables for commercial banks and a treatment variable using the city-zone database. The growth of the dependent variable is constructed as the difference in logs. The treatment variable is a market maker dummy multiplied by a dummy indicating the period of the index rebalancing by J.P. Morgan. All estimations are for the period 2013-2014. Exchange rate exposure is the total assets minus total liabilities denominated in foreign currency divided by the net worth. Solvency ratio is the initial tier 1 capital divided by risk-weighted assets and market risk. The dependent variable is winsorized at the 5th and 95th percent level. Errors are bootstrapped clustered at the bank level. *, **, and *** denote 10, 5 and 1 percent level of significance respectively.

Table 2.10: Commercial Credit and Market Makers: Robustness Tests

	City-Zone Database (Only Private Banks)	City-Zone Database				
Explanatory Variables	**Dependent Variable: Growth Commercial Credit/Assets (2013-2014)**			**Dependent Variable: Growth Commercial Credit (2013-2014)**		
Market Maker*Rebalancing$_{\text{Mar 2014-Sep 2014}}$	0.056 ***	0.059 ***	0.054 ***	0.037 ***	0.037 **	0.034 ***
	(0.015)	(0.018)	(0.018)	(0.014)	(0.015)	(0.012)
Corporate Debt*Rebalancing$_{\text{Mar 2014-Sep 2014}}$		-0.001	-0.000			
		(0.001)	(0.001)			
Foreign*Rebalancing$_{\text{Mar 2014-Sep 2014}}$			0.017			
			(0.024)			
Time Fixed Effects	No	No	No	Yes	No	No
City-Zone-Time Fixed Effects	Yes	Yes	Yes	No	Yes	Yes
Industry-Time Fixed Effects	No	No	No	No	No	No
Bank Fixed Effects	Yes	Yes	Yes	No	No	Yes
Observations	4,396	4,571	4,571	4,571	4,571	4,571
R-Squared	0.231	0.226	0.226	0.046	0.176	0.229

Notes: This table presents OLS estimations of the growth of commercial credit to total assets or the growth of commercial credit against different explanatory variables for commercial banks and a treatment variable. The growth of the dependent variable is constructed as the difference in logs. The treatment variable is a market maker dummy multiplied by a dummy indicating the period of the index rebalancing by J.P. Morgan. All estimations are for the period 2013-2014. Corporate debt is the debt securities issued by a bank divided by total liabilities. Foreign is a dummy indicating whether a bank is foreign. The dependent variable is winsorized at the 5th and 95th percent level. Errors are bootstrapped clustered at the bank level. *, **, and *** denote 10, 5 and 1 percent level of significance respectively.

Table 2.11: Commercial Credit and Market Makers: Robustness Tests

	City-Zone Database				
Explanatory Variables	**Dependent Variable: Growth Commercial Credit/Assets (2013-2014)**				
Market Maker*Rebalancing$_{\text{Mar 2014-Sep 2014}}$	0.085 ***	0.082 ***	0.090 ***	0.105 ***	0.091 ***
	(0.021)	(0.023)	(0.025)	(0.028)	(0.030)
Assets*Rebalancing$_{\text{Mar 2014-Sep 2014}}$	-0.018 **	-0.018 *	-0.014	-0.014	-0.011
	(0.009)	(0.009)	(0.009)	(0.009)	(0.010)
Liquid Assets*Rebalancing$_{\text{Mar 2014-Sep 2014}}$	0.004 **	0.004 *	0.004 *	0.005 **	0.005 **
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Investments*Rebalancing$_{\text{Mar 2014-Sep 2014}}$	0.002	0.001	0.001	0.000	0.001
	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)
ROA*Rebalancing$_{\text{Mar 2014-Sep 2014}}$	0.022 ***	0.021 ***	0.02 ***	0.018 **	0.021 ***
	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)
Solvency Ratio*Rebalancing$_{\text{Mar 2014-Sep 2014}}$	-0.003 **	-0.003 **	-0.002 **	-0.003 **	-0.002 **
		(0.001)	(0.001)	(0.001)	(0.001)
Sovereign Debt Exposure*Rebalancing$_{\text{Mar 2014-Sep 2014}}$		0.028	0.067	-0.151 *	-0.116
		(0.092)	(0.094)	(0.090)	(0.082)
Exchange Rate Exposure*Rebalancing$_{\text{Mar 2014-Sep 2014}}$			-0.020	-0.019	-0.018
			(0.015)	(0.015)	(0.015)
Corporate Debt*Rebalancing$_{\text{Mar 2014-Sep 2014}}$				-0.000	0.000
				(0.001)	(0.001)
Foreign*Rebalancing$_{\text{Mar 2014-Sep 2014}}$					0.022
					(0.024)
Time Fixed Effects	No	No	No	No	No
City-Zone-Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
Industry-Time Fixed Effects	No	No	No	No	No
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	4,571	4,571	4,571	4,571	4,571
R-Squared	0.227	0.230	0.232	0.233	0.234

Notes: This table presents OLS estimations of the growth of commercial credit to total assets against different explanatory variables for commercial banks and a treatment variable. The growth of the dependent variable is constructed as the difference in logs. The treatment variable is a market maker dummy multiplied by a dummy indicating the period of the index rebalancing by J.P. Morgan. All estimations are for the period 2013-2014. Corporate debt is the debt securities issued by a bank divided by total liabilities. Foreign is a dummy indicating whether a bank is foreign. Sovereign debt exposure is the initial local public debt divided by assets. Exchange rate exposure is the total assets minus total liabilities denominated in foreign currency divided by the net worth. Assets is the initial log of assets. Liquid assets is the initial liquid assets to total assets. Investments is the initial total investments in securities over total assets. ROA is initial return on assets. Solvency ratio is the initial tier 1 capital divided by risk-weighted assets and market risk. The dependent variable is winsorized at the 5th and 95th percent level. Errors are bootstrapped clustered at the bank level. *, **, and *** denote 10, 5 and 1 percent level of significance respectively.

Table 2.12: Real Effects: Firm-Level Database

Explanatory Variables	**Dependent Variable: Growth Financial Debt (2011-2014)**		**Dependent Variable: Growth Investments (2011-2014)**	
Exposure to Market Makers*Rebalancing$_{2014}$	0.353 **	0.338 ***	0.518 **	0.467 **
	(0.154)	(0.112)	(0.217)	(0.219)
Assets		-61.05 ***		-47.625 ***
		(5.238)		(16.477)
Cash		-1.143		23.566
		(25.607)		(96.657)
Cash Flow		0.003		-0.010
		(0.002)		(0.010)
Leverage		-276.005 ***		30.216
		(20.188)		(41.110)
Net Worth		-5.107		55.363
		(21.318)		(54.556)
Debt Securities		33.772 **		-0.126
		(16.186)		(22.935)
Time Fixed Effects	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Observations	6,818	6,818	6,818	6,818
R-Squared	0.390	0.525	0.341	0.345

Notes: This table presents OLS estimations of the growth of financial debt and investments against different explanatory variables. The growth of the dependent variable is constructed as the difference in logs. Assets is the initial log of assets. Cash is the initial cash over assets. Cash flow is the initial total cash flow divided by the fixed assets. Leverage is total debt divided by assets. Net worth is the initial assets minus liabilities divided by assets. Debt securities is a dummy indicating whether a firm issued debt securities. The dependent variable is winsorized at the 1th and 99th percent level. Errors are clustered at the industry level. *, **, and *** denote 10, 5 and 1 percent level of significance respectively.

Table 2.13: Real Effects: Parallel Trends Assumption Test

Explanatory Variables	**Dependent Variable: Growth Financial Debt (2011-2014)**		**Dependent Variable: Growth Investments (2011-2014)**	
Exposure to Market Makers*Rebalancing$_{2014}$	0.350 **	0.322 **	0.640 ***	0.617 **
	(0.170)	(0.152)	(0.236)	(0.244)
Exposure to Market Makers*Rebalancing$_{2013}$	-0.006	-0.037	0.334	0.321
	(0.155)	(0.143)	(0.379)	(0.384)
Assets		-61.083 ***		-28.177 **
		(6.212)		(12.452)
Cash		-1.211		131.296 *
		(31.831)		(68.263)
Cash Flow		0.003		-0.002
		(0.002)		(0.002)
Leverage		-276.066 ***		-12.288
		(20.156)		(35.700)
Net Worth		-5.246		3.309
		(22.532)		(41.026)
Debt Securities		33.78 *		-14.676
		(20.084)		(22.153)
Time Fixed Effects	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Observations	6,818	6,818	6,818	6,818
R-Squared	0.390	0.525	0.341	0.345

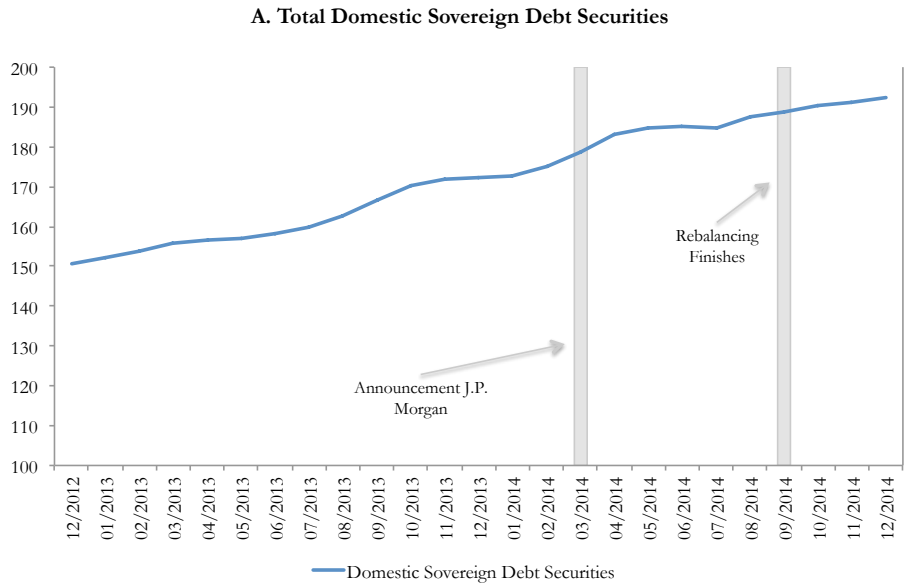
Notes: This table presents OLS estimations of the growth of financial debt and investments against different explanatory variables. The growth of the dependent variable is constructed as the difference in logs. Assets is the initial log of assets. Cash is the initial cash over assets. Cash flow is the initial total cash flow divided by the fixed assets. Leverage is total debt divided by assets. Net worth is the initial assets minus liabilities divided by assets. Debt securities is a dummy indicating whether a firm issued debt securities. The dependent variable is winsorized at the 1th and 99th percent level. Errors are clustered at the industry level. *, **, and *** denote 10, 5 and 1 percent level of significance respectively.

Table 2.14: Real Effects: Employment, Production and Sales

	Employment	Production	Sales
Explanatory Variables	**Dependent Variable: Growth Real Variable (2013-2014)**		
Exposure Market Maker*Rebalancing$_{\text{Mar 2014-Sep 2014}}$	0.124 **	0.166 ***	0.237 ***
	(0.055)	(0.045)	(0.034)
Time Fixed Effects	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes
Observations	757	757	757
R-Squared	0.285	0.301	0.349

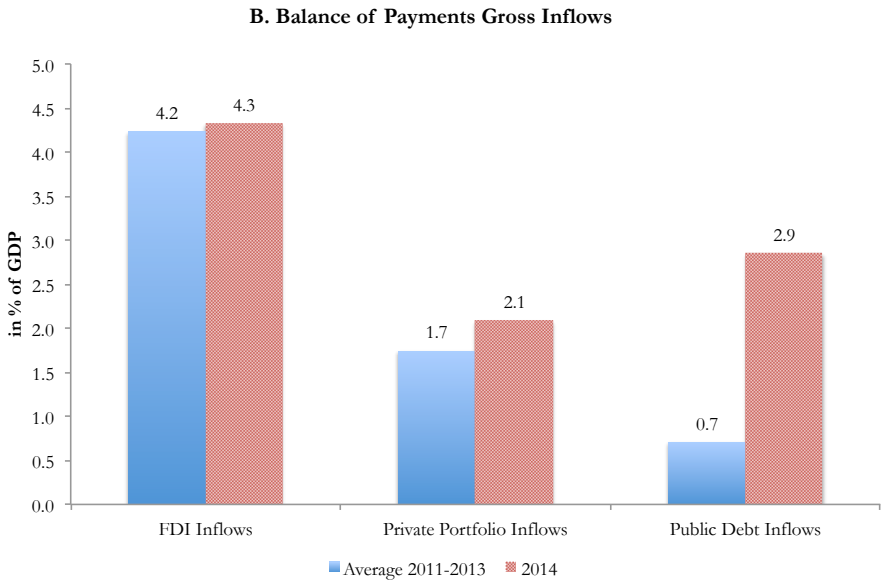
Notes: This table presents OLS estimations of the yearly growth of real variables against different set of fixed effects and a treatment variable for manufacturing industries. The growth of the dependent variable is constructed as the difference in logs of a month versus the month of the year before. The treatment variable is the exposure of an industry to market makers in 2013 multiplied by a dummy indicating the period of the index rebalancing by J.P. Morgan. All estimations are for the period 2013-2014. The dependent variable is winsorized at the 1th and 99th percent level. Errors are bootstrapped clustered at the industry level. *, **, and *** denote 10, 5 and 1 percent level of significance respectively.

Appendix Figure 2.1, Panel A: Total Domestic Debt Securities and Capital Flows Balance of Payments



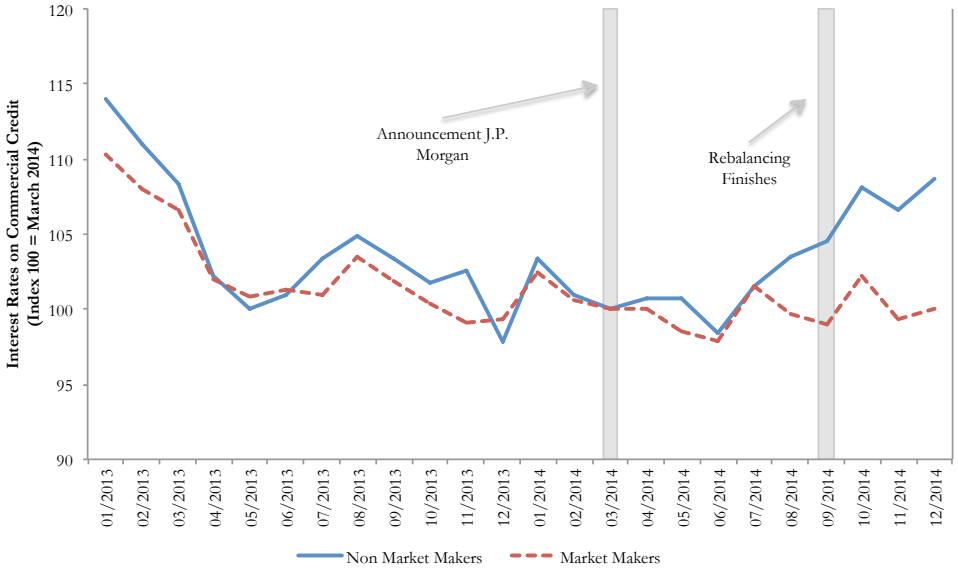
Notes: This figure presents the total local currency sovereign debt securities and gross liability flows from the balance of payments by instrument type. Panel A shows the total local currency sovereign debt securities in trillions of Colombian Pesos. The grey bars indicate the events described in the picture. Panel B depicts the gross inflows from balance of payments data. The blue bars depicts the average inflows during the period 2011-2013 and the red bars show the inflows during 2014, the year of J.P. Morgan's index rebalancing. All values are in percentage of nominal GDP. FDI is foreign direct investment, private portfolio flows are liability flows in private portfolio debt and equity, and public debt inflows are liabiity flows to government debt securities.

Appendix Figure 2.1, Panel B: Total Domestic Debt Securities and Capital Flows Balance of Payments



Notes: This figure presents the total local currency sovereign debt securities and gross liability flows from the balance of payments by instrument type. Panel A shows the total local currency sovereign debt securities in trillions of Colombian Pesos. The grey bars indicate the events described in the picture. Panel B depicts the gross inflows from balance of payments data. The blue bars depicts the average inflows during the period 2011-2013 and the red bars show the inflows during 2014, the year of J.P. Morgan's index rebalancing. All values are in percentage of nominal GDP. FDI is foreign direct investment, private portfolio flows are liability flows in private portfolio debt and equity, and public debt inflows are liabiity flows to government debt securities.

Appendix Figure 2.2: Interest Rates on Commercial Credit



Notes: This figure shows the evolution of the interest rates on commercial credit dividing by market maker and non market maker banks at the end of 2013. The index is constructed by averaging the growth of interest rates at each point in time. The index is normalized to 100 for March 2014. The grey bars indicate the events described in the picture.

Appendix Table 2.1: Sovereign Debt Exposure and Market Makers

Explanatory Variables	**Dependent Variable: Growth Local Public Debt/Assets**	
Market Maker*Rebalancing$_{\text{Mar 2014-Sep 2014}}$	-0.086 **	-0.080 **
	(0.035)	(0.031)
Time Fixed Effects	Yes	Yes
Bank Fixed Effects	No	Yes
Observations	429	429
R-Squared	0.090	0.102

Notes: This table presents OLS estimations of the growth of local public debt to total assets against a treatment variable using balance sheet monthly data. The growth of the dependent variable is constructed as the difference in logs. The treatment variable is a market maker dummy multiplied by a dummy indicating the period of the index rebalancing by J.P. Morgan. All estimations are for the period 2013-2014. Errors are bootstrapped clustered at the bank level. *, **, and *** denote 10, 5 and 1 percent level of significance respectively.

Appendix Table 2.2: Commercial Credit, Market Makers and Competition

	City-Zone Database		
Explanatory Variables	**Dependent Variable: Growth Commercial Credit/Assets (2013-2014)**		
Market Maker*Rebalancing$_{\text{Mar 2014-Sep 2014}}$	0.073 ***	0.068 ***	0.065 ***
	(0.020)	(0.022)	(0.019)
Market Maker*Herfindahl Index*Rebalancing$_{\text{Mar 2014-Sep 2014}}$	-0.004 *	-0.002	-0.002
	(0.002)	(0.003)	(0.003)
Time Fixed Effects	Yes	No	No
City-Zone-Time Fixed Effects	No	Yes	Yes
Industry-Time Fixed Effects	No	No	No
Bank Fixed Effects	No	No	Yes
Observations	4,569	4,569	4,569
R-Squared	0.045	0.176	0.224

Notes: This table presents OLS estimations of the growth of commercial credit to total assets against different explanatory variables for commercial banks and a treatment variable. The growth of the dependent variable is constructed as the difference in logs. The treatment variable is a market maker dummy multiplied by a dummy indicating the period of the index rebalancing by J.P. Morgan. The herfindahl index is the initial sum of market shares squared for market makers and non market makers and is created at the city-zone-time level. All estimations are for the period 2013-2014. The dependent variable is winsorized at the 5th and 95th percent level. Errors are bootstrapped clustered at the bank level. *, **, and *** denote 10, 5 and 1 percent level of significance respectively.

Appendix Table 2.3: Deposits and Market Makers

	City-Zone Database		
Explanatory Variables	**Dependent Variable: Growth Total Deposits/Assets (2013-2014)**		
Market Maker*Rebalancing$_{\text{Mar 2014-Sep 2014}}$	0.028	0.027	0.025
	(0.021)	(0.021)	(0.019)
Time Fixed Effects	Yes	No	No
City-Zone-Time Fixed Effects	No	Yes	Yes
Industry-Time Fixed Effects	No	No	No
Bank Fixed Effects	No	No	Yes
Observations	4,706	4,706	4,706
R-Squared	0.016	0.108	0.135

Notes: This table presents OLS estimations of the growth of total deposits over total assets against different explanatory variables for commercial banks and a treatment variable. The growth of the dependent variable is constructed as the difference in logs. The treatment variable is a market maker dummy multiplied by a dummy indicating the period of the index rebalancing by J.P. Morgan. All estimations are for the period 2013-2014. The dependent variable is winsorized at the 5th and 95th percent level. Errors are bootstrapped clustered at the bank level. *, **, and *** denote 10, 5 and 1 percent level of significance respectively.

Appendix Table 2.4: Industry Exposure to Market Makers - Part 1

Industry Name	Exposure to Market Makers (in %)
Building Management Services and Landscaping (gardens, parks)	10.79
Residential Care Medical Services	19.29
Maintenance and Repair of Computers, Personal and Household Goods	22.34
Recreational, Artistic and Entertainment Activities	27.90
Gambling and Betting Activities	33.43
Scientific Research and Development	36.14
Capital Rentier (only for Individuals)	39.93
Employees	44.03
Activities of Households as Employers of Domestic Staff	54.11
Installation, Maintenance and Repair of Specialized Machinery and Equipment	58.29
Libraries, Archives, Museums and other Cultural Activities	58.33
Coking, Refined Petroleum Product Production and Fuel Blending Activity	59.26
Legal and Accounting Activities	63.12
Collection, Treatment and Garbage Disposal; Recovery of Materials	63.94
Forestry and Logging	64.63
Aquatic Transport	64.99
Real Estate	65.50
Architectural and Engineering; Technical Testing and Analysis	66.57
Food and Beverage Services	67.05
Other Personal Service Activities	67.08
Information Service Activities	67.32
Disposal and Treatment of Wastewater	68.40
Manufacture of Furniture, Mattresses and Box Springs	70.41
Health Care Activities	70.44
Mining of Metal Ores	70.58
Advertising and Market Research	71.17
Trade, Maintenance and Repair of Motor Vehicles and Motorcycles, Parts and Accessories	72.75
Other Manufacturing Industries	73.96
Beverage Manufacture	74.68
Manufacture of Computer, Electronic and Optical Products	75.26
Water Collection, Treatment and Distribution	77.63
Wholesale Business except for businesses of Motor Vehicles and Motorcycles	78.29
Manufacture of Other Non-metallic Mineral Products	78.51
Land Transport and Transport Via Pipelines	79.04
Public Administration and Defense; Compulsory Social Security Schemes	79.22
Accomodation Sector	79.38
Activities of Head offices; Management Consultancy Activities	79.75
Education	80.09
Clothing Manufacture	80.46
Motion-Pictures Production, etcétera	80.62
Financial Services Activities, except Insurance and Pension Funding	80.64
Office Administrative, Office Support and Other Business Support Activities	80.69
Manufacture of Motor Vehicles, Trailers and Semi-trailers	81.44
Manufacture of Machinery and Equipment n.c.p.	81.71

Notes: This table shows the exposure of each industry to market maker banks at the end of 2013. The exposure is constructed by summing the commercial credit of market maker banks to each industry and dividing it by the total credit to the same industry by all commercial banks.

Appendix Table 2.5: Industry Exposure to Market Makers - Part 2

Industry Name	Exposure to Market Makers (in %)
Mining-Services Support Activities	81.83
Wood Processing and Manufacture of Wood and Cork Products, except Furniture	82.14
Tanning and Retanning of Leather; Shoemaking; etc.	82.40
Rental and Leasing Activities	82.90
Storage and Transport ancilliary Activities	83.34
Manufacture of Chemicals and Chemical Products	83.54
Extraction of Coal and Lignite	83.74
Manufacture of Pharmaceuticals, Medicinal Chemicals and Botanical Products for Pharmaceutical Use	83.78
Private Security and Investigative Activities	83.83
Manufacture of Rubber and Plastic Products	83.92
Sports, Leisure and Recreational Activities	84.28
Other Mining and Quarrying	84.65
Other Professional, Scientific and Technical Activities	84.72
Retail Trade, except of Motor Vehicles and Motorcycles	84.74
Civil Engineering Works	85.68
Employment Activities	85.73
Agriculture, hunting and related service activities	85.80
Manufacture of Fabricated Metal Products, except Machinery and Equipment	85.97
Publishing Activities	86.24
Manufacture of food products	86.70
Electricity, Gas, Steam and Air Conditioning	86.72
Air Transport	86.81
Manufacture of Appliances and Electrical Equipment	87.82
Building Construction	87.83
Manufacture of Textiles	87.93
Manufacture of Basic Metal Products	88.46
Insurance (including Reinsurance), Social Insurance and Pension Funds, excluding Social Security	88.65
Activities auxiliary to Financial Service Activities	89.00
Computer Systems Development and Related Activities	89.43
Building Construction Specialized Activities and Civil Engineering Works	90.01
Fisheries and Aquaculture	90.87
Activities of Membership Organisations	91.12
Manufacture of Paper, Cardboard and Paper Products and Cardboard	91.36
Activities of Travel Agencies, Tour Operators, Reservation Services and Related Activities	92.08
Telecommunications	93.13
Printing activities and Production of Copies from Original recordings	93.24
Programming and Broadcasting Activities	94.05
Manufacture of Other Transport Equipment	95.66
Extraction of Crude Petroleum and Natural Gas	96.56
Mail and Messaging Services	97.19
Manufacture of Tobacco Products	99.31
Social work Activities without Accommodation	100.00

Notes: This table shows the exposure of each industry to market maker banks at the end of 2013. The exposure is constructed by summing the commercial credit of market maker banks to each industry and dividing it by the total credit to the same industry by all commercial banks.

Appendix Table 2.6: Manufacturing Industries and Exposure to Market Makers

Industry Name	**Exposure to Market Makers (in %)**
Coking, Refined Petroleum Product Production and Fuel Blending Activity	59.26
Manufacture of Furniture, Mattresses and Box Springs	70.41
Other Manufacturing Industries	73.96
Beverage Manufacture	74.68
Manufacture of Computer, Electronic and Optical Products	75.26
Manufacture of Other Non-metallic Mineral Products	78.51
Clothing Manufacture	80.46
Manufacture of Motor Vehicles, Trailers and Semi-trailers	81.44
Manufacture of Machinery and Equipment n.c.p.	81.71
Transformación de la madera y fabricación de productos de madera y de corcho, excepto muebles	82.14
Wood Processing and Manufacture of Wood and Cork Products, except Furniture	82.40
Manufacture of Chemicals and Chemical Products	83.54
Manufacture of Pharmaceuticals, Medicinal Chemicals and Botanical Products for Pharmaceutical Use	83.78
Manufacture of Rubber and Plastic Products	83.92
Manufacture of Fabricated Metal Products, except Machinery and Equipment	85.97
Publishing Activities	86.24
Manufacture of food products	86.70
Manufacture of Appliances and Electrical Equipment	87.82
Manufacture of Textiles	87.93
Manufacture of Basic Metal Products	88.46
Manufacture of Paper, Cardboard and Paper Products and Cardboard	91.36

Notes: This table shows the exposure of each manufacturing industry to market maker banks at the end of 2013. The exposure is constructed by summing the commercial credit of market maker banks to each industry and dividing it by the total credit to the same industry by all commercial banks.

Chapter 3

FINANCIAL GLOBALIZATION IN EMERGING ECONOMIES: MUCH ADO ABOUT NOTHING?

Joint with Eduardo Levy Yeyati

3.1 Introduction

Financial globalization (FG), understood as the deepening of cross border capital flows and asset holdings, has become increasingly relevant for the developing world for a number of reasons, including the consequences of its changing composition on countries' balance sheets, its role in the transmission of global financial shocks, its benefits in terms of financial development, international risk sharing and business cycle smoothing, and the implication of all of the above for macroeconomic and prudential policies. In this paper, we focus on these issues from an empirical perspective, building on, updating, and specializing the existing literature to characterize the evolution and implications of FG in emerging economies.

As conventional wisdom has it, the globalization process has been growing steadily since the mid-1980s, particularly in developing countries (Kose et al. (2010)) and has accelerated in the 2000s, with a dramatic increase in cross-border portfolio flows as a fraction of global wealth (Gagnon and Karolyi (2010)). How-

ever, this pattern depends on the measure of FG-usually proxied in the literature by the average of cross border assets and liabilities over GDP (FG-to-GDP ratios). As we show in the first part of the paper, a more natural normalization of foreign holdings by host market size (to control for financial market deepening and spurious relative price effects) reveals a more stable FG pattern during the 2000s.[1] In turn, normalizing foreign portfolio asset holdings by total portfolio holdings by residents show that, despite the growing FG ratios, international portfolio diversification in the emerging world are still remarkably low, and have remained stable or declined.

The second part of the paper is devoted to the costs and benefits of FG in emerging economies, an elusive subject that has produced conflicting results in the literature. FG has been associated with the deepening of local markets (in terms of credit to the private sector, and equity market capitalization) with varied success: the literature has found a positive influence from market depth to FG (Lane and Milesi-Ferretti (2008); Kose et al. (2010)) and vice versa (Baltagi et al. (2009)). Identification of causality is further complicated by the choice of the time window: as (Mishkin (2007)) notes, while entry of foreign capital and institutions may improve domestic financial markets conditions through greater competition and liquidity, financial crises could end up blurring this link. We revisit the existing evidence and analyze it through the lens of new proposed metrics that, in our view, are better suited to analyze the question. We find that there is indeed a positive effect that works through market-specific channels (e.g., foreign equity liabilities, associated with foreign participation, help deepen local equity markets rather than local financial markets as a whole).

In turn, empirical evidence on the link between FG and consumption smoothing has shown mixed results at best. On the one hand, Giannone and Reichlin (2006) report an increase in risk sharing for European countries in the early 1990s, when FG advanced significantly (although their result may be dependent

[1]Relative price effects arise from the fact that the standard ratio implicitly compares nominal output and outstanding financial holdings. Thus, for example, an equity market boom raises the equity FG-to-GDP ratio regardless of changes in portfolio composition. This was the case, for instance, for emerging markets in the 2000s, , when the ratio increase significantly in the pre-crisis rally to fall sharply during the 2007/2008 financial crisis. To the extent that cross-border debt liabilities are denominated in hard currency, the same applies to debt FG ratios in the event of changes in the real exchange rate.

on the specific subsamples used) and Artis and Hoffmann (2007) argue that financial globalization improves risk sharing in the long term. On the other hand, Bai and Zhang (2012) analyze a two period sample, 1973-1985 and 1986-1998, for advanced and developing economies, and showed that although according to their measure FG doubles from period to period, there is no substantial improvement in international risk sharing. In the same vein, Kose et al. (2009) discuss the theoretical advantages of FG in terms of international risk sharing as a way to hedge consumption against domestic income shocks, but find that only advanced economies have reaped those benefits so far.

We examine the risk sharing benefits of FG from a critical perspective. We test the evolution of risk sharing, based on the output sensitivity of consumption in EM ("consumption betas", where both output and consumption are computed relative to the world's) and find neither improvement nor link with conventional FG-to-GDP ratios. We argue that this negative result can be attributed to two main factors. First, FG-to-GDP ratios overstate the increase in international portfolio diversification by EM residents. A revised measure of diversification, which exhibits the expected positive correlation with consumption betas, reveals that diversification in EM is well below that in advanced economies, and has not improved in recent years. Moreover, the rising "financial recoupling" in international securities markets (namely, the cross-market correlation of assets returns) has significantly reduced the scope for international diversification gains. Thus, to the view that the literature has failed to find consistent evidence of the effect of FG on international risk sharing in emerging markets despite the rapid deepening of FG, our research would respond that both FG and portfolio diversification has been overstated due to measurement choices.

The paper is structured as follows. Section 3.2 looks at alternative measures of FG, how they evolved over the recent period, for a group of advanced, emerging and frontier markets, in terms of intensity, direction and composition. Section 3.3 tackles the link of FG with financial development (understood as local market deepening). Section 3.4 presents new evidence on the link of FG with consumption smoothing (through international portfolio risk sharing). Section 3.5 summarizes the main findings, discusses policy implications and concludes.

3.2 What do we talk about when we talk about financial globalization?

How to measure financial globalization? Despite being the subject of a rich and growing literature, FG, broadly understood as global linkages through cross-border financial flows, has been empirically approached in various, often uncorrelated ways in the academic work. As a result, assessing a country's integration with international financial markets remains a complicated and controversial task. Indeed, there is a general consensus about the need to at least distinguish between de jure and de facto financial globalization. While the former is based on regulations, restrictions and controls over capital flows and asset ownership, the latter is related to the intensity of capital flows and cross-market correlation and arbitrage.

A succinct list of proxies for de jure globalization would include several measures typically based on the IMF's AREAR (Quinn and Inclan (1997), Kaminsky and Schmukler (1999), Chinn and Ito (2008) (henceforth CI), Schindler (2009)) or the IFC's equity globalization index that measures the ratio of equity market capitalization that is investable for non-residents (Bekaert and Harvey (1997)). While all of these measures are predictably close to each other when applied to a particular financial market (e.g., equities), they differ across markets in a way that would complicate the characterization of a financially globalized economy.[2] Here, we consider as our de jure measure CI's index of financial openness.[3]

It is reasonable to assume that the extent to which globalization affects asset prices and, more generally, economic performance is related to the actual intensity and sensitivity of the cross-border flows, namely, de facto globalization, regardless of existing controls and restrictions.[4] For example, many tightly regulated economies are the recipients and sources of important capital flows (and are there-

[2]For instance, one country may choose to restrict access to stocks but let the fixed income markets (debt, currency derivatives) relatively untouched, leading to very different FG scores depending on the de jure measure of choice.

[3]The measure is based on principal components extracted from disaggregated (qualitative) measures of capital and current account restrictions in the IMF's AREAER, converted to numerical values by the authors.

[4]Because of this, we will use proxies for de facto FG for most of the paper, a choice that has become the norm in most of the literature on financial integration. We only use the de jure measure for comparison purposed in this section.

fore financially globalized), whereas other control-free economies are shunned by international investors and, as a result, are isolated from global market swings and trends. This distinction has led most researchers to focus on de fact measures of FG, typically proxied by the ratio of foreign assets plus foreign liabilities over GDP, based on data on foreign positions compiled by Lane and Milesi-Ferretti (2007) (henceforth, LMF)-a measure that has become standard in the recent FG literature.[5]

Findings are not independent from how the sample is cut. In this paper, we focus on a set of 34 emerging markets (EM) and specially a Latin America subgroup within emerging markets. During the last two decades has been the region with more (and more varied) financial liberalizations and because of this we consider it a good benchmark for the rest of regions. Occasionally, we also split this group into Asian, and other EM to analyse regional differences. In addition, for the sake of comparison, we divide developed economies into two groups: a set of 5 peripheral core economies (PCE: Australia, Canada, New Zealand, Norway and Sweden) that, in our view, provide a reasonable mirror in which to look at the relative developments in Latin America, and a sample of more advanced economies (G5: France, Germany, Italy, Japan and the US).[6] For a better comparison with existing results in the literature, in some cases we use a broader advanced markets category (AM), as well as a frontier markets category (FM) that comprises less financially developed economies that tend to be associated with limited financial integration.

[5]Kraay et al. (2005) report a similar dataset on country's asset positions. An alternative approach to FG relies on price convergence, an application of the Law of one Price to financial markets. Measures within this group point at transaction costs and regulation that inhibit market arbitrage, and usually compare prices of identical or similar assets trading in different markets. On this, see Levy Yeyati et al. (2009) and references therein.

[6]EM comprise countries customarily included in emerging markets indexes such as the MSCI or the EMBI, excluding financial centers (Singapore and Hong Kong) which tend to display disproportionate large gross cross-border positions. The G5 comprises countries in the G7 group minus Canada (already included in PCE) and the UK (because of its status as financial center). FM are less financially developed markets that do not make it to the emerging category. See the Appendix for a detailed list.

3.2.1 How large is FG (and how has it evolved)?

To have a first look at both the differences and the evolution of alternative FG proxies over time, in Figure 3.1 we plot the standard de facto measure (based on cross-border holdings compiled by LMF normalized by the country's GDP) broken down into equity, debt and FDI stocks, as well as CIÂ´s measure of de jure FG.

We start by focusing in Latin America, which provides a broad overview of what is generally happening in emerging markets. As can be seen, the correlation between de jure and de facto measures of FG is far from perfect. While it is positive for the complete sample, there are surges in the de jure measure in the early 90s (coinciding with official waves of liberalizations in the region), which do not match perfectly the more stable pattern of FG-to-GDP ratio. Moreover, FG is driven by the increasing role of FDI and, more recently, equity markets as the main vehicles for cross-border investments, at the expense of debt liabilities a fact already documented in the literature.[7] Also, the figure clearly shows that, for all the debate about growing financial integration in Latin America, FG in LAC (and other emerging markets) is much smaller, and has been growing more slowly that in more advanced markets.

As for the rest of the sample, the de jure and de facto measure move hand in hand for EM, but de jure FG looks stable in more advanced countries (PCE and AE), despite the upward trend in de facto FG. Moreover, despite a relatively limited (and declining) de jure FG in Asian markets, the pattern of de facto FG looks similar to other EM, both cross section and over time.

Finally, the charts document a difference in the composition of the FG-to-GDP pattern between emerging and advanced economies.

This is more clearly seen when we compare changes in gross foreign positions for the three different instruments (equity, debt and FDI) over the 2000-2007 period, again using the traditional FG over GDP measure (Figure 3.2). In LAC

[7] See, e.g., Cowan et al. (2006), Yeyati et al. (2007). Note that this debt pattern is not so much the results of declining debt ratios but rather a consequence of a greater reliance on domestic markets at the expense of external debt which was typically held by international investors. That said, to the extent that capital flight from EM allocated to emerging bond funds domiciled abroad are recorded as foreign holdings, the pattern may be reflecting a methodological bias associated with capital repatriation in the 2000s.

emerging markets we observe a marked decline in the debt liability position due to the rapid sovereign deleveraging process (coupled with growing reserve assets, and a growing equity and FDI net liability position) which contrast with the growing net debt of G5 countries.

While Figures 3.1 and 3.2 indicate a growing FG-to-GDP pattern across the board, this simple ratio downplays a number of potentially crucial measurement issues that may bias the empirical diagnosis and lead to erroneous policy implications, and that therefore deserve some careful consideration.

In particular, rather than the standard normalization by the (US dollar) GDP, normalization by the local market capitalization (marcap) seems to be more adequate when assessing cross-border flows as a source of international contagion and exogenous price volatility -the logic being that the impact of cross border flows, presumably associated with foreign asset and liability holdings, will likely be a function of their size relative to the local market. Indeed, it can be shown that an increasing FG over GDP ratio, rather than a sign of growing globalization as it is typically interpreted, this increase in marcap can be largely explained as the combination of a stable foreign participation and a deepening local market - itself a reflection of equity valuation changes.

Indeed, for some specific purposes, we could refine this normalization further by making it asset class-specific, whereby market capitalization refers to the asset class defined in the numerator. More precisely, to proxy for foreign participation in local markets (for example, to analyse its influence on local market development), equity (alternatively, debt) liabilities should be normalized by local stock (alternatively, debt) market capitalization. Thus, we normalize foreign equity liabilities (FEL), by the total domestic equity market capitalization in US dollars. In turn, we normalize foreign debt liabilities (FDL) by the country's total debt stock (sourced from the Bank for International Settlements). Note that both measures are now ratios of stocks on stocks, and are free from valuation effects associated to relative price changes, as in a stock market rally, or a sudden change in the real exchange rate that affects the (largely dollarized) debt assets and liabilities of emerging economies.

Table 3.1 and Figure 3.3 offer an alternative cut of FG data for the 2000s, looking at foreign equity and debt liabilities normalized by the host market capi-

talization (marcap), to zoom in on the question about whether a growing FG (over GDP) is a sign (and, possibly, a consequence) of greater foreign participation, or whether it just reflects (and responds to) the autonomous deepening of domestic markets, including through persistent price rallies. The re-normalization shows that the deepening of domestic markets played a central role in explaining the increase in the FG over GDP ratio. This is particularly striking in Latin American EM where FG to market capitalization ratios in the latest period remained virtually unchanged for equity and contracted by 7% for debt securities, in stark contrast with rising FG to GDP ratios.

This evidence suggests that changes in FG to GDP ratios mask valuation effects due to asset inflation. Specifically, if the perceived rise in FG in EM equity markets is in part due to an increase in local market capitalization in terms of the GDP, much of equity market "deepening" was mechanically driven by the equity price increases prior to the 2008 crisis, rather than to new issuance. If so, the narrative of the evolution of FG based on GDP ratios would spuriously reflect equity markets booms and busts -another reason to use marcap ratios instead.[8]

3.2.2 Does greater FG mean greater international portfolio diversification?

The standard normalization by the US dollar GDP present two caveats when looking at portfolio diversification and international risk sharing (namely, the decoupling of residents' consumption from domestic income shocks): 1) the GDP ratio ignores residents' local portfolio (that is, their participation in local asset markets), and 2) it suffers from the same valuation bias mentioned above.[9] For example, a synchronized global equity price rally would automatically increase foreign and

[8]Similarly, to the extent that FDI cross-border asset holdings are constructed from FDI flows, distributed according to trade patterns (in line with the tight empirical correlation between trade and FDI flows) and adjusted for valuation using real bilateral exchange rates, one could argue that changes in the net FDI position should reflect the significant real appreciation of EM currencies, as well as the steady FDI net inflows.

[9]Note that, since debt holdings, unlike equity holdings, are computed at nominal rather than market values, price changes should not play a role, However, nominal values introduce a different bias: market discounts (typically substantial in EM debt) that modify the foreign-domestic composition of residents' portfolios, are not captured in the data, and may lead to an overstatement of the portfolio share allocated to local debt instruments.

domestic equity holdings over GDP ratios, showing an increase in FG assets and liabilities over GDP regardless of the direction of the flows, indicating an increase in portfolio diversification even if the composition of equity portfolios remain the same.

While the domestic-foreign composition or physical assets is hard to estimate (due to the lack of reliable capital stock data for most developing countries), we could proxy portfolio diversification (PD) as the foreign share of the representative residentÂ´s equity and debt securities portfolio by combining LMF and marcap figures, such that:

$$PD(\text{equities} + \text{debt securities}) = \frac{(FEA + FDA)}{[(FEA + \text{equity market cap } - FEL) + (FDA + \text{total debt } - FDL)]} \tag{3.1}$$

where FEA and FEL (FDA and FDA) are foreign equity (debt) assets and liabilities.

This new measure has the advantage of tracking the evolution of the resident investor's portfolio diversification while filtering out time trends such as equity price cycles. Thus, this metric, while still imperfect s it only normalizes by a proxy of financial income (leaving non-financial income out of the picture), is nonetheless a more accurate gauge of the portfolio diversification of a countryÂ´s residents than the standard FG-to-GDP ratio used in the literature.

Figure 3.4 sheds light on the first aspect: note the stark contrast between emerging and advance economies. The level of PD in the developed world appears to be growing, although they are still too low to have a decisive impact in risk sharing. By contrast, PD in the emerging world is not only much lower (less than 10% for the representative resident's portfolio) but has been falling over time (perhaps the reflection of local market development and the undoing of offshoring of domestic savings).[10] At any rate, the international portfolio diversification of EM residents appears to be quite limited and declining over time -a critical aspect that we will come back to when we look at FG and risk sharing below.

[10]On the prevalence of financial offshoring in emerging countries, see Yeyati (2007). Naturally, the methodological bias mentioned in footnote 7 also applies here, to the extent that part of the offshored savings were invested in emerging markets vehicles domiciled abroad.

3.2.3 Are foreign asset holdings a good proxy for capital flows?

The stock size of cross border holdings, while possibly a good indication of foreign participation or geographical portfolio diversification, may not be the best summary statistic of de facto FG in the traditional sense of capital mobility and international arbitrage, since important gross flows in and out of a country over a given year are perfectly consistent with a relatively small net -as well as with small cumulative flows over longer periods. As a result, to the extent that foreign asset holdings largely reflect cumulative flows, intense flows could be consistent with limited geographical diversification of assets and liabilities. Conversely, the existence of large foreign asset holdings (for example, as a result of capital flight) does not necessarily imply frequent portfolio rebalancing and cross-market arbitrage.

How correlated are FG holdings and flows? In particular, are larger stocks of foreign assets and liabilities associated with larger flows of capital in and out of the country? The answer is yes, albeit to varying degrees depending on the country group and the type of instrument

To illustrate, we run regressions of the size (the absolute value) of annual Balance of Payments (BoP) flows on LMFÂ´s beginning-of-the-period stock holdings -controlling for time effects to eliminate the spurious correlation associated with time-varying common factors such as price trends. The results, which we report separately for each asset and country group in Figure 3.5, indicate that larger holdings are associated with larger flows, particularly in the case of FDI.[11] However, a look at the scatter plots of the partial regression residuals shows important differences when it comes to portfolio holdings, where the link with flows appear to be strong only for EM equity.

The diverse nature of the correlation between stocks, on the one hand, and gross and net flows on the other is even more clear in the regressions of Table 3.2, where we run a minimalist panel specification of flows (total, and by asset type) on beginning-of-the-period holdings, plus additional controls. With the exception of debt securities, cross-border holding have a positive correlation with

[11]Note that this correlation may reflect the fact that the BoP, which is recorded on an accrual basis, reports reinvested dividends of foreign companies as FDI flows.

the associated flow.

3.2.4 Financial globalization at a glance: Preliminary score

From the previous discussion, it follows that the characterization of FG is complex and prone to potentially misleading simplifications, and cannot be summarized by the standard de facto measures. Because of that, the cross-country evolution of FG and its implications is best characterized by comparing and discussing alternative FG proxies. Specifically, in this paper we look at four different sources: (i) Lane and Milesi-Ferretti (2007) yearly dataset of cross border asset and liability holdings (by country, based on adjusted Balance of Payments data); (ii) capital flows from the IMF's Balance of Payments Statistics; and (iii) EPFR's monthly data on global fund flows and assets under management (AUM) (by issuing country).

In short, the first pass at the data provides a few preliminary findings:

- **There is much less FG in EM than is usually thought**. More precisely, FG-to-GDP ratios in EM lag those in advanced economies. Moreover, when normalized by the (growing) size of domestic markets, FG both in EM and advance countries have remained relatively stable in the past ten years. Thus, one can conclude that FG in both cases has largely mirrored the relative dynamism of local markets. On the one hand, the larger FG to GDP ratio in advanced economies simply reflects their deeper markets. On the other, the upward trend in equity FG to GDP ratios in EM masks valuation effects due to local asset inflation (in particular, the equity boom prior to the 2008 crisis).

- **FG in LAC is still dominated by FDI at the expense of debt**. Unlike in advance economies where debt securities still account for the larger part of cross border holdings -although equity flows have been gradually taking over debt flows as their main portfolio vehicle, especially in Latin America where debt liabilities declined markedly due to sovereign deleveraging.

- **Portfolio diversification in EM is still very limited, and has been declining over time**. Indeed, there seems to be no correlation between traditional

measures of FG and the degree to which EM residents diversify into international securities.

- **There is a significant correlation between liability holdings and the corresponding flows for FDI and equity instruments**, which suggests that, while not interchangeable, for those assets larger stocks are associated with larger flows -a link relevant to the discussion of the incidence of FG and financial stability.

- **There is little (if any) correlation between de jure and de facto measures**. While this does not come as a surprise, it warns us that they represent different economic aspects and, at the very least, they should not be used interchangeably. It also motivates our focus on de facto FG in the rest of the paper.

3.3 Does FG foster financial depth?

Conventional wisdom tells us that FG, by attracting sophisticated investors and considerable liquidity, should foster the development of domestic financial markets. However, on the other hand, deeper, more liquid markets are expected to attract foreign inflows and larger sophisticated investors that require a minimum trading scale.

Indeed, as we have shown above, while FG-to-GDP ratios have been on the rise for most EM, FG-to-market capitalization ratios have remained relatively stable. Are the former (the key exhibit behind the conventional view of the ever rising FG in the emerging world) simply the reflection of international investors catching up, belatedly, with local market developments? Moreover, intuitively, tighter financial integration could foster the transmission of shocks in financial centers to peripheral advanced and developing markets, creating an exogenous source of financial (and ultimately real) instability. In this section, we revisit the causes and consequences of FG from an empirical perspective.[12]

[12]See, e.g., Mishkin (2011) and Kose et al. (2010). Following Kose et al. (2010), in the paper we use the terms financial globalization and financial integration interchangeably.

Many studies acknowledge the positive link between financial integration and domestic financial development, a link summarily illustrated in Figure 3.6. However, the literature leaves some key questions unanswered regarding this link. Does the composition of financial integration matter? Is the link instrument-specific (that is, does a deep domestic equity market leads to more FG in the equity market, as opposed to FG in general)? How do these links vary across different group of countries? Finally and perhaps more importantly: Does financial globalization drive financial development or the other way around? In this section, we show that a few measurement considerations along the lines described above help to refine the evidence and the interpretation of the empirical results.

One can think of a number of aspects that intervene in the degree and intensity of cross-market investment. For starters, investors tend to maximize risk-adjusted returns across different markets, balancing yield equalization and diversification and risk pooling (the more so, the less correlated national markets are). But there are a number of factors (which can be broadly grouped as transaction costs) that are not included in the asset price quote and may end up being more relevant than attractive yields or hedging benefits. This aspects include not only financial innovation that reduces transfer and settlement costs and facilitates monitoring and transparency, but also access to specialized analysis (which in turn requires a minimum market size to justify specialization costs), and a rich menu of instruments to cater specific investors, both of which require a minimum market size to justify specialization and standardization costs. Market size is also critical in terms of liquidity risks, which may keep big players away. Thus, even in the face of a decline in credit risks (due, e.g., to enhanced fiscal solvency) currency risk (due, e.g., to a balanced of long currency position and a reduced tail risk of a sharp currency run), local markets may fail to fully develop scale until they gain a minimum scale. This rather circular logic underlies the simultaneity problem noted above: If, a priori, market depth is a condition for foreign participation and foreign participation fosters market deepening, how can we tell one link from the other?

On the other hand, the way in which FG is measured is not irrelevant: an improvement of local market conditions should be correlated with an increase in gross (and net) foreign liabilities (locals bringing money back; foreigners bringing

money in). While the literature that looks at the globalization-financial development link often treats foreign assets and liabilities similarly (as in the standard FG measure discussed in the previous section), there is in principle no reason why capital outflows and residentsÂ´ investment abroad should be positively related with local market development. By the same token, the tests may improve in accuracy by making the connection market-specific: a deep equity market should attract equity inflows; similarly, a liquid bond market should lure bond investors. Indeed, it is not unusual in the developing world for countries to have blooming emerging markets in one asset class and shallow frontier markets in another. At any rate, the connection between the local market depth and foreign investment is stronger when we focus on a single market (as we do for equities in Figure 3.7).

With this in mind, we revisit the results in Lane and Milesi-Ferretti (2008) on the drivers of FG. The authors report a positive cross-country correlation between FG (measured as foreign asset + foreign liabilities over GDP) and financial development (proxied by bank deposits and stock market capitalization over GDP), for a sample of EM and advanced markets (AM). We extend their exercise to the period 1995-2007 (the latest year for which LMF is available at the time of this writing), include FM in the sample, and run panel regressions for different proxies of financial development: the standard one used in the original paper, and assets-specific versions (e.g., stock market capitalization over GDP). In addition, we include time dummies to capture common factors such as global liquidity and risk aversion, as well as global investor reallocations to emerging relative to core markets,[13] and GDP per capita, as a broad proxy for economic (and financial) development.[14]

The regression results, reported in Table 3.3 for a sample of EM equity markets, show a closer link between local stock market development and foreign equity liabilities (as opposed to the sum of assets and liabilities used in the original

[13]See the Appendix for a detailed list. AM are the 28 advanced countries used in Lane and Milesi-Ferretti (2008). All variables are lagged and included in logs, except capital account openness.

[14]As LMF note in their paper, "the level of economic development can also be an important factor in explaining domestic residents' propensity to engage in cross-border asset trade." We prefer to include it here more specifically as an indicator that subsumes many of the transaction costs listed above.

paper).[15] The link between financial development and FG is weaker for cross-country and stronger over time, where financial development is proxied by the sum of equity market capitalization and bank deposits over GDP as in the original specification (columns 1 and 2). We split our financial development proxy considering bank deposits and equity market capitalization as different variables instead of their sum. Columns 3 and 4 show that FG (as the sum of total foreign assets and liabilities) has a stronger link with bank deposits than with stock market capitalization. Furthermore, columns 5 and 6 confirm our hypothesis that financial domestic markets that a deep domestic equity market is strongly linked to more FG in the equity market, as opposed to FG in general. A similar thing happens when we regress equity market capitalization against financial globalization. The former is more strongly linked to financial equity liabilities than with a broader measure of FG (columns 7 and 8).

As noted, the strong link between financial globalization and financial domestic development comes with a severe endogeneity problem: foreign flows to equity and local debt markets, by definition, add to these markets' liquidity and depth. Is it the domestic market depth that draws foreign inflows, or rather the latter that fosters the deepening of domestic markets? The connection from FG to domestic financial markets have been noted by Rajan and Zingales (2003), who emphasize the impact of FG and trade liberalization on the size of the domestic financial sector. In the same direction, Baltagi et al. (2009) estimate dynamic GMM with internal instruments to argue that both FG and trade openness cause greater financial development (measured separately as private credit, and local stock market capitalization).

This causality problem is best approached by looking at foreign liabilities and the domestic depth of the equity market.[16] In line with Baltagi et al. (2009), we estimate a GMM, albeit with a few changes. We focus on the more homogeneous EM group, and compute, for each country-year, equity FG averages excluding its own ratio, as an external instrument -the assumption being that FG, which is highly correlated across EM (the median correlation between individual Equity

[15] Note that the correlation between de jure and de facto FG is generally not significant or of the opposite sign, in line with the findings in the previous section.

[16] Cross-border holdings and flows could influence the depth of the banking sector, albeit in a less straightforward way, to the extent that flows are largely intermediated by banks.

Liability holdings and their EM group aggregates is 0.86) can only affect financial development in the host country.[17] The chosen specifications with both internal and external instruments are supported by the Arellano-Bond test for second order autocorrelation and the Hansen test of over identifying restrictions. Moreover, the results indicate that equity inflows indeed appear to foster the deepening of the equity market (columns 9 and 10 of Table 3.3).

What can we conclude from the evidence in this section? While foreign capital does seem to flow to larger, deeper markets, there is at least some indicative evidence that it also has contributed to develop the corresponding local market. For example, growing foreign holdings of EM equity (rather than broader measures of FG) led to deeper EM equity markets. Ultimately, the use of asset class-specific measures of FG confirms that, in this regard, foreign capital is no different than the domestic one: it both attracts is attracted by liquidity in the market place.

3.4 How has FG affected international risk sharing?

In past theoretical research studies, the implications about financial integration and macroeconomic volatility are clear: countries with greater FG should reduce consumption relative to output volatility through international risk sharing.

In theory, one of the more important benefits of financial globalization comes by allowing more efficient international risk sharing in a country. As is stated in the literature, a more efficient international risk sharing may help reduce consumption volatility. Standard theoretical open economy models yield clear testable implications regarding the role of financial integration in risk sharing: the farther the country is from financial autarky, the lower the correlation between consumption and domestic output, and the greater the correlation of consumption across (financially integrated) countries. Furthermore, models with complete markets predict that correlation of consumption growth with the growth of world output (or, equivalently, world consumption) would be higher than that with domestic output.

[17] We run a parsimonious version of the previous specification, dropping trade and other financial development proxies that are generally not significant, to gain observations at a minimum loss of information.

Recent empirical studies have failed to validate this premise. Kose et al. (2009) analyze output and consumption growth rates, and their volatilities, for the period 1960-2004, and finds little evidence on a beneficial effect from FG on international risk sharing (as captured by a smoothing out of output changes in the consumption pattern, once common global shocks are filtered out). In particular, following a standard risk sharing measure, they measure risk sharing as the consumption betas estimated from:

$$\Delta ln(c_{it}) - \Delta ln(C_t) = \alpha + \beta \left[\Delta ln(y_{it}) - \Delta ln(Y_t)\right] + \varepsilon_{it} \tag{3.2}$$

where $c_{it}(y_{it})$ is the PPP-measured per capita consumption (GDP), $C_t(Y_t)$ is the world per capita consumption (GDP).[18] C_t and Y_t are, respectively, measures of aggregate (common) movements in consumption and output. Since it is not possible to share the risk associated with common fluctuations, the common component of each variable is subtracted from the corresponding national variable. The difference between the national and common world component of each variable captures the idiosyncratic (country-specific) fluctuations in that variable. In this specification, under complete markets and perfect international risk sharing, the left-hand side of the equation should be zero.

In turn, to assess the influence of FG on international risk, they estimate,

$$\begin{aligned}\Delta ln(c_{it}) - \Delta ln(C_t) = \alpha + \mu \left[\Delta ln(y_{it}) - \Delta ln(Y_t)\right] + \\ \lambda FG_i \left[\Delta ln(y_{it}) - \Delta ln(Y_t)\right] + \varepsilon_{it}\end{aligned} \tag{3.3}$$

where FG_i is a measure of the country's financial globalization over the period, and the degree of risk sharing is measured by $(1 - \mu - \lambda FG)$, where a negative λ would indicate higher risk sharing for higher FG. The study focuses on three measures of financial integration: gross holdings (the sum of foreign assets and liability holdings), assets holdings, and liability holdings, and finds that FG improves risk sharing only for the late period (1987-2004), the one most closely

[18] Growth in World Output and Consumption is measured as followed: $\sum \Delta ln(x_{it})\text{Share}_{AM}$, where x_{it} is either real per capita consumption or output in country i (where the country belongs to the AM sub-sample), and Share_{AM} is the share country i represents of AM consumption or GDP measured by PPP current prices.

associated with an advance in FG, and for advanced economies.[19]

The data does not support these premises. The figures shown in Table 3.4 indicate that consumption volatility generally exceeds that of output. Moreover, the same figures suggest that, for MFI, the volatility of consumption growth relative to that of output have increased in the last decades, while it has decreased for LFI.[20]

A first glance at the data indicates that this pattern has continued to prevail. Table 3.4 presents descriptive statistics of growth and consumption volatility for 1995-2007 (and the sub-period 2000-2007), across our selected country groups. The statistics indicate that, in recent years, output volatility and economic growth seem to have moved hand in hand. EM exhibits the highest output volatility, AM the lowest, and frontier markets (FM) lie in between.

Overall, the ratio of consumption over growth volatility ranks according to priors: the lower for presumably more financially integrated AM, followed by EM and FM. However, when, following Kose et al. (2009), we divide the developing group (EM+FM) into More Financially Integrated (MFI) and Less Financially Integrated (LFI) economies (whether FG over GDP lies above or below the sample median), the link is much less clear: in contrast with LFI economies, MFI do not appear to have benefited from smoother consumption volatility -despite the marked decline in growth volatility.[21]

Figure 3.8 offers another glance at the same evidence. Following Bai and Zhang (2012), it asks whether the country-specific sensitivity of consumption to output growth (relative to global values, estimated based on annual data), increased in the 2000s relative to the 90s, as FG-to-GDP ratios rose. Sensitivities appear to have remained stubbornly close to one to one in the past two decades, contradicting the risk sharing argument.

In order to measure the impact of FG on risk sharing more rigorously, we proceed in two steps. We first estimate, for the period 1995-2007, "consumption betas" country by country using (1). Next, we run a regression of estimated betas

[19]These results expand on previous findings by Kose et al. (2009) along the same lines, for the period 1960-1995.

[20]We define output (consumption) volatility as the variance of output (consumption) growth rates.

[21]FG is measured here, as usual, as the sum of foreign assets and liabilities over GDP.

on alternative measures of FG.[22] The standard FG proxy appears negatively correlated with betas for the AM sample (Figure 3.9), but the link is not significant (and changes sign) for EM.[23]

Why this disappointing result? Kose et al. (2009) address and discard a number of potential explanations (measurement errors, country characteristics, FG composition), to propose two hypothesis: (i) a threshold effect, namely, the idea that countries need to achieve a minimum degree of integration to reap the diversification benefits (a proposition prompted by the better results they find for AM), and (ii) the pro-cyclicality of capital flows in emerging markets, which in principle may offset the risk sharing benefits of FG.

While the first hypothesis is virtually impossible to verify, a casual look at the data suggests that a simple threshold cannot explain the whole story. The fact that emerging economies exhibit today levels of FG comparable to those exhibited by AM in the past begs the following question: Do developing countries with AM-level FG display a better risk sharing pattern? Figure 3.10 shows consumption and GDP growth pairs within the developing group for the period 1995-2007, broken into high and low FG, according to whether or not the level of FG of a given pair lies within the AM range for the same period. As can be seen, the results, if anything, contradict the hypothesis: high FG pairs display higher consumption betas.

The second hypothesis is also hard to substantiate in the data. For starters, the diversification benefits of FG as measured in the literature (namely, in terms of international portfolio diversification) should in principle work through a decoupling of residents' income from the domestic economic cycle. By borrowing and investing abroad, residents benefit from income from their foreign assets that is uncorrelated with the domestic cycle, while sharing the ups and downs of the domestic cycle with foreign lenders. In this light, capital flows pro-cyclicality should a priori have little to do with risk sharing and consumption smoothing: indeed, to the extent that capital flows have a stronger impact on GDP growth than on the consumption pattern, they should increase "measured" risk sharing. Moreover, as

[22] Note that this is similar to allowing $\hat{\mathrm{I}}_{\frac{1}{4}}$ to vary across countries in Kose et al. (2009) panel estimation -and that their risk sharing measure for country i would equal to $1 - \beta_i$.

[23] Using FDI holdings, or the sum of equity plus debt holdings, over GDP as FG proxies yields comparable results.

Kose and coauthors suggest, the recent shift away from pro-cyclical fixed income securities (most notably, bonded debt) to variable income vehicles (FDI and equity flows) should have mitigated capital flow pro-cyclicality in the recent period, which is at odds with the persistently high consumption betas found in recent data (Figure 3.9).

Here, we highlight two alternative reasons that, we believe, may explain why higher FG does not lead to a smoother consumption pattern. The first one is related to measurement considerations. If consumption smoothing is the result of a diversified portfolio, the standard FG measure may not be the best gauge. The previous discussion of the price effect in equity markets is a good illustration of the limits of FG over GDP as a proxy for portfolio diversification: as equity prices rise, the share of foreign equity over GDP also rises, regardless of whether the foreign share of the residentsÂ´ equity portfolio changes. Thus, we may be looking at increased diversification when there is none. More generally, by looking only at the standard FG proxy, we miss domestic assets that typically represent the largest part of residentsÂ´ wealth. Thus, the consequences of FG on international risk sharing may be better suited for our PD measure. In Section 2 we stated that FEL (FDL) to market capitalization highlights "real" inflows to a certain market in the host country. In turn, PD measures exactly the diversification of wealth for a particular country combining both debt and equity instruments as we defined it. We rely on this new measure to gauge the effects of FG on international risk sharing.

Does our new measure of portfolio diversification (PD) fix the problem? Reassuringly, when in Figure 3.10 we substitute PD for the standard FG-to-GDP measure, we indeed obtain a better fit and a negative slope for EM. Thus, while the use of PD brings the analysis conceptually closer to a risk sharing test and the data empirically closer to the expected negative correlation between globalization and risk sharing, results are still far from the theoretical result. This should not be surprising given the rather low degree of diversification in the developing world (Figure 3.4). Moreover, the menu of financial assets in middle- to low-income countries is often limited and accessible only to a small population of high-income households.

What if financial assets were made available to the middle class with savings

capacity, the one often associated with more advanced economies? And why is risk sharing so limited in the developed world where financial sophistication and access should not be such a problem?

An additional reason why the global diversification of financial portfolios does not immediately translate into smoother (less cyclical) consumption pattern, independent of portfolio composition and financial access, lies in the fact that financial assets tend to move very close to each other, particularly in the event of extreme events. In other words, the international diversification margin may have been declining along with a steady process of financial recoupling, namely, the growing co-movement between EM and global portfolio assets (Levy-Yeyati and Williams (2012)).

Figure 3.12 illustrates the point: the share of the variability of returns explained by the first principal component (PC1) is large and has been growing larger over time (even before the 2008-2009 sell-off).[24] In turn, PC1 is highly correlated with global assets returns, as captured by the S&P 500 and MSCI equity indexes, and the spread on high yield US corporate debt (Table 3.5), indicating that most of the co-movement displayed by EM assets comes from global influences or globally synchronized shocks. In sum, even if residents in emerging economies were to diversify their portfolio internationally, the diversification gains would be limited by the growing co-movement with other EM or with AM, limiting in turn the impact of FG on their consumption pattern.[25]

[24]For the figure, we regress country-specific equity. FX and CDS spread changes on the PC1 constructed based on changes in the corresponding asset for all EM. Credit default swaps (CDS) spreads are used as a proxy for debt securities. Importantly, while the analysis in the figure is based on monthly returns, the co-movement also verifies (and often increases) for longer horizons.

[25]Naturally, in an imperfect world, individual portfolio diversification is only part of the story, as consumption smoothing could also be affected by cyclicality of foreign invesdtment flows. More precisely, while foreign assets may diversify residents' financial income flows, foreign capital flows (which, as the evidence reported above, are positively linked to the stock foreign liabilities) can contribute or detract from this bening effect depending on how the correlate with non-financial income. Given that the evidence in the literature suggests that foreign flows tend to move procyclically in emerging economies, one could infer that international risk sharing may ultimately decline with the stock of foreign assets.

3.5 Final Remarks and Policy Discussion

Perhaps the main take away from the previous empirical examination of FG is its most pedestrian finding: for all the market and media hype about the increasing globalization of emerging economies, financial globalization in the emerging world appears to have been vastly overstated. Rather than growing in the 1990s and 2000s as usually argued based on standard GDP ratios, de facto globalization have accompanied (and, to some extent, supported) a more secular process of financial deepening (in EM and elsewhere), temporarily slowed down by the recent global crisis. More precisely, once measured in a way that minimize the various biases that plagued the most popular empirical proxies, FG in EM looks rather stable, and well below advance country levels.

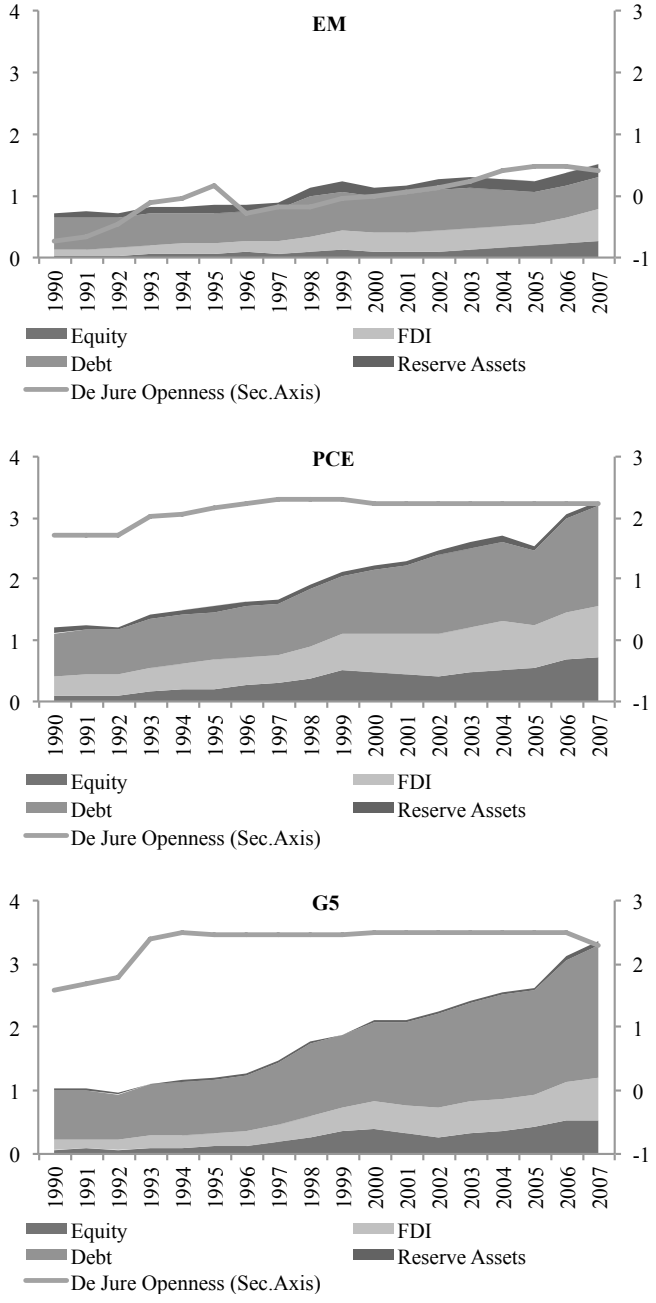
This finding is critical for an FG debate that often investigates its causes and consequences starting from the debatable premise that FG has actually strengthened over the years. Instead, the globalization process during the 1990s (which almost defined emerging markets as a concept) came to a halt in the 2000s.[26] This statement is mostly true for policy debates that generally start from the premise of a growing FG, a view that we argue is particularly misleading in the case of emerging markets. Also, policy discussions on local financial development and international risk sharing should benefit from the use of better (albeit still imperfect) measures: as we show above, under these metrics FG has not increased as much as often believed; hence, the minor statistical impact.

That said, it is true that the ratio of foreign liabilities over GDP is a useful measure of the macroeconomic exposure to swings in global risk appetite, as witnessed by the rise in the pre-2008 crisis years. Indeed, the enthusiasm for EM continued to elicit overweight portfolio positions from benchmarked investors, plus an increasingly active speculative turnover, during the 2009-2011 recovery, opening the question of whether cross-border holdings (particularly, easy-to-unwind foreign portfolio liabilities) are good or bad or, more generally, whether they should be taken by policy makers as a source of concern (particularly now that global liquidity , as well as EM inflows, may start to revert to normal levels).

[26]This is particularly so for emerging Latin America, where FG lags those in their emerging peers, and has come down in the 2000s reflecting in part the sovereign de-leveraging trend in the region.

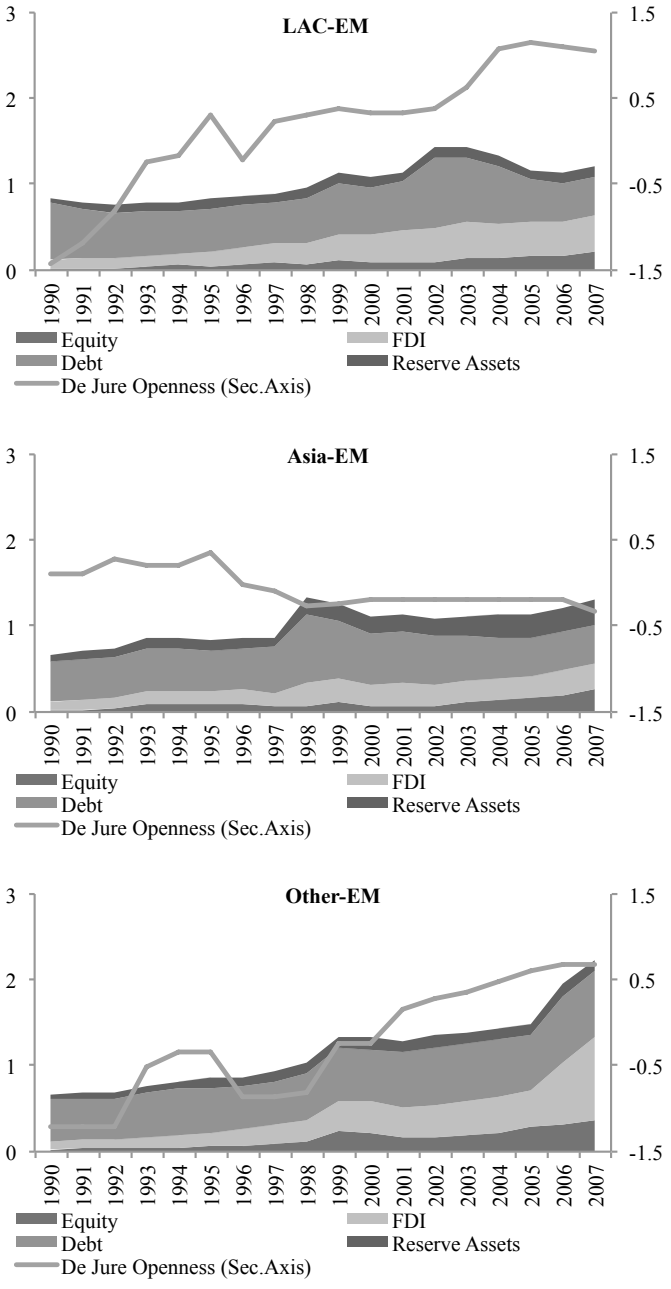
However, once we correct for valuation effects, low and stable levels of FG, coupled with measurement limitations and the short time span of available FG data for EM, advises to take any normative conclusion with a grain of salt.

Figure 3.1A: FG measures: EM vs. others



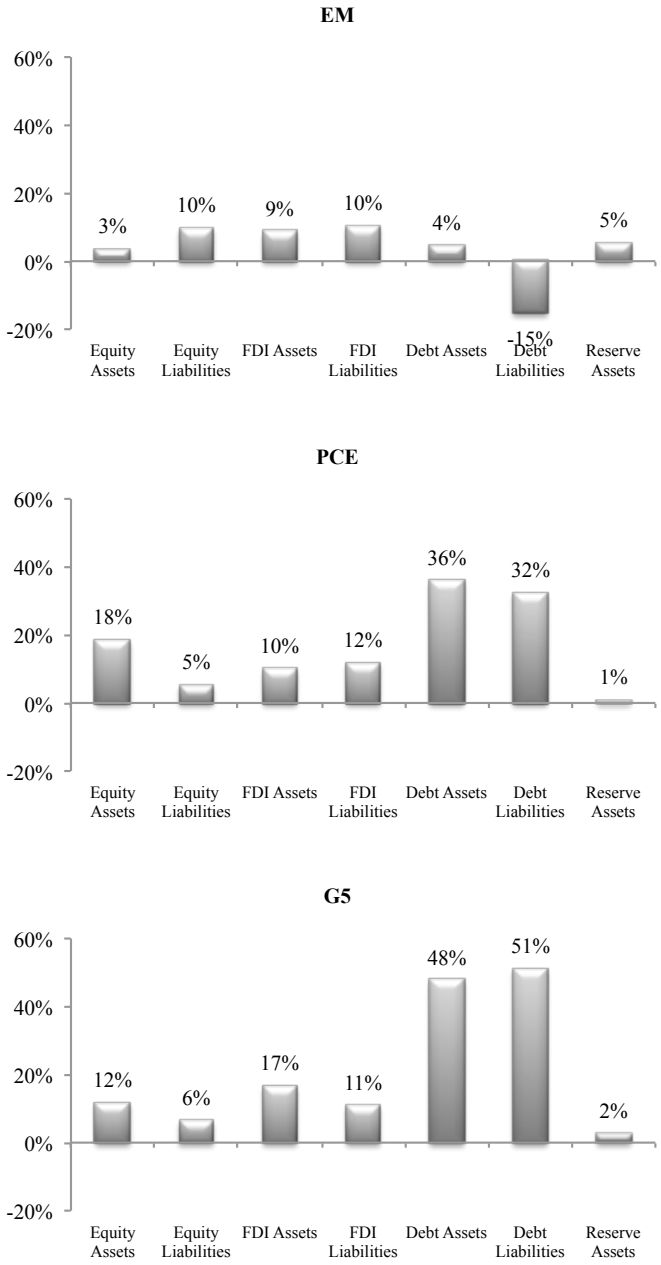
Notes: The figure shows country group averages of de facto FG over GDP and CI's measure of de jure FG. Only countries with complete data from 1990 to 2007 were used. Source: LMF (2008), WDI, CI (2008).

Figure 3.1B: FG measures: Within EM



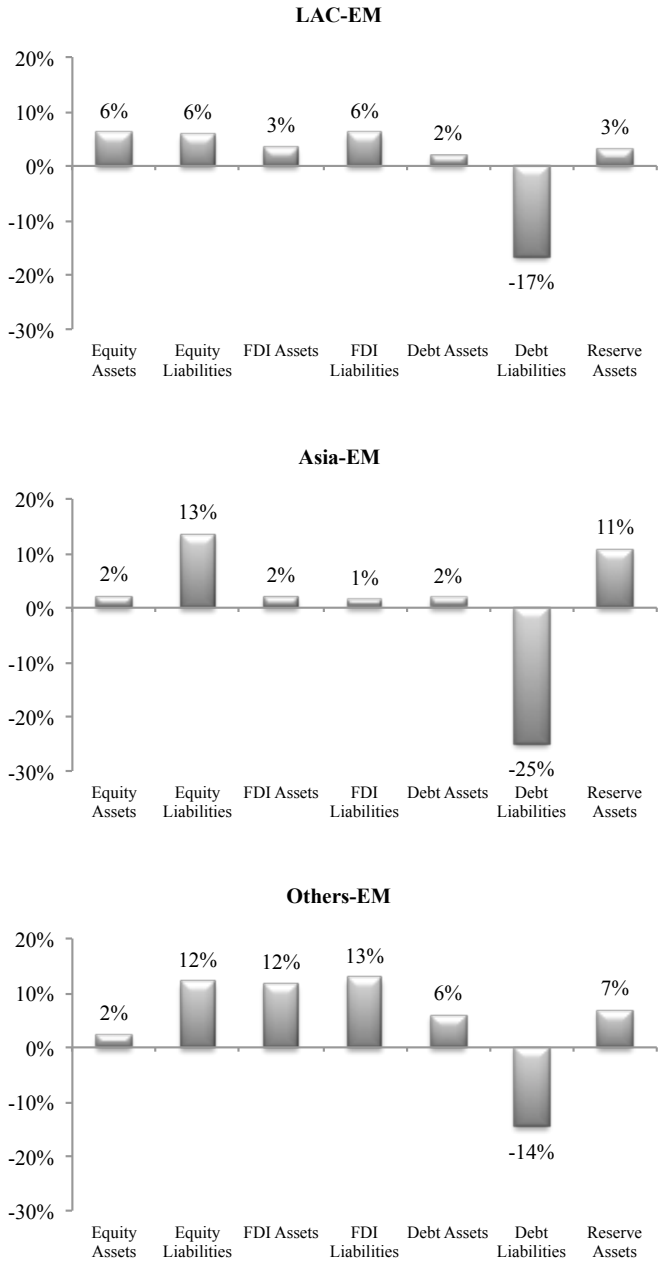
Notes: The figure shows country group averages of de facto FG over GDP and CI's measure of de jure FG. Only countries with complete data from 1990 to 2007 were used. Source: LMF (2008), WDI, CI (2008).

Figure 3.2A: From 1999 to 2007: EM vs. others



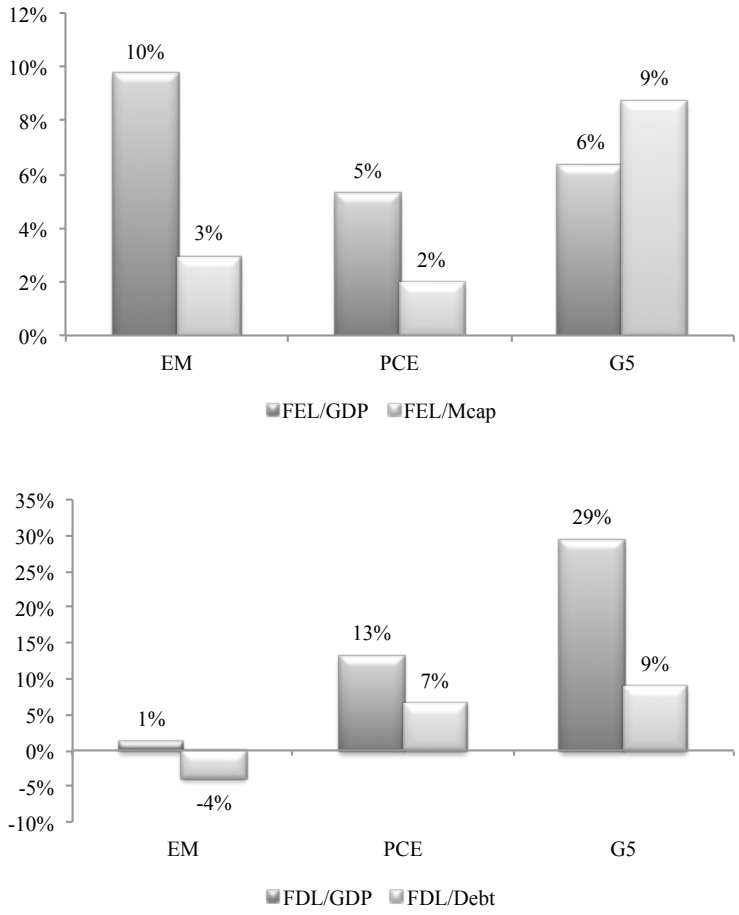
Notes: The figure presents changes of de facto FG over GDP. The country sample is the same as in F1a. Changes are from 1999 to 2007. Source: LMF (2008), WDI.

Figure 3.2B: From 1999 to 2007: Within EM



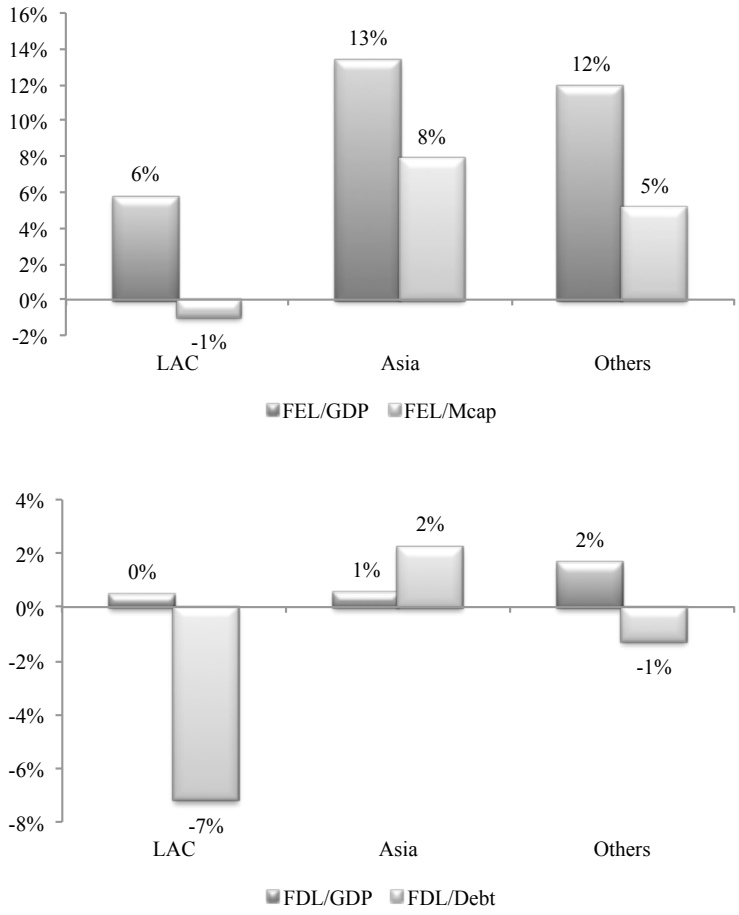
Notes: The figure presents changes of de facto FG over GDP. The country sample is the same as in F1b. Changes are from 1999 to 2007. Source: LMF (2008), WDI.

Figure 3.3A: FG and different normalizations: EM vs. others



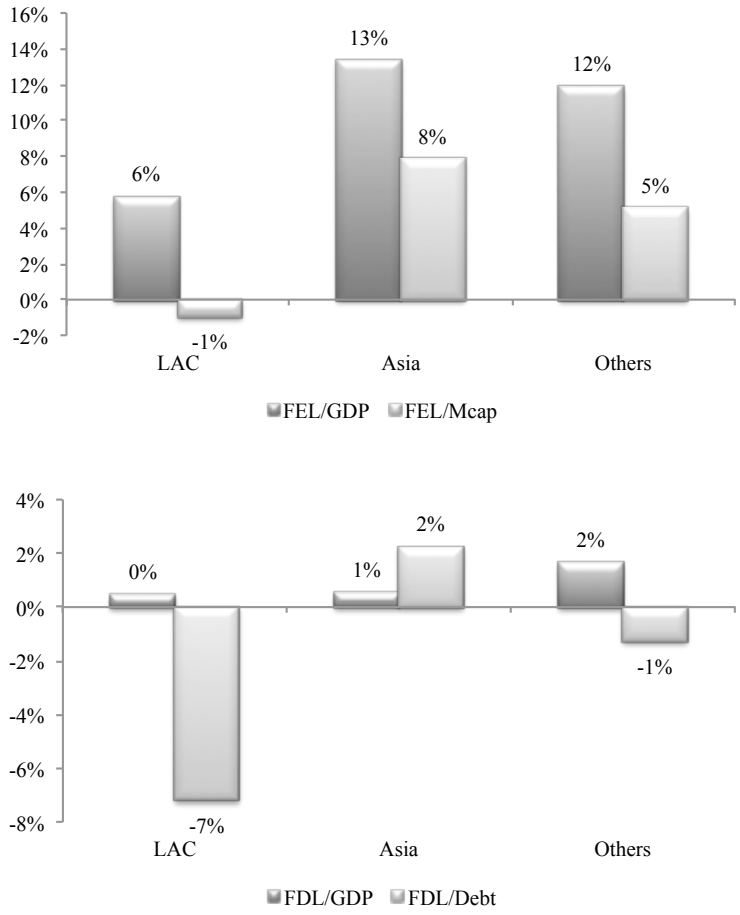
Notes: The figure presents changes in foreign equity/debt liabilities divided by GDP or the corresponding market capitalization. Changes are from 1999 to 2007. Source: LMF (2008), WDI, BIS.

Figure 3.3B: FG and different normalizations: Within EM



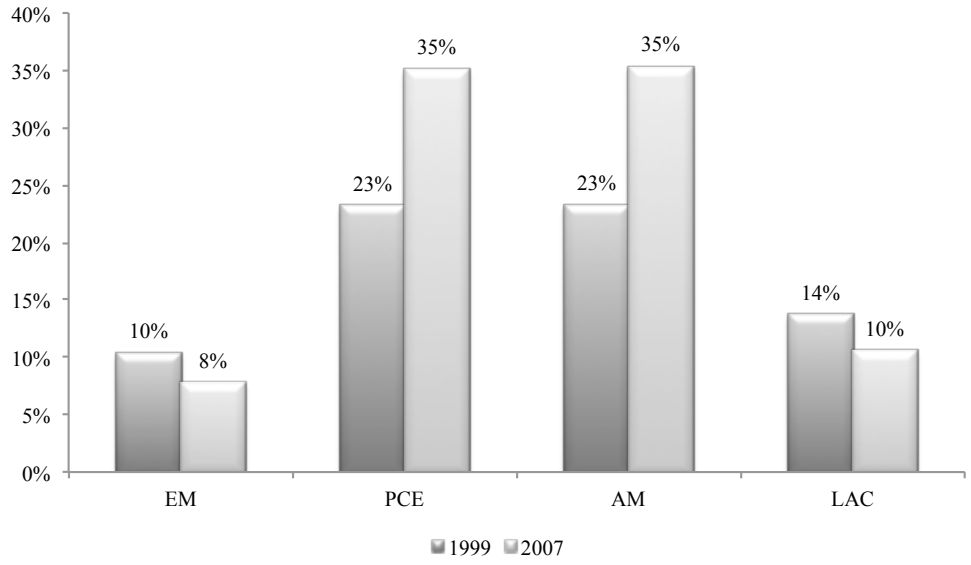
Notes: The figure presents changes foreign equity and debt liabilities divided by GDP or the corresponding market capitalization. Changes are from 1999 to 2007. Source: LMF (2008), WDI, BIS.

Figure 3.3B: FG and different normalizations: Within EM



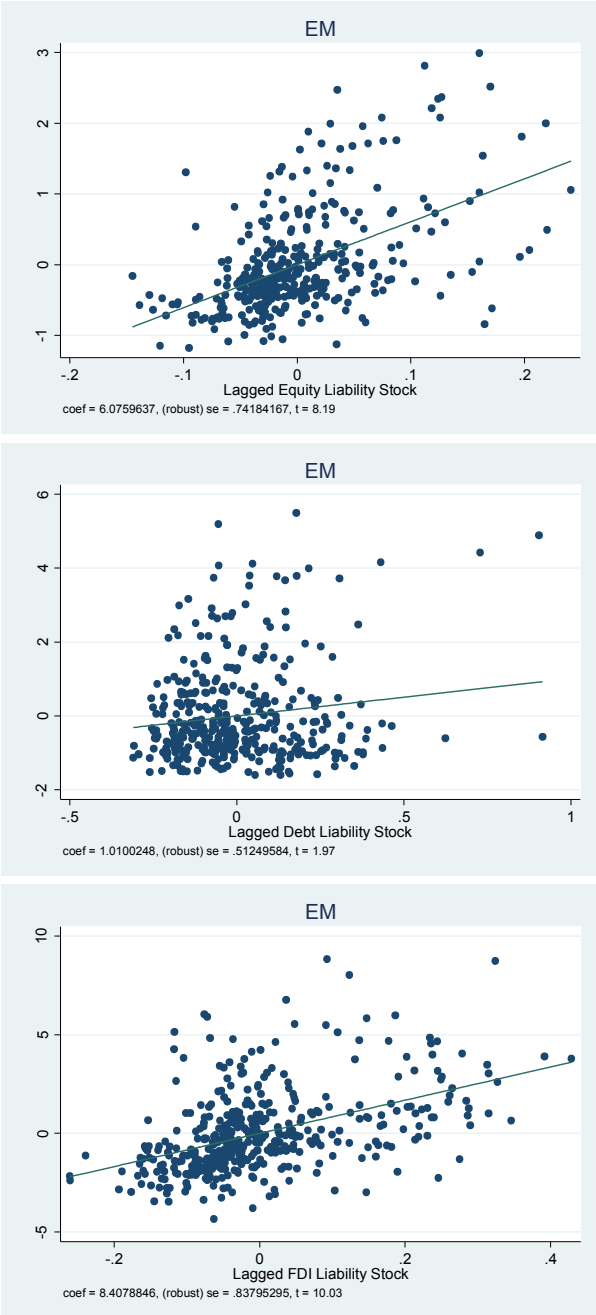
Notes: The figure presents changes foreign equity and debt liabilities divided by GDP or the corresponding market capitalization. Changes are from 1999 to 2007. Source: LMF (2008), WDI, BIS.

Figure 3.4: Portfolio Diversification



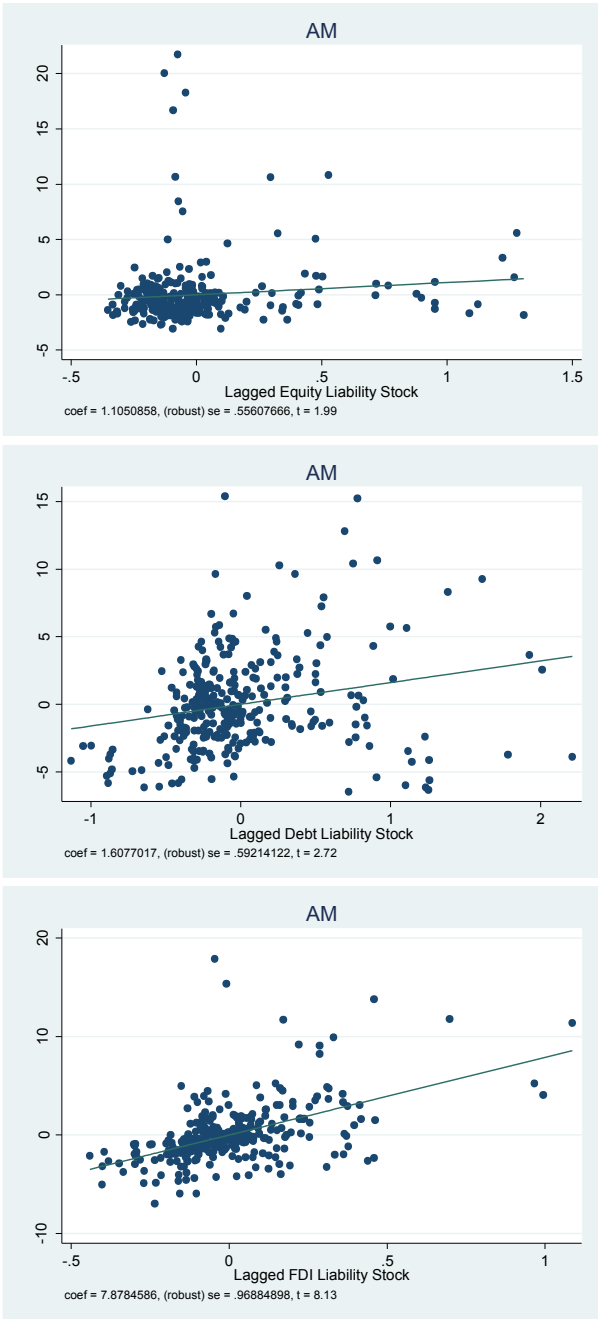
Notes: The figure shows level of portfolio diversification (PD) in 1999 and 2007. PD is measured as (FEA+FDA)/(NFEA+NFDA+Mcap+Total Debt). FEA is foreign equity assets, FDA is foreign debt assets, NFEA is net foreign equity assets and NFDA is net foreign debt assets. Source: LMF (2008), WDI, BIS.

Figure 3.5A: Initial Holdings and Flows by different instruments: EM



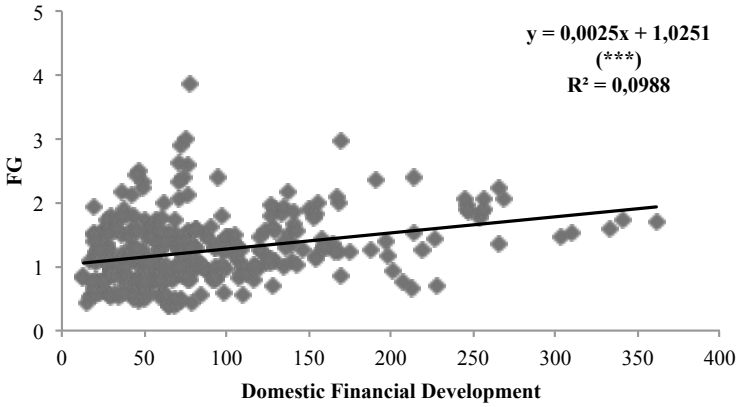
Notes: The figure shows partial regression plots from estimations of abs(flows) vs. end-of-last-period FG holdings for different instruments (equity, debt, FDI). Time dummies and de jure capital account openness were included in the regressions as additional controls. Source: LMF (2008), BoP IMF IFS, WDI, CI (2008).

Figure 3.5B: Initial Holdings and Flows by different instruments: AM



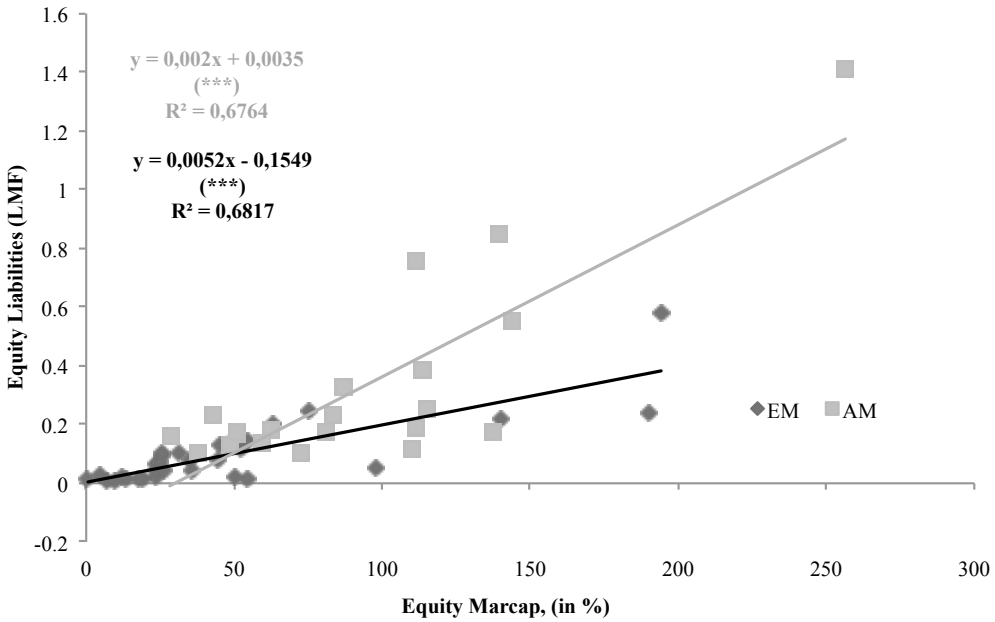
Notes: The figure shows partial regression plots from estimations of abs(flows) vs. lagged FG holdings for different instruments (equity, debt, FDI). Time dummies and de jure capital account openness were included as additional controls in the regressions. Source: LMF (2008), BoP IMF IFS, WDI, CI (2008).

Figure 3.6: FG and financial development at first glance



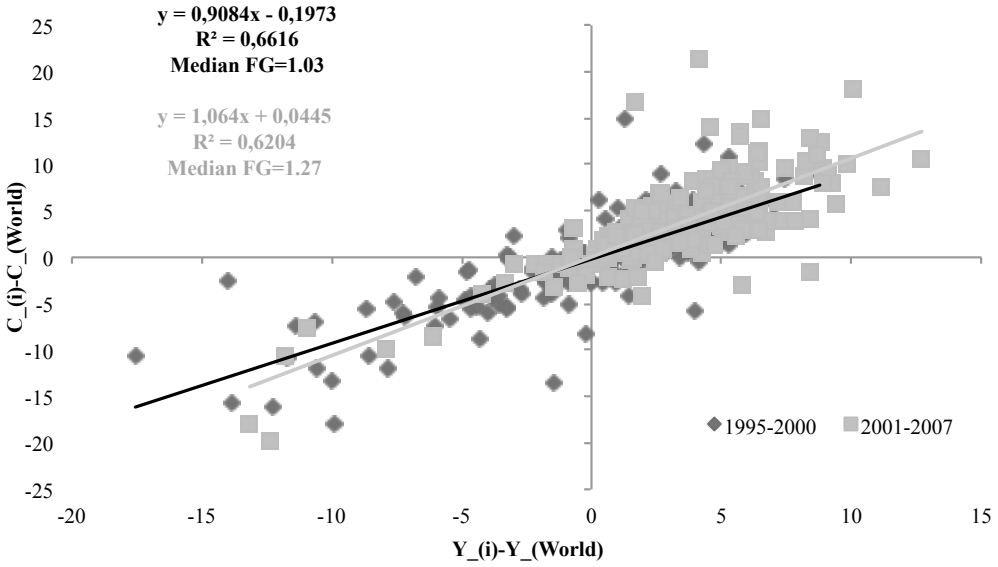
Notes: The figure plots de facto FG (measured as is sum of stock of foreign assets and liabilities over GDP) against domestic financial development (measured as the sum of bank deposits and equity marcap over GDP). The sample comprises EM countries with data available from 1995-2007 excluding Singapore. (***) denotes that the slope of the simple regression is significant at a 1% level. Source: WDI and LMF (2008).

Figure 3.7: Domestic Financial Development and FG: Equity Markets



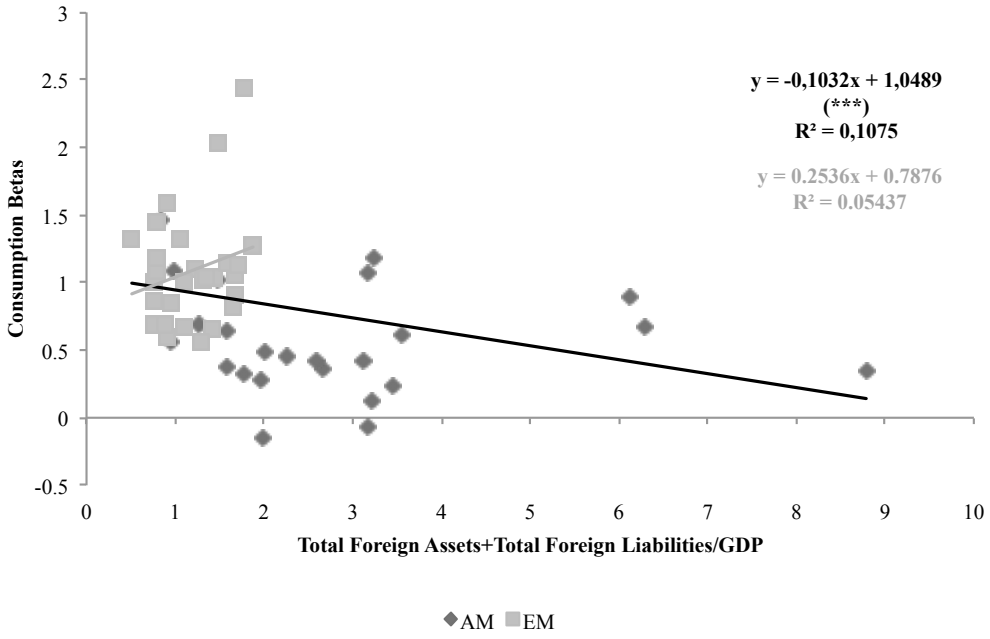
Notes: The figure plots foreign equity liabilities over GDP against equity market capitalization over GDP. (***) denotes significance at the 1% level. Source: LMF (2008), WDI.

Figure 3.8: Risk Sharing and FG



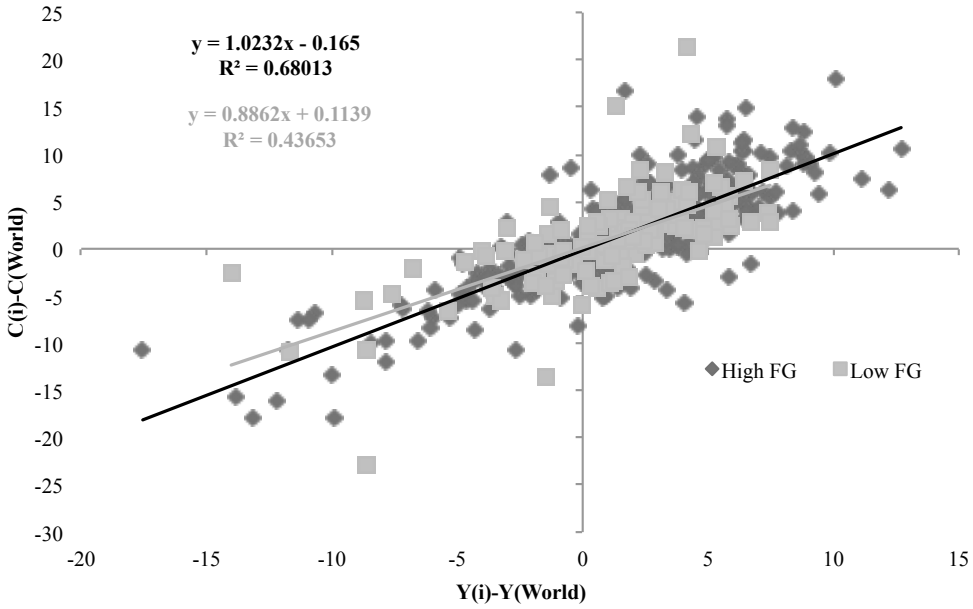
Notes: The figure plots per capita consumption against output growth. $X_i - X_{World}$ refers to the domestic variable minus the world variable. C, and Y represent consumption and output growth per capita. FG is the ratio of the sum of foreign assets and liabilities to GDP. Source: WDI, LMF (2008).

Figure 3.9: Risk Sharing: Consumption betas vs. FG



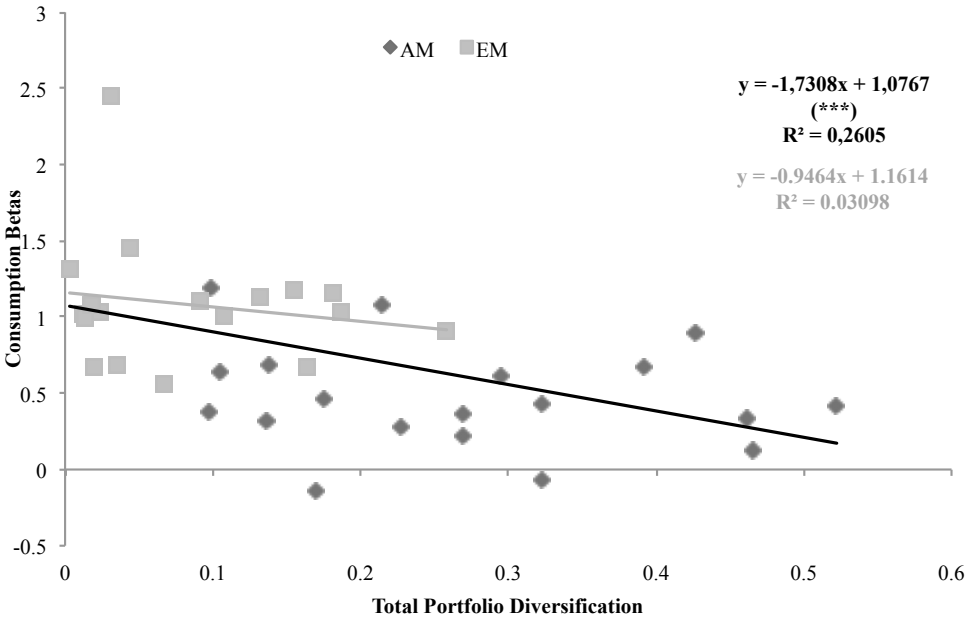
Notes: The figure presents a scatter plot of consumption betas as measured by the slope of $c_i - c_{World}$ to $y_i - y_{World}$ vs. FG/GDP. C and Y represent consumption and output growth per capita respectively. *** denotes significance at the 1% level. Source: LMF (2008), WDI.

Figure 3.10: The higher FG the greater risk sharing?



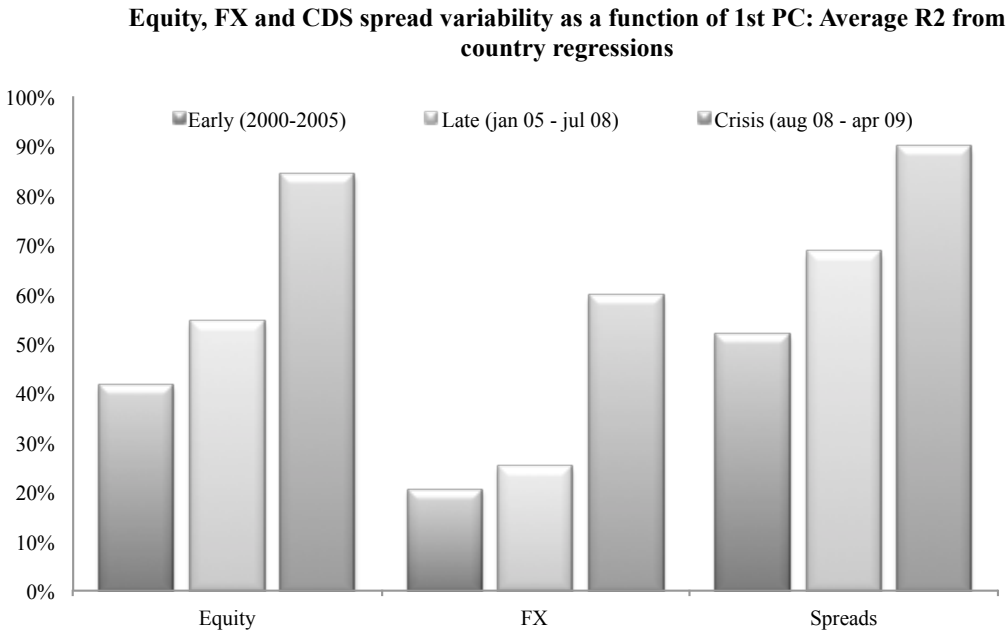
Notes: The figure plots consumption against per capita output growth in countries with high and low financial globalization. $X_i - X_{World}$ refers to the domestic variable minus world variable. C, and Y represent consumption and per capita output growth. The sample comprises all developing countries. High and low FG is determined by the lower bound of FG in advanced markets sample. If a country is above that lower bound, it belongs to the high FG group. FG is the sum of total assets and liabilities over GDP. Source: WDI, LMF (2008).

Figure 3.11: Risk Sharing and Portfolio Diversification



Notes: The figure plots consumption betas (measured by the slope of $c_i - c_{World}$ to $y_i - y_{World}$) against portfolio diversification (as measured in Figure 4). C and Y represent consumption and output growth per capita respectively. *** denotes significance at the 1% level. Source: LMF (2008), WDI.

Figure 3.12: Financial recoupling in EM: Across Assets



Notes: The figure reports the average R-squared of the regressions of country-specific equity returns, FX returns and sovereign credit spreads on the corresponding first principal component computed over an emerging markets sample. Countries: Argentina, Brazil, Chile, China, Colombia, Czech Republic, India, Israel, Korea, Mexico, Peru, Poland, Russia, Singapore, South Africa, Taiwan, Turkey and Uruguay. Source: Bloomberg.

Table 3.1: FG and different normalizations

Variable	Year	Level				Difference			
		EM	*PCE*	*G5*	***LAC***	*EM*	*PCE*	*G5*	***LAC***
FEL/GDP	1999	10.2%	24.6%	20.3%	**6.5%**	9.7%	9.7%	5.3%	**5.7%**
	2007	19.9%	29.8%	26.6%	**12.2%**				
FEL/Mcap	1999	18.5%	25.7%	22.1%	**18.3%**	2.9%	2.9%	1.9%	**-0.9%**
	2007	21.4%	27.7%	30.9%	**17.3%**				
FDL/GDP	1999	8.8%	39.7%	25.9%	**9.6%**	2.4%	2.4%	13.1%	**0.7%**
	2007	11.2%	52.8%	55.2%	**10.3%**				
FDL/Debt	1999	23.7%	39.3%	21.2%	**30.1%**	-3.5%	-3.5%	6.5%	**-6.7%**
	2007	20.2%	45.9%	30.0%	**23.5%**				

Notes: This table presents group averages for different financial globalization measures normalized by GDP, Market Capitalization or Total Debt.

Table 3.2: Initial Holdings and Flows

VARIABLES	FE Equity	BE Equity	FE Debt	BE Debt	FE FDI	BE FDI	FE Eq. Global Funds	BE Eq. Global Funds	FE Debt Global Funds	BE Debt Global Funds
EM Absolute Flows										
Stock of Foreign Equity Liab.	4.310***	10.95***								
	(0.677)	(2.821)								
Stock of Foreign Debt Liab.			1.863	3.322**						
			(1.537)	(1.491)						
Stock of Foreign FDI Liab.					20.96**	16.56***				
					(9.013)	(2.816)				
AUM Stock							0.0405***	0.0655***	0.072***	0.115***
							(0.0139)	(0.0123)	(0.0104)	(0.0096)
Observations	383	383	398	398	433	433	168	168	88	88
R-squared	0.174	0.736	0.045	0.349	0.417	0.666	0.541	0.614	0.6016	0.8828
Countries	25	25	24	24	25	25	21	21	22	22
AM Absolute Flows										
Stock of Foreign Equity Liab.	0.170	3.602***								
	(2.161)	(0.708)								
Stock of Foreign Debt Liab.			3.771***	5.399***						
			(0.611)	(1.299)						
Stock of Foreign FDI Liab.					13.24	7.903***				
					(11.75)	(2.171)				
Observations	274	274	280	280	298	298				
R-squared	0.168	0.996	0.306	0.742	0.238	0.954				
Countries	17	17	17	17	17	17				

Notes: This table presents estimations of absolute flows vs. lagged stocks of different financial globalization variables. Robust standard errors in parentheses. FE indicates fixed effects estimation, and BE indicates between estimation. FG stock variables are lagged one period. All estimations include time dummies and capital account openness as additional control. *** p<0.01, ** p<0.05, * p<0.1.

Table 3.3: FG and domestic financial development

Group of Countries	EM	EM	EM	EM	EM	EM	EM	EM	EM	EM
Type of estimation	BE	FE	BE	FE	BE	FE	BE	FE	GMM (External)	GMM (Internal)
VARIABLES	FG	FG	FG	FG	Equity Liabilities	Equity Liabilities	Equity Liabilities	Equity Liabilities	Equity Marcap	Equity Marcap
Trade	0.195	0.186	0.324*	0.184	-0.241	-0.262				
	(0.140)	(0.132)	(0.159)	(0.124)	(0.405)	(0.544)				
Financial Development	0.138	0.375***								
	(0.110)	(0.0720)								
Equity Mcap_GDP			0.159*	0.0878**	0.647**	0.493**				
			(0.0901)	(0.0403)	(0.229)	(0.215)				
Bank Deposits_GDP			-0.186	0.430***	0.631	-0.642*				
			(0.189)	(0.120)	(0.480)	(0.364)				
FG/GDP							0.55	0.600**		
							-0.411	-0.241		
Foreign Equity Liab_GDP							0.527***	0.321***	0.402***	0.418***
							-0.13	-0.147	(0.114)	(0.131)
GDP per capita PPP	0.143	0.00144	0.144	-0.140	0.208	1.469*	-0.264	0.831*	0.405	0.535
	(0.0993)	(0.211)	(0.0978)	(0.237)	(0.249)	(0.854)	-0.225	-0.462	(0.740)	(0.788)
KA Openness	0.110*	-0.0128	0.0901	-0.0134	-0.0134	0.0939				
	(0.0620)	(0.0162)	(0.0610)	(0.0194)	(0.155)	(0.104)				
Constant	-2.582**	-2.430	-2.752**	-1.403	-7.368**	-14.95*	7.252***	-2.753		
	(1.136)	(1.937)	(1.127)	(2.148)	(2.871)	(7.276)	-2.451	-3.915		
P-value Joint Test			0.2357	0.001***	0.000***	0.025**				
Number of Instruments									27	27
Arellano-Bond Test AR (2)									0.335	0.275
Hansen Test									0.485	0.277
Observations	326	326	326	326	326	326	325	325	323	323
Countries	27	27	27	27	27	27	27	27	27	27
R-squared	0.550	0.581	0.588	0.584	0.742	0.536	0.698	0.557		

Notes: Robust standard errors in parentheses. BE represents between estimation, and FE indicated fixed effects estimation. All Variables are in log terms except Capital Account Openness. All variables are lagged one period. All estimations include time dummies. Joint test is $FD_1 = FD_2 = 0$. GMM indicates dynamic GMM estimation, and in parenthesis is the type of instruments used. External instruments is the regional (EM) stock of the FG variable excluding the corresponding country.*** p<0.01, ** p<0.05, * p<0.1.

Table 3.4: Output and Consumption volatility: Group Medians

Sample	Full Sample	Full Sample		Late Period	Late Period	
Period	1995-2007	1995-2007		2000-2007	2000-2007	
Variable	Volatility Y	Volatility C	Ratio	Volatility Y	Volatility C	Ratio
Full Sample	2.0479	2.3151	1.13	1.5727	1.8504	1.18
	(1.7193)	(2.3557)		(1.5481)	(2.1965)	
AM	1.1995	1.1041	0.92	1.2349	0.9973	0.81
	(0.4551)	(0.7680)		(0.3853)	(0.9085)	
EM	3.2135	4.2959	1.34	1.9481	2.3524	1.21
	(1.7803)	(2.2195)		(2.0011)	(2.4793)	
FM	2.1109	3.5319	1.67	1.9681	3.1093	1.58
	(1.2735)	(2.2865)		(0.5892)	(1.9335)	
MFI	2.8847	4.6620	1.62	1.6999	2.9576	1.74
	(1.8151)	(2.4317)		(2.3729)	(2.7419)	
LFI	2.2018	3.3633	1.53	2.0503	2.1163	1.03
	(1.6487)	(1.9825)		(0.8561)	(1.8566)	

Notes: More financially integrated (MFI) economies are developing economies with FG (measured by the sum of foreign assets and liabilities over GDP) above the sample median. LFI are economies with FG below the sample median. Full sample is 1995-2007 and late period is 2000-2007. Standard errors appear in parenthesis. Source: WDI, World Bank Data and LMF (2008).

Table 3.5: Correlations first PC vs. Global Indexes

		S&P	MSCI Developed	HY
PCE - Equity	2000-2009	0.843	0.941	-0.685
	2000-2004	0.831	0.919	-0.616
	2005-2009	0.868	0.956	-0.727
EM - Equity	2000-2009	0.810	0.892	-0.641
	2000-2004	0.786	0.817	-0.640
	2005-2009	0.843	0.939	-0.665
EM - CDS	2000-2009	-0.625	-0.671	0.753
	2000-2004	-0.526	-0.566	0.516
	2005-2009	-0.775	-0.774	0.815

Notes: This table reports the correlation of global indices vs. the first principal component of equity returns and CDS spreads. Source: Bloomberg.

Appendix Table 3.1: List of Countries

AM	PCE	EM	G5	FM
Australia	Australia	Argentina	France	Bahrain
Austria	Canada	Brazil	Germany	Bangladesh
Belgium	New Zealand	Bulgaria	Italy	Bosnia and Herzegovina
Canada	Norway	Chile	Japan	Botswana
Denmark	Sweden	China	United States	Croatia
Finland		Colombia		Ghana
France		Czech Republic		Jordan
Germany		Ecuador		Kazakhstan
Greece		Egypt, Arab Rep.		Kenya
Iceland		Estonia		Kuwait
Ireland		Hungary		Lebanon
Italy		India		Mauritius
Japan		Indonesia		Nigeria
Netherlands		Israel		Oman
New Zealand		Korea, Rep.		Pakistan
Norway		Latvia		Qatar
Portugal		Lithuania		Saudi Arabia
Spain		Malaysia		Serbia
Sweden		Mexico		Slovenia
Switzerland		Peru		Sri Lanka
United Kingdom		Philippines		Trinidad and Tobago
United States		Poland		Tunisia
		Romania		United Arab Emirates
		Russian Federation		
		South Africa		
		Thailand		
		Turkey		
		Ukraine		
		Uruguay		
		Venezuela, RB		
		Vietnam		

Notes: This table reports the list of countries used throughout the paper.

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