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International Asset Allocations and Capital Flows: The Benchmark Effect*

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Abstract

We study different channels through which well-known benchmark indexes impact asset allocations, capital flows, and asset prices across countries, using unique monthly micro-level data of benchmark compositions and mutual fund investments during 1996-2014. Benchmarks are useful for identification and have important effects on equity and bond mutual fund portfolios, including both passive and active funds. Benchmark effects are important after controlling for industry, macroeconomic, and country-specific time-varying effects. Reverse causality and common shocks do not drive the results. Exogenous, pre-announced changes in benchmarks result in movements in asset allocations and capital flows mostly when these changes are implemented. Moreover, assets in the benchmarks experience abnormal returns when benchmark changes become effective, suggesting that the

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reallocations implied by those changes are not immediately arbitraged away. By impacting country allocations, benchmarks explain apparently counterintuitive movements in capital flows and asset prices, for example, generating outflows and depressing prices in countries being upgraded.

Keywords: Benchmark Indexes, Contagion, Coordination Mechanism, ETFs, International Asset Prices, International Portfolio Flows, Mutual Funds

JEL Classifications: F32, F36, G11, G15, G23

1. Introduction

Theories and empirical work abound about how capital is invested internationally, studying the behavior of both country portfolios (international asset and liability positions) and capital flows. A significant part of the literature has focused on the role that macroeconomic fundamentals play in international investment decisions.[1] In this paper, we focus instead on another factor that, so far, has been mostly absent from the literature on international investments and that we call "the benchmark effect."[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 asset prices across countries. 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).[3] To the extent that the investment strategy of these funds is pinned down by the composition of their benchmark indexes ("benchmarks"), changes in the weights that a popular benchmark gives to different countries can trigger a similar rebalancing among the funds that track it and result in sizeable movements in international portfolio allocations and capital flows. Furthermore, because a growing number of mutual funds follow benchmarks more passively as a way to cut costs, increase transparency, and provide simple investment vehicles (such as, index funds and exchange-traded funds or ETFs), the importance of the benchmark effect is likely to rise.

Although the effect of benchmarks on international asset allocations and capital flows has not received much attention in the international finance literature, it is frequently and increasingly mentioned in broader discussions. For example, when Israel was moved from the MSCI Emerging Markets Index to the World Index (composed of developed markets) capital was expected to leave the country at the time of the switch due to the behavior of funds following these indexes, even though the upgrade was announced in advance and it occurred because Israel's fundamentals had improved (Business Week, 2010). This has 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

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

[2] 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; Cremers et al., 2013; Busse et al., 2014). 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; Hau, 2011; Vayanos and Wooley, 2011; Bartram, Griffin, and Ng, 2012; Faias et al., 2012) or how the fact that managers follow benchmarks could explain the growing correlations in financial markets between emerging economies and the U.S. during the 2000s (Levy Yeyati and Williams, 2012).

[3] See, for example, Khorana et al. (2005), Shiller (2008), Hellwig (2009), Mishkin (2011), and Gelos (2013).

upgrades of Portugal (1997), Greece (2001), Qatar (2014), and the United Arab Emirates (U.A.E.) (2014) and the downgrades of Venezuela (2006), Argentina (2009), and Greece (2013) (Financial Times, 2013a,b,c; The Economist, 2014a). Following our paper, the Bank for International Settlements also discussed this issue in detail in a quarterly report (BIS, 2014). 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 capital flows into (out of) that country (The Economist, 2012).

In this paper, we systematically study different ways in which benchmarks affect the international asset allocations and capital flows of mutual funds, as well as their effects on asset prices. First, we discuss how the cross-sectional and time-series variation in the country composition of benchmark indexes ("benchmark weights") helps in the identification of shocks to mutual fund portfolios and might explain systemic effects. Second, we present thorough econometric evidence that movements in benchmark weights result in movements in the actual country weights ("weights") of the funds that declare that benchmark, depending on their degree of activism (the degree to which their country allocations deviate on average from those of their respective benchmarks). Third, we show the consequences that the relation between mutual fund weights and benchmark weights has for capital flows, and explain the various channels through which the benchmark effect impacts those flows. Fourth, we use upgrades and downgrades of countries to study how and when the prices of the securities being affected respond to benchmark changes.

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.[4]

One important advantage of our database is that it allows us to test how the use of benchmarks affects international capital allocation, capital flows, and asset prices. First, we measure the independent effect of these benchmarks on country allocations and capital flows after controlling for several factors often mentioned in the literature, most notably, industry and macroeconomic effects. Second, because benchmarks are adjusted frequently and are subject to significant exogenous revisions that are clear, anticipated, and large (entailing changes in the assets included, changes in the loading of each asset or country, and reclassification of countries across benchmarks), we are able to test the causality from benchmarks changes to mutual fund portfolio changes. These effects are independent of any buy-and-hold effect that benchmarks might have on mutual fund allocations.

[4] 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.

Third, we argue that large benchmark changes such as country upgrades and downgrades can have systemic effects on capital flows and asset prices. Moreover, they can lead to counterintuitive movements, including capital outflows and declining prices during upgrades, as well as inflows and higher prices in countries with deteriorating fundamentals. Fourth, by linking different countries in the same portfolio, benchmark changes can trigger reallocations across countries in that portfolio, connecting countries that might otherwise be disconnected (e.g., Qatar and U.A.E. with Argentina, Kuwait, Nigeria, and Pakistan in the MSCI Frontier Markets Index or Brazil, Russia, India, and China in the MSCI BRIC Index).

Our results show that benchmarks have statistically and economically significant effects on mutual fund allocations and capital flows 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. However, there is relevant heterogeneity across funds. Explicit indexing funds 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 are still significantly influenced by their behavior, with about 50 percent of their allocations explained by the benchmark effect. These benchmark effects on the mutual fund portfolios are relevant even after controlling for time-varying industry allocations and country-specific or fundamental factors, among others. Furthermore, the results are not 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 benchmark indexes affect benchmark weights, and exogenous changes in benchmark weights lead to changes in mutual fund weights.

By influencing the mutual fund asset allocations across countries, benchmarks also affect international capital flows. For given past allocations, realized returns, and net inflows to a fund, there is a direct relation between the fund's allocation and its capital flows to various countries. This association decreases with the degree of activism as funds might reallocate their holdings across countries. Therefore, reallocations in the benchmarks directly impact capital flows through the reallocations in the fund weights. Furthermore, because the sensitivity of country flows to fund flows is partly mediated by the benchmark weight, the use of benchmarks might also generate amplification and contagion effects across countries. These effects arise from the impact that a shock to a country's returns or to the returns of other countries in its benchmark has on its benchmark weight. We show algebraically the presence of these direct, sensitivity, amplification, and contagion effects, describe them through various examples derived from our data, and quantify their importance. Because the direct benchmark effect is the most important one, we present evidence on how aggregate capital flows behave around these large benchmark changes.

To complement the evidence on the systemic effects of benchmark changes, we analyze the behavior of asset prices around those events. To the extent that changes in mutual fund portfolios imply just

reallocations among investors, asset prices would not necessarily react to changes in the benchmarks. But if prices react to those events, it would be consistent with the market as a whole being impacted by the behavior of investors following benchmarks. We find, in fact, that large benchmark changes (such as upgrades and downgrades of countries) are associated with a return differential between stocks/debt included and not included in the benchmarks. Moreover, this differential behaves as predicted by the mutual funds flows; it becomes positive (negative) when there are predicted inflows to (outflows from) a country. Notably, these effects are present both during the announcement and effective dates of these benchmark changes. The cumulative differential returns are 1 percent around the announcement date and 3.5 percent around the effective date. Our results suggest that, through the reallocations they trigger, benchmark changes have effects on asset prices beyond the information content of upgrades and downgrades. The evidence is also consistent with limits to arbitrage in the markets affected by benchmark changes.

The benchmark effects documented in this paper can help understand some of the discussions in the literature related to cross-country portfolio allocations. Theoretical work shows that benchmarks can matter for portfolio allocations because managers will optimally tilt their portfolio to the assets in the index used to track their performance (Basak and Pavlova, 2012). But this effect is not trivial and has not been tested empirically. In practice, as Appendix 1 discusses, the extent to which the portfolios of both passive and active funds 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, among others things. Moreover, mutual funds declare prospectus benchmarks but they need not follow them, as deviations from benchmarks could bring greater profitability (Cremers and Petajisto, 2009). Furthermore, the number of assets in benchmark indexes is much larger than that held in international mutual fund portfolios (Didier et al., 2013), which suggests that some funds do not fully replicate these indexes. We contribute to these discussions by showing, for different types of mutual funds, how closely related the country portfolios are to their benchmarks, and how shocks to the latter affect the former.

Our findings on the benchmark effect also shed light on some of the numerous discussions on international capital flows. First, our findings show that the use of benchmarks to reduce principal-agent problems and the mechanics of benchmark construction have an independent effect on capital flows, aside from the role that fundamentals and industry factors play. Moreover, benchmarks seem to account for some of the shifts in capital flows and contagion effects that are sometimes difficult to explain. Second, through their effect on individual portfolios, benchmarks could act as a coordinating mechanism that leads mutual funds (and other asset managers following similar strategies) to move in tandem in given countries, having quantitatively significant systemic effects through herding-like behavior. This is important because individual funds tend to be relatively small compared to the size of capital flows to a country. While there is a large literature showing that mutual funds might imitate their peers and display herding behavior (Scharfstein and Stein, 1990; Froot et al., 1993; Hirshleifer et al., 1994; Hong et al., 2005), there exist only a handful of cases where coordination has been shown

empirically (Chen et al., 2010; Hertzberg et al., 2011).[5] Here we provide evidence consistent with another coordinating mechanism. Third, the existing literature shows that mutual funds tend to behave pro-cyclically and can have important effects on domestic markets (Kaminsky et al., 2004; Gelos and Wei, 2005; Broner et al., 2006; Jotikasthira et al., 2012; Forbes et al., 2012; Fratzscher, 2012; Hau and Lai, 2013; Raddatz and Schmukler, 2012; Stein, 2013; IMF, 2014). However, it has only started to show why and how these effects take place. Our results suggest that benchmarks might be a potential avenue through which these effects occur. Fourth, our findings provide a possible explanation for the momentum and feedback loop theories (Barberis et al., 1998; Daniel et al., 1998; Shiller, 2000; Gervais and Odean, 2001; Wurgler, 2011; Vayanos and Wooley, 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. Our results on capital flows and asset prices provide new evidence suggesting limits to arbitrage, given the growing importance of investors that follow benchmark indexes.

The rest of the paper is organized as follows. Section 2 describes the data. Section 3 discusses how benchmarks are constructed and help with identification. Section 4 studies the effect of benchmarks on mutual fund asset allocations. Section 5 analyzes the relation between asset allocations and capital flows, and the effects of benchmarks on these flows. Section 6 studies how asset prices react around benchmark changes. Section 7 concludes.

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.[6] Throughout the paper, 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 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 that took place up to 2014.

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

[5] Other possible mechanisms are the exposure to common funding shocks, pure herding, or the use of similar investment strategies unrelated to benchmarks.

[6] 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.

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 (e.g., developed Asia).[7] Frontier market funds are usually classified as regional funds. The data also comprise portfolios of ETFs. We use only funds that have 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 total net assets (TNAs, A_{it}). We also have information on each fund's static characteristics, such as the asset class, domicile, currency, whether it is an ETF, its strategy (passive or active), and, crucially, its declared benchmark. We complement these data with information on each fund's net asset value (NAV), obtained 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.[8] 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.[9] The combination of the two databases provides us with an extensive cross-sectional and time-series coverage of funds. 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.[10] 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). We obtained this information from Datastream and MSCI.

In addition to our data on fund country weights, we also use data on the country 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. 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.[11] Moreover, we gather data on daily returns to analyze the impact of benchmark changes in asset prices. We use

[7] 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 gauge their performance relative to the MSCI All Country World Index that contains both developed and emerging countries.

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

[9] In our estimations, we only use country allocations and, thus, do not include the residual category of other countries nor cash.

[10] 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.

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

Datastream to collect daily prices in U.S. dollars for firms and sovereign bonds for the episodes analyzed in Section 6.

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.[12] 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.[13,14] 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).[15] Our final database consists of an unbalanced panel, 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. Because we have much more matched data on equity funds than bond funds we rely more heavily on the former than the latter. However, despite the much lower data availability, the results on bond funds are broadly consistent with those on equity funds.

We also classify funds according to their degree of activism, 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. 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.[16] Because mutual funds in our sample have only long positions, this measure ranges from 0 to 100 percent. 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)

[12] Results are qualitatively similar when excluding these funds.

[13] 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.

[14] There is no agreement in the literature on how to assign benchmarks. To different degrees, papers use the declared benchmark, the one assigned by analysts, and the one that yields the smallest deviation from the fund portfolio (Cremers and Petajisto, 2009; Sensoy, 2009; Cremers et al., 2013; Jiang et al., 2014; Busse et al., 2014).

[15] 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 16 percent.

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

if they are in the lower part (upper) of the distribution of the active share measure (using the median active share).[17]

Our database of mutual funds, before matching with the benchmarks, contains 2,837 equity funds and 838 bond funds with three geographical investment scopes: global, global emerging, and regional funds (Appendix Table 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. The benchmarks indexes we use have different scope and are listed in Appendix Table 2.

The TNAs of mutual funds increased significantly over time, reaching large values at the end of the sample (Appendix Figure 1). In 2011, the equity (bond) funds in our sample had 1.2 trillion (303 billion) U.S. dollars in TNAs. 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.[18]

3. Benchmarks and Identification

Benchmark indexes and how they are constructed (and frequently revised) present some clear advantages for identification and analysis of the impact of the benchmark effect. First, the fund-country-time dimension of the data and the fact that countries belong to more than one benchmark allow us to control for fund-time, industry-time, and country-time unobserved variation, mentioned in the literature as important factors for mutual fund allocations. Second, pre-determined changes by index providers help disentangle the role of relative returns in the relation between mutual fund weights and benchmark weights. Third, using specific, pre-determined upgrades and downgrades of countries we are able to analyze the behavior of capital flows and asset prices around these changes, and draw some conclusions about the systemic importance of the benchmark effect.

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

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

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).[19]

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 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. The indexes are periodically rebalanced to ensure their continuity and representativeness (MSCI Barra, 2013a,b). 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 (as described in Raddatz et al., 2014).

A first methodological challenge in studying the effect of benchmarks is the need to control for several sources of variation in the data. In our case, the fund-country-time dimension allows us to analyze the independent impact of the benchmark effect. In particular, we use fund-country and fund-time fixed effects to 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). We use first differences to address concerns related to the persistence of weights and the cross-sectional variation driving our results. We use industry fixed effects to test whether our results capture the impact of industry-level omitted variables, which could be a significant factor given the literature on managerial incentives, that highlights the use of relative performance to evaluate managers against the industry. To disentangle country-specific determinants (such as, fundamentals) from benchmark effects, we use the variation across benchmark for the same country-time observation. Because the benchmark weight for each country moves according to its relative return, it can move to different degrees in the same direction in different benchmarks or it can even move simultaneously in opposite directions in different benchmarks. In fact, there is a significant

[19] While benchmark indexes have become very popular over the past years and there exist a high diversity of indexes, a large percentage of mutual funds declare a concentrated subset of these indexes. For instance, the MSCI Emerging Markets Index, the MSCI World Index, or the MSCI Europe Index are followed by 52 percent of our equity mutual fund sample. J.P. Morgan constructs many of the indexes bond funds follow. Appendix 2 provides more information on the benchmark index industry.

amount of variation in changes in benchmark weights for a given country at a particular point in time (Figure 1, Panel A).

A second typical problem in relating benchmark weights and mutual fund weights is that relative returns could play an important role. In particular, fluctuations in returns (a common shock) could affect both variables simultaneously. Moreover, reverse causality could arise if benchmark weights responded through returns to movements in fund allocations, instead of the other way around. However, the potential problem that relative returns introduce is ameliorated by the fact that benchmark indexes are built and adjusted using pre-determined criteria, which are not focused on the actions of fund managers. The fact that the benchmark indexes we use are exogenously rebalanced frequently (by including/excluding securities, changing free floats, the security loading, and the number of shares at the security level, and reclassifying countries into different groups) help address both the omitted variable and reverse causality concerns. 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.

We can effectively isolate the buy-and-hold from the exogenous components in each benchmark weight. In particular, the buy-and-hold component moves with relative returns and the exogenous component is driven by changes introduced by the benchmark provider. 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, $w_{ct}^B = w_{ct-1}^B(R_{ct}/R_t^B)$, 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:

$$w_{ct}^B = w_{ct-1}^B(R_{ct}/R_t^B) + E_{ct}^B. \quad (1)$$

By using both of these components separately, we can analyze how mutual funds respond to benchmark changes that come from returns and from exogenous events. This allows us to draw a causal impact from benchmark weights to mutual fund weights.

To illustrate the importance of these two components, we estimate the following regression that links changes in benchmark weights with changes in relative returns:

$$\Delta\ln(w_{ct}^B) = \theta_c^B + \theta_t^B + \theta_{ct} + \beta(r_{ct} - r_t^B) + \epsilon_{ct}^B, \quad (2)$$

where $\Delta\ln(w_{ct}^B)$ is the change in the log-weight of country *c* in benchmark *B* between *t-1* and *t*, $(r_{ct} - r_c^B)$ is the difference between the net return of country *c* and that of benchmark *B* at time *t*, and

ϵ_{ct}^{B} is the error term.[20] The coefficient of interest is β, which captures the relation between relative returns and percentage changes in benchmark weights. The parameters θ_{c}^{B}, θ_{t}^{B}, and θ_{ct} correspond to benchmark-country, benchmark-time, and country-time fixed effects that absorb non-parametrically those dimensions of the data. The inclusion of these fixed effects means that the identification comes exclusively from the time variation of the data (within a benchmark-country).

The results show that on average benchmark weights move almost one-to-one with relative returns (Table 1). Namely, changes in benchmark weights are on average driven by changes in a country's relative market capitalization and, as such, exhibit a high degree of pass-through from relative returns at the monthly frequency.[21] At the same time, relative returns are not the only important determinant of changes in benchmark weights. In fact, the R^2 of the various regressions are between 0.3 and 0.6 at the monthly level. The main reason for this is that benchmark companies revise the indexes regularly, leading to frequent re-weighting of all the countries, which is not captured by movements in market capitalization.[22] These are the exogenous reallocations mentioned above and are independent of the performance of a country.

Though most exogenous changes imply small reallocations, other ones are large. One example is the overall index redefinition by MSCI (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). These changes were effective in two steps, at the end of November 2001 and at the end of May 2002. In fact, the changes in E_{ct}^{B} (the residual component in Equation (1)) at those times were indeed much larger (due to the exogenous benchmark changes) than during the other months (Figure 1, Panel B). Another example of large episodes is the upgrade and downgrade of countries across the developed, emerging, and frontier country category.

A third methodological problem when analyzing benchmark changes is that additions to and deletions from indexes might not be information-free events (Denis et al., 2003) and that their aggregate effect is difficult to pin down. For example, when securities are added to an index, their expected earnings increase, and there are significant improvements in realized earnings, indicating that additions might not be information-free events (as argued in Shleifer, 1986). Our data, instead, allow us to shed light on this front and advance in the identification problem, complementing the existing literature.

[20] This derivation uses that the change in the market capitalization of a country relative to other countries in the same benchmark equals its relative gross return R_{ct}/R_{t}^{B} (assuming a constant number of securities in an index). It also uses that the log gross relative return, $\ln(R_{ct}/R_{t}^{B})$, is approximately equal to the difference in net returns $(r_{ct} - r_{t}^{B})$.

[21] 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.

[22] 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.

There are four distinct features of the upgrades and downgrades we analyze that help us differentiate between a pure benchmark effect and the information content effect. A first characteristic of our events is that, 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) capital flows and prices react. To the extent that capital flows and 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.

A second feature of our events is that they 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 receive a weight proportional to their market capitalization. For example, while an upgrade from the emerging to the developed category typically implies 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 managed across developed and emerging markets is roughly similar, in many cases an upgrade implies capital outflows, while a downgrade leads to capital inflows. To the extent that a benchmark upgrade is associated with capital outflows and with a price decline, we will be able to attribute this change to the benchmark effect related to the reallocation.

To estimate the capital flows by mutual funds during these events, we use:

$$Predicted\ Capital\ Flows_{ct} = A_{i\in\hat{B}} w_{ct}^{\hat{B}} - A_{i\in\tilde{B}} w_{ct}^{\tilde{B}} \quad (3)$$

Namely, we sum the total assets by funds in the new benchmark and multiply it by the country's benchmark weight, and we subtract the total assets in the exiting benchmark multiplied by the country's benchmark weight in that index. As long as $A_{i\in\hat{B}}$ and $A_{i\in\tilde{B}}$ are similar, upgrades could generate predicted outflows and downgrades predicted inflows, which goes against the informational effect of the announcement.[23]

A third feature of our data that is that we are able to analyze whether large upgrades and downgrades have effects on countries other than those being upgraded/downgraded. If a country, which has 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.

[23] Benchmark weights usually decrease by 10 times when a country goes from emerging to developed markets and between 20 and 40 times when a country goes from frontier to emerging markets.

A fourth advantage of the country upgrades and downgrades is that we can construct two different groups of price indexes for each country. A treatment group that, for example, is a stock market capitalization index formed with the stocks (debt instruments) in the benchmark of the country that is being upgraded or downgraded. And, a control group that, for example, is a market capitalization index of all the other stocks (debt instruments) that are excluded from the benchmark of the country affected by the change. This cross-sectional difference allows us to control for firms or governments that are exposed to the same local and global shocks, but are different in their exposure to benchmark changes.

4. Benchmarks and Asset Allocations

In this section, we estimate how benchmark weights affect mutual fund weights. Before starting with the systematic analysis, we provide the example of Israel, which illustrates the impact of benchmarks on the allocations of different types of funds. This change 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 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.

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. However, this example serves to make the point that there is a very tight connection between benchmarks and passive funds and a looser connection between benchmarks and active funds. It also shows that these exogenous events to the composition of benchmarks matter for mutual fund allocations. Namely, the reclassification of countries across benchmarks can trigger asset liquidation to reduce the country exposure, which is not necessarily driven by price effects.

4.1 Basic Specifications

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

More specifically, we estimate the parameters of the following specification:

$$w_{ict} = \theta_{ic} + \theta_{it} + \alpha_1 w_{ict}^{B} + \varepsilon_{ict} \quad (4)$$

where, w_{ict} is the weight for fund *i*, in country *c*, and at time *t*; w_{ict}^{B} is the respective benchmark weight that fund *i* follows; θ_{ic} and θ_{it} are fund-country and fund-time fixed effects. 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.[24] We run these regressions pooling all funds together and separating them by their degree of activism.[25]

To help interpret the estimates of α_1 in Equation (4), Appendix 1 discusses a possible portfolio decision framework following Roll (1992) and Brennan (1993), among others. The estimates show, on average, how much the weight of a country in a fund increases when its weight on the benchmark increases. Holding other things constant, a manager that is more risk averse or has a smaller tracking error will allocate its weights more closely to the benchmark weights. For managers that want to have a tracking error equal to zero, α_1 will be equal to one. For managers that do not follow the benchmark, α_1 will equal zero. For managers that partially follow the benchmark, α_1 will be between zero and one.

The results using all equity funds (Table 2, Panel A) show that, for a given group of funds, the estimated coefficients for benchmark weights (α_1 in Equation (4)) vary little across specifications. For instance, for the group of all funds and no fixed effects the coefficient obtained in the weight regressions is 0.82. Controlling for the two sets of fixed effects reduces the estimated coefficients for the total sample to 0.77. This suggests that part of the relation estimated without fixed effects is driven by the average levels of country and benchmark weights. For example, larger countries get higher weights across benchmarks and are also more prominent across funds. Controlling for this through the inclusion of fund-country fixed effects shifts the identification to variation in country weights relative to that average and is close to using only time-series variation. Nonetheless, coefficients are statistically significant and not very different from those without including fixed effects. In general, the overall fit of the regressions is good, both including and excluding fixed effects, ranging from about 0.73 to 0.91 for the total sample.

[24] 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.

[25] In Raddatz et al. (2014), we show results using log weights instead of weights. The results are very similar to those reported here.

Where we find meaningful variation in the estimates is when comparing funds with different degrees of activism. For instance, the coefficients decline monotonically with the degree of activism. 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 0.97, 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 when using fixed effects.

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. This is observed not only in the statistical and economic significance of the estimated coefficients, but also in the degree of variance of the data that can be explained by the benchmark. The lowest R^2 reaches about 40 percent for truly active funds. Once fund-country and fund-time fixed effects are included this explained variation increases to almost 85 percent for these funds. Thus, the evidence shows that even the most active funds follow the benchmark to a considerable degree, which might explain part of the aggregate consequences documented below.

The results for bond funds are qualitatively similar (Table 2, 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.

4.2 Is it Benchmark Weights?

Our baseline results show a tight relation between country weights and benchmark weights that goes beyond persistent country-fund allocations and fund-time shocks. In the rest of this section, we address several issues that arise with the estimation of Equation (3) and we try to establish that our main findings largely come from the causal impact that benchmark weights have on portfolio allocations.

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

$$\Delta w_{ict} = \theta_{ic} + \theta_{it} + \alpha_2 \Delta w_{ict}^{B} + \varepsilon_{ict} \quad (5)$$

The results suggest that, although the coefficients estimated for α_2 are a bit smaller (Table 2), they are similar to those estimated in levels. Moreover, they follow a similar pattern for different degrees of

activism. With the standard caveat of having significantly fewer observations, the results tend to be similar for bond funds.[26]

To control for the possibility that the mutual funds in our sample are following the industry and that the benchmark weights in Equation (3) are capturing the impact of an industry-level omitted variable, we add to the previous regressions the median weight across a specified segment of mutual funds. We obtain coefficients for benchmark weights of similar size and significance as those of our baseline results (Table 3, Panel A). Industry weights are positive and statistically different from zero, but their point estimate is much smaller than those of benchmark weights. For example, for all equity funds the coefficient of benchmark weights is 0.67 while that of industry weights is 0.36. Moreover, the R-squared coefficients increase only marginally by adding the industry weights.[27] That is, instead of benchmark weights mistakenly capturing the role of industry weights, these tests favor the explanation that the industry effects on mutual fund allocations might be driven by all funds following similar benchmarks.

We control for the fact that country fundamentals are an omitted factor both parametrically and non-parametrically. First, we include common macroeconomic variables available at monthly frequency such as industrial production, inflation, exchange rate changes, and stock market returns.[28] Second, we add a set of country-time fixed effects, absorbing non-parametrically all possible time-varying, country-specific shocks. This second approach identifies α exclusively from how the within-time variation in a country's weight across benchmarks relates to the within-time variation in its weight across funds that follow those different benchmarks.

The results show that after including standard high-frequency measures of macroeconomic variables as controls the coefficient from the benchmark index remains almost unaltered (Table 3).[29] Moreover, when including country-time fixed effects the results are similar to the ones previously reported. If anything, the coefficients for the more active funds diminish in size but those of the more passive ones remain high. These results show that, although benchmarks might be correlated with macroeconomic factors, there is an independent benchmark effect on mutual fund weights beyond these factors. These results are also illustrated in Figure 3, which plots the relation between weights and benchmark weights filtering out country-specific factors.

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

[27] In these regressions we rely on the dispersion of the industry behavior relative to each of the benchmarks to account for the possibility that if all funds in an industry follow similar benchmarks the median industry weights will be very similar to those of the benchmarks. In addition, in unreported regressions we find that, when including only industry weights, their coefficients are much larger. They only diminish when we include benchmark weights.

[28] In additional tests, we also included the expected values of the macroeconomic variables and obtained similar results.

[29] Explicit indexing bond funds are few and do not allow us to perform estimations with country-time fixed effects.

As discussed in Section 3, a typical identification problem is that of omitted variables. In particular, exogenous variations in returns are reflected in both the benchmark and mutual fund weights. Another potential problem is reverse causality. To address these concerns, we use regular exogenous changes to the benchmark indexes and study how these changes affect mutual fund weights. We exploit these changes in three ways that expand the type of evidence already presented for the case of Israel.

First, we substitute the benchmark weight in Equation (4) for its two components from Equation (1) and estimate the parameters of the following specification:

$$w_{ict} = \theta_{ic} + \theta_{it} + \alpha[w^B_{ict-1}(R_{ct}/R^B_{it})] + \beta E^B_{ict} + \varepsilon_{ict} \quad (6)$$

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 causal impact. The results show that the exogenous component has a significantly positive effect on mutual fund weights (Table 4). As expected, the relation is decreasing in the degree of activism, but even active fund allocations are positively correlated with this component of benchmark weights.

Second, we focus on large events, expanding the type of analysis conducted for Israel. 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 indexes are released in the months of February, May, August, and November.[30] We compute the exogenous component during these months as in Equation (6) 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.[31]

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 the following regression:

$$w_{ict} = \theta_{ic} + \theta_{it} + \alpha_N w^B_{ict} D_N + \alpha_E w^B_{ict} D_E + \varepsilon_{ict} \quad (7)$$

[30] For this estimation we exclude non-MSCI indexes.

[31] We also performed estimations with the 10th and 90th percentiles (instead of the 25th and 75th percentiles) and found qualitatively similar results. Alternatively, we computed estimations with dummies on these months of exogenous changes without finding evidence of changes in the relation between benchmark and country weights.

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 negligible in economic terms, and that the link between mutual fund weights and benchmark weights does not change during exogenous episodes (Table 4). That is, funds do not tend to respond differently to exogenous events or other changes in benchmark weights.

Third, we test how mutual funds responded to the MSCI methodological change event mentioned in Section 3. 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 4).[32]

From all these exercises we conclude that it is unlikely that our results on the benchmark effect are mainly driven by omitted variables or reverse causality. The evidence is consistent with a causal link from changes in benchmark weights to changes in fund weights.

5. Benchmarks and Capital Flows

In this section, we explore the consequences of our findings that benchmark weights affect mutual fund weights for the capital flows of these funds. We study the quantitative importance of various channels through which the benchmark effect impacts country flows and how it is reflected in mutual funds flows and aggregate capital flows.[33]

To capture the relation between benchmark weights and capital flows, we start from the following identity:

$$F_{ict} = w_{ict} F_{it} + \tilde{A}_{it}(w_{ict} - w_{ict}^{BH}) \quad (8)$$

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

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

[33] By capital flows we mean the flows of the funds we analyze into countries in which they invest and by aggregate capital flows those reflected in the aggregate official statistics of countries. Because we do not have aggregate detailed data for all countries, we cannot always determine to what extent these mutual fund flows are reflected in the balance of payments statistics at the country level. 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; Miao and Pant, 2012).

movements in total and relative returns. F_{it} is the net flow (in dollars) to fund *i* at time *t*, also known as injections or redemptions.

The two terms in the equation above relate to the two forces driving a fund's flows to a country: net inflows and reallocation. Net inflows to countries occur as net flows to the fund (F_{it}) are allocated across countries in proportion to the fund's desired country weight at that moment (w_{ict}).[34] The flows due to reallocation of existing assets, $\tilde{A}_{it}(w_{ict} - w_{ict}^{BH})$, arise from the difference between a fund's desired country weight and the buy-and-hold weight that mechanically results from the fund's previous allocation and movements in relative returns.

Equation (8) shows a direct connection between weights and country flows. Fund managers' decisions about country weights have a direct impact on country flows. For instance, an increase in the desired weight in a given country induces both a reallocation of existing assets to that country and more inflows to that country when the fund itself has injections.

To describe and quantify the various mechanisms through which the benchmark effect operates on flows, it is useful to normalize Equation (9) by lagged fund assets (A_{it-1}), obtaining:

$$f_{ict} = \frac{F_{ict}}{A_{it-1}} = w_{ict}\left(\frac{A_{it}}{A_{it-1}}\right) - w_{ict-1}R_{ct} = w_{ict}\gamma_{it} - w_{ict-1}R_{ct} \tag{9}$$

where $F_{it} + \tilde{A}_{it} = A_{it}$, $w_{ict}^{BH} = w_{ict-1}\,R_{ct}/R_{it}$, $f_{it} = F_{it}/A_{it-1}$, and $\gamma_{it} = f_{it} + R_{it}$.

Starting from Equation (9) along with the use of Equation (4) linking w_{ict} and w_{ict}^{B}, we can derive the response of flows to changes in several variables, and the role that the link between funds and benchmarks has on these responses. The derivations below summarize the responses of country flows to shocks to benchmark weights, fund flows, own-country returns, and third-country returns, respectively. All of them assume that variables as of *t-1* are kept constant. The effects on flows are:

$$\frac{\partial f_{ict}}{\partial w_{ict}^{B}} = \alpha(f_{it} + R_{it}) = \alpha\gamma_{it}, \tag{10}$$

$$\frac{\partial f_{ict}}{\partial f_{it}} = \alpha w_{ict}^{B} + \varepsilon_{ict}, \tag{11}$$

[34] We use the term "desired country weight" to refer to the weight the fund decides to have in that country considering all the possible constraints it faces. It does not mean to imply that it is the optimal weight that the fund would choose in an unconstrained or partially constrained scenario. For example, if the fund cannot change positions in a country to move to the portfolio suggested by its view of the country fundamentals because doing so would be too costly, we consider the desired outcome of this trade-off. Thus, this is a constrained optimal decision of the portfolio manager.

$$\frac{\partial f_{ict}}{\partial R_{ct}} = \alpha\gamma_{it}\frac{w^B_{ict-1}(1-w^B_{ict})}{R^B_{it}} + w_{ict}w_{ict-1}\left(1+\frac{\partial f_{it}}{\partial R_{it}}\right) - w_{ict-1} + \gamma_{it}\frac{\partial \varepsilon_{ict}}{\partial R_{ct}}, \quad (12)$$

$$\frac{\partial f_{ict}}{\partial R_{\tilde{c}t}} = -\alpha\gamma_{it}\frac{w^B_{ict}(1-w^B_{ict-1})}{R^B_{it}} + w_{ict}(1-w_{ict-1})\left(1+\frac{\partial f_{it}}{\partial R_{it}}\right) + \gamma_{it}\frac{\partial \varepsilon_{ict}}{\partial R_{\tilde{c}t}}. \quad (13)$$

Using Equations (10)-(13), we discuss and illustrate the different effects of benchmarks on capital flows. While Equation (10) directly shows the response of flows to changes in benchmark weights, the other benchmark effects on flows appear in the first terms of Equations (11)-(13).[35]

Equation (10) captures the "direct benchmark effect," or the direct impact of changes in benchmark weights. The impact on flows of an exogenous change in benchmark weights (i.e., a change not driven by returns) is proportional to the gross growth in fund assets, γ_{it} or $(f_{it}+R_{it})$. The proportionality depends on how closely fund weights track benchmark weights, as captured by the α estimated in Section 4.

The direct benchmark effect helps explain, for example, the counterintuitive outflows when Israel was upgraded from the MSCI Emerging Markets Index to the MSCI World Index. To show the effect of the exogenous change in benchmark weights we compare the explicit indexing funds tracking these two indexes (Figure 4). The direct benchmark effect captures almost all the variation in country flows for both types of funds, which occur due to all the reallocations right at the time of the switch. 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. Emerging market funds withdrew 2 billion U.S. dollars from Israel while developed market funds injected 160 million.

The direct benchmark effect can also generate significant shocks and reallocations across countries, in the sense that changes in other countries bring home changes to the rest of the countries sharing the same benchmark, producing contagion-like effects. For example, the upgrade of Qatar and U.A.E. from frontier to emerging status in May 2014 triggered large positive direct benchmark effects 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 5 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.

[35] The derivations take w_{ict-1} as given and use the following expressions: $w_{ict} = \alpha w^B_{ict} + \varepsilon_{ict}$, $R_{ict} = \sum_c w_{ict-1}R_{ct}$, and $R^B_{ict} = \sum_c w^B_{ict-1}R_{ct}$.

Equation (11) shows the "sensitivity effect" in its first term, which captures that an increase (decrease) in a fund's inflows will increase (decrease) the fund's capital flows to a country proportionally to the country's benchmark weight. Thus, benchmark weights determine the sensitivity of country flows to fund flows. The last term in this equation corresponds to the response of the active part of a fund portfolio to the shock. The sensitivity effect shows that countries with higher weights in a benchmark are more prone to more inflows (outflows) when the funds receive injections (redemptions), possibly explaining why large countries might be subject to large changes in capital flows regardless of their fundamentals. Figure 6 illustrates this effect by showing the flows to Brazil and India from explicit indexing funds tracking the MSCI Emerging Markets Index against the flows into each of these equity funds. The relation of country and fund flows is depicted by two points in time, when each country had different benchmark weights. The relation becomes steeper as each country's benchmark weight increases, as shown in Equation (11).

For a more systematic analysis of the sensitivity effect, we regress country flows against benchmark weights multiplied by fund flows (Table 5). There is a positive and significant relation between the two variables, which monotonically decreases with the degree of activism. For example, on average across all equity funds, an injection of one dollar to a fund is associated with country flows of 0.74 dollars times the benchmark weight. Every dollar an explicit fund receives is associated with 84 cents allocated proportionally to the benchmark weight. This number declines for funds that are more active, being 0.69, 0.55, and 0.41 for closet indexing, mildly active, and truly active funds, respectively. The relation is also maintained when we control for different sets of fixed effects. Under this estimation, a change in the benchmark weight changes the sensitivity of country flows to fund flows as indicated above.

Equation (12) shows the response of country flows to own-country returns. The first term measures the "amplification effect," according to which an increase in a country's return has a positive impact on its flows. In this case, the link to a benchmark induces inflows (outflows) into countries experiencing positive (negative) return shocks when a fund expands. The second term captures the extent to which the increase in returns increases the value of the fund's existing assets and, if fund flows respond to returns, also its injections. The third, negative term in this expression comes from the direct effect of country returns on buy-and-hold weights and, for a given benchmark weight, reallocations.

Equation (13) displays the response of country flows to third-country returns. The first term shows the "contagion effect" associated with returns.[36] This effect is qualitatively similar to that in Equation (12), but in this case the effect is negative because an increase in every other country's returns reduces a country's relative market capitalization (and thus its benchmark weight). Therefore, it brings home shocks to returns occurring to other countries that share the benchmark. This form of contagion could be benign because negative shocks to other countries bring inflows to the unaffected one (although positive shocks to other countries bring outflows to the unaffected one). However, even under

[36] This contagion effect is different from the "margin call" and other effects described in the literature and occur in the absence of leverage (Calvo and Mendoza, 2000; Kodres and Pritsker, 2002; Manconi et al., 2012; Hau and Lai, 2013).

negative shocks to other countries it is possible to have outflows in the unaffected country if the effect on the second term is large enough, namely, if flows to the fund decline strongly enough in response to a shock to its returns. Notice that, when this happens and α is small, the second term in Equation (13) dominates and the contagion is no longer benign.

A corollary of Equation (11) to (13) and the estimates in Figure 6 and Table 5 is that changes in benchmark weights (or returns) change the sensitivity of country flows to fund flows. This leads to interesting dynamic interactions between various effects. For instance, a decline in the returns of the rest of the countries sharing a benchmark with country A will induce a higher benchmark weight for country A. But the same increase in benchmark weights makes country A more vulnerable to future movements in fund flows. If in reaction to the initial shock there are large withdrawals of funds, country A would be more affected even though it was the country that performed relatively well. Namely, during good times (when funds are receiving injections), a country that does relatively well gets more country flows. But during bad times, a country that does relatively poorly (its weight decreases) is less affected by the outflows.

Some of these effects can be illustrated by the evolution of country flows to China and Russia from explicit indexing funds following the MSCI Emerging Markets Index, before the global financial crisis and during the European crisis (Figure 7). We also show a similar analysis for Spain and Ireland in the explicit indexing funds tracking the MSCI Europe, Australasia, and, Far East Index. Before the global financial crisis China and Russia had similar benchmark weights and flows. However, during the global financial crisis China did relatively well compared to Russia, which increased its benchmark weight importantly. During the peak of the European crisis, emerging market funds had net withdrawals, which translated into much larger outflows in China than in Russia (proportionally to their weights). That is, China was penalized by its stronger performance. A similar pattern is observed for developed countries. Spain and Ireland received inflows during the pre-crisis, with the former receiving four times more flows than Ireland according to its benchmark weight. Still, Ireland received around 80 million U.S. dollars in that period. Immediately after the crisis, Ireland did relatively worse than Spain, and the subsequent outflows were smaller in Ireland than in Spain.

The effects described in this section affect different types of funds differently. For closed-end explicit indexing funds, the country flows are different from zero only when there is a direct benchmark effect. For open-end index funds, all the channels operate because of the flows the funds receive. For non-explicit indexing funds, the total country flows depend on the level of activism and how the manager allocates the active part of the portfolio. However, the effects described above illustrate how their country flows respond to different shocks to the extent that they follow benchmark indexes.

We perform simulations to illustrate the quantitative importance of the various manifestations of the benchmark effect. We impute values to the different parameters involved in Equations (10)-(13) using the medians and interquartile ranges of the actual data. Table 6 yields order-of-magnitude estimates for the four effects described above, where a shock entails a move from the 25th to the 75th percentile

for each variable in our sample. The different manifestations of the benchmark effect result in non-trivial variations in country flows. The simulation shows that the direct benchmark effect has the highest potential to induce inflows (or outflows). For instance, a 1.5 percentage points increase in a country's benchmark weight (from 4 to 5.5 percent in this case) results in an inflow corresponding to approximately 30 percent of a fund's total assets allocated to that country.[37] On the other extreme, the sensitivity effect has the lowest impact (a 3.2 percent increase in response to a 4 percentage point increase in fund flows). This is reasonable because, as its name puts it, the direct benchmark effect has a direct impact on flows. An exogenous, independent change in a country's benchmark weight induces net inflows and reallocation effects to that country in detriment of all other countries. In contrast, an increase in fund flows is shared across all countries where a fund invests, more or less proportionally to the usually small country weights. The sizes of the amplification and contagion effects are identical in our baseline parameterization. They both lie between the direct benchmark and sensitivity effects. The reason is that these effects work indirectly through the response of benchmark weights to each of the changes. These responses depend on the initial level of returns and benchmark weights, but it is usually less than one-for-one.[38]

Because the most important channel at work is the direct benchmark effect, we examine two cases for which we have good data to illustrate whether aggregate capital flows move in a way consistent with that of mutual fund flows. In particular, we analyze the episodes of Colombia and Israel. The former is an episode from Colombia's debt market in which J.P. Morgan announced on March 19, 2014 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. The second episode is the one discussed above, when MSCI upgraded Israel from emerging to developed market status.

Using data from national sources, we analyze how capital flows moved around these two episodes. During the time of the benchmark change, the share of Colombian TES bonds held by foreigners increased by a factor of around 2.33 (Figure 8, Panel A). This was driven by an increase in the total purchases of these securities by foreigners, showing a marked difference with previous periods. In the case of Israel, the balance of payments registered a large equity outflow when the upgrade became effective (Figure 8, Panel B). This outflow is similar in size to the outflows observed by mutual funds, and 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,

[37] This is an approximation because we divide Δf_{ict} by w^B_{ict-1}, and thus take it as a percentage of a fund's total assets in a country if it perfectly followed the benchmark.

[38] The various effects described above can interact and build up. A shock to a country's returns increases its benchmark weight and induces inflows through the amplification effect. If these inflows are important enough to have an impact on returns, a feedback loop might be established. Also, a current increase in benchmark weights, either through the direct benchmark effect or other channels will increase the future response of that country's flows to injections through the sensitivity effect. Moreover, with the exception of the direct benchmark effect, other effects could be present for funds that do not follow a benchmark ($\alpha = 0$) through the response of the non-benchmark component to each of the shocks. What is particular of the benchmark effect is that the form benchmarks are calculated guarantees that the response of flows to an own-country shock through benchmarks is positive, and it is negative for shocks to the returns to other countries. For the non-benchmark component, the sign of these responses is indeterminate.

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. Because the equity capital flows move in a different direction than the upgrade would a-priori suggest, this type of episode seems helpful in separating the information content effect from the benchmark change effect, as discussed in Section 3. Moreover, both of these episodes illustrate how international capital flows in the aggregate can be related to the direct benchmark effect.

6. Benchmarks and Asset Prices

In this section, we analyze how asset prices perform around benchmark changes by focusing on cases where the direct benchmark effect is large, such as, country upgrades and downgrades in both debt and equity markets. Importantly, for each country we compare how stocks/debt instruments included in the shocked benchmarks perform relative to the securities not included in those benchmarks. Before showing the systematic analysis, we provide examples that illustrate the behavior of asset prices.

As stated above, Israel was upgraded from the MSCI Emerging Markets Index to the MSCI World Index at the end of May 2010. Considering both the emerging and developed market funds, our direct benchmark effect calculations predict outflows of around 2 billion U.S. dollars. Indeed, the Israeli stocks in the MSCI index fell almost 4 percent in the week of the announcement and significantly underperformed the stocks not included in the index, even when the news was an upgrade (Figure 9, Panel A). 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, versus a 1.5 fall in the Israeli stocks outside the index. Still a month after the effective date, there was a considerable gap between these two groups of stocks (Figure 9, Panel B).

Another interesting case is that of Argentina's downgrade by MSCI from the emerging to the frontier country category. The event was first announced on February 20, 2009, with the effective date at the end of May 2009. Since liquidity in Argentina's stock market was not up to MSCI requirements, the company announced at the same a change in the underlying securities. As of the effective date, the American Depositary Receipt (ADR) counterparts would replace the stocks included in Argentina's index. Thus, we analyze the premium between the ADRs and the corresponding underlying stocks (Figure 10, Panel A). The premium fluctuated around zero before the announcement, and increased to almost 20 percent a couple of months later, even when the announcement was a downgrade. Moreover, there was a significant increase from 22 to 32 percent in the days previous to the effective date.

The episode in Colombia described in Section 5 shows that the direct 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). A week after the announcement, the Colombian local currency bonds that received the weight increase were up almost 2 percent compared to the other local currency bonds. And the gap between the two types of bonds remained afterwards, even though it was non-existent before (Figure 10, Panel B).[39]

The cases of Qatar and U.A.E. described in Section 5 illustrate the impact of the direct benchmark effect on the prices of these two countries as well as those of other countries in the MSCI Frontier Market Index. For Qatar and U.A.E., capital inflows of around 800 million U.S. dollars were expected. In fact, both during the announcement date and before the effective date (when most of the buying from the emerging market funds happened) there were sharp increases in prices in the MSCI stocks of Qatar and U.A.E. relative to the non-MSCI stocks of these two countries (Figure 11). Because both 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.[40] The within 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 relative to those outside the index (Figure 12, Panel A). Moreover, coinciding with the movements in capital flows described in Figure 5 around the effective date, the asset prices of firms included in the MSCI Frontier Market Index increased compared to those of firms outside the index (Figure 12, Panel B). These jumps occurred during the days when passive funds rebalanced their portfolios.

The episodes described above show how asset prices perform when benchmarks change. The movements observed are consistent with reallocations by mutual funds that shift the demand for the assets in the benchmarks, ultimately affecting prices. Some of these price effects take place immediately after the announcements become public; but prices also react around the effective date. Moreover, the predictions about the impact of the benchmarks changes on capital flows help understand the reactions of asset prices.

6.1 Event Study Analysis

To study more systematically the direct benchmark effect, we conduct an event study analysis of asset price movements around large episodes related to the direct benchmark effect in both debt and equity markets. For each episode, we identify both the announcement and effective dates. We use a range of 66 well-identified episodes across developed, emerging, and frontier countries (listed in Appendix Table 3) that allow us to have a treatment and a control group. Moreover, we predict whether the direct benchmark effect is expected to affect the country positively or negatively in terms of capital flows using Equation (3), and then test the reaction of asset prices.

[39] For this event, we only have the announcement date, due to the fact that J.P. Morgan established an incremental increase (over four months) and did not disclose the exact dates of the increments.

[40] 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 (MSCI Barra, 2014).

The episodes we use can be divided into four types. First, MSCI upgrades/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. As the treatment group, we study the behavior of the MSCI stock market index of the countries that receive the grade change. As a control group, we construct a market capitalization index with all the firms listed in the country that are not part of the MSCI country index.

Second, we analyze the contagion from Qatar and U.A.E. to 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 downweight experienced by the two upgraded countries. As above, we analyze a window starting two weeks before the effective date, up to the following 30 business days. The treatment and control groups are analogous to those used for the MSCI upgrades/downgrades. 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 five different episodes from Citigroup and J.P. Morgan, the two largest debt index producers at the international level. In these events, the announcement date is known, but the effective date is not always disclosed (and we do not have benchmark data to define it). Therefore, we use only the announcement date when we do not have the effective date. The changes involve the addition of local currency denominated government bonds in the indexes constructed by these two companies. The treatment group is the J.P. Morgan GBI-EM country index, which is a market capitalization based index of the different local currency government bonds. The control group is the J.P. Morgan EMBI country index, which comprises foreign currency government bonds. We analyze total returns from these indexes in U.S. dollars. Because all the countries we analyze are in some way upgraded, index-tracking funds are expected to reallocate funds into a specific type of debt in these countries, according to the direct benchmark effect.

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.[41] Because the movements between investment and non-investment grade should affect all the existing government debt of a country, we analyze the broadest possible index as the treatment group, the J.P. Morgan EMBI Country Index. As control, we use the J.P. Morgan EMBI Global Index.

For the event study, 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 treated group minus those of the control group. Abnormal returns are the residuals of a regression of the returns of the treated group relative to the returns of the control group 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.[42]

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 7, Panel A). Raw returns increase by 2.97 percent at their peak. Even excess and abnormal returns show an almost 2 and 1.6 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 7, 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 permanent. When considering only the effective date (Table 7, Panel C), there are no effects in the two weeks prior to the effective date.[43] However, during the week prior to the effective date, the average cumulative returns (of all types) increase significantly: from 1.1 to 4.9 percent in raw returns, from 1 to 3.5 percent in excess returns, and from 0.5 to 3.5 percent in abnormal returns. Even 30 business days after the initial effective date, the effect does not tend to vanish, indicating that there is not a complete reversal of the effect.

[41] 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.

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

[43] 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.

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.

7. Conclusions

This paper shows how benchmarks affect asset allocations, capital flows, and asset prices 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 asset allocations, capital flows, and prices not only because funds explicitly declare a benchmark to compare their performance, but also because funds with different degrees of activism tend to follow their benchmark asset allocation rather closely, though to different extents. Benchmark weights also receive frequent, exogenous revisions by the companies that construct them. These benchmark changes affect the mutual fund portfolios, their reallocations, and their sensitivity to injections or redemptions. The effects of benchmarks on mutual fund allocations are significant even after controlling for industry effects, country-time effects, and macroeconomic fundamentals, and after addressing potential omitted variables and reverse causality problems. The decisions about allocations impact capital flows through different channels, and the upgrades and downgrades of countries are associated with significant changes in asset prices.

These results can explain some of the findings documented in the literature, as well as sometimes counterintuitive and unexpected movements in cross-country investments and asset prices. First, the reclassification of countries across benchmarks has significant direct reallocation effects on capital flows, given that assets under management and country weights differ across benchmarks and types of funds. 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 when upgraded and capital inflows when 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.

Second, sensitivity, amplification, and contagion effects can occur even when fundamentals or the absolute returns of a country do not warrant them. For example, during global crises, some countries might suffer the curse of being large or having done relatively well. That is, during large retrenchments,

countries with larger weights will suffer more withdrawals (although in some cases their larger market capitalization might help them withstand the shock). During generalized declines in asset prices, countries whose prices fall less than other countries in the same benchmark will see their benchmark weight increase and, thus, will be more exposed to subsequent withdrawals by the underlying investors of the funds that follow that benchmark. During good times, when funds receive injections, countries that do relatively well will receive more inflows, witnessing an amplification of the shock that increased its relative return.

More generally, as a country becomes more relevant in a benchmark, it becomes more sensitive to shocks because injections and redemptions have stronger effects on the capital flows to this country. While this effect might be entirely driven by fundamentals (e.g., by the country growing relatively fast), it can also be driven by non-fundamental factors such as bubbles, self-fulfilling expectations, shocks to other countries sharing the same benchmark, or exogenous decisions made by the company constructing the benchmark. For example, if investors suddenly favor a country and drive its asset valuations upward, the subsequent injections that the relevant mutual funds receive will be more tilted toward this country. This, in turn, might generate more upward pressure on prices, reinforcing the effect. This positive-feedback loop increases as more funds follow benchmark indexes more closely over time, generating pro-cyclicality and possibly explaining (along with other factors) some of the widely documented momentum, whereby investment reallocations are related to past returns. Furthermore, the link between benchmarks and market capitalization could impinge a pro-cyclical bias in benchmark allocations because countries that do relatively well will tend to gain weight in a benchmark relative to the rest.

Third, by impacting international capital flows, benchmark changes at the country level are associated with price effects. In particular, stocks and debt instruments in benchmark indexes increase or decrease in value relative to other instruments from the same country that do not belong to those indexes, 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 likely to expand. First, the evidence suggests that funds worldwide are becoming less active (Cremers et al., 2013; The Economist, 2014b) and the number of benchmarks are increasing rapidly. Therefore, the types of benchmark effects documented here are expected to grow over time. Second, models of international asset allocation and capital flows that use macroeconomic fundamentals and other important factors might start incorporating the type of mechanisms described in this paper. Third, benchmarks offer several advantages for researchers. Among other things, they help compare individual portfolios against some well-known specific asset allocations, make portfolios allocations

easier to evaluate, and allow for the identification of various effects. Fourth, in countries with a limited number of assets, benchmark effects could pose difficulties. For example, countries that improve their standing by conducting a better fiscal policy will increase the probability of being included in more indexes, but this can make it difficult for bond investors to invest in these countries because the better fiscal policy reduces the number of instruments available for investment. It might also complicate the conduct of monetary policy as investors purchase the central bank instruments in lieu of the disappearing treasury ones. Fifth, although benchmark effects shed light on the behavior of heterogeneous investors, the general equilibrium effects still need to be understood. For example, does the use of benchmarks as a disciplining mechanism coordinate manager decisions across institutions, generating herding, information cascades, and other systemically important effects? Given that some funds try to replicate their benchmark index almost mechanically, do other funds or sophisticated investors anticipate or compensate for their reaction? Are there wealth transfers? Or do they also follow these benchmarks? How do funds manage their active portfolio? What are the effects of benchmarks on capital market financing, the returns to retail investors, and the real economy?

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Table 1. Log Difference Country Benchmark Weights

This table shows the results of OLS regressions of the log difference of country benchmark weights on relative returns. Panel A shows the 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 parentheses and clustered at the benchmark-time level. *, **, and *** denote statistical significance at 10, 5, and 1 percent, respectively.

	Dependent Variable: Log Difference Country Benchmark Weights							
Explanatory Variables	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

Table 2. Weights vs. Benchmark Weights

This table presents OLS regressions of mutual fund country weights against benchmark country weights with different sets of fixed effects. Panel A displays results for equity funds and Panel B for bond funds. Funds are divided by degree of activism. Results are presented in levels and differences. Estimations in levels do not contain observations where both weights and benchmark weights are zero. Standard errors are in parentheses and clustered at the benchmark-time level. *, **, and *** denote statistical significance at 10, 5, and 1 percent, respectively.

	Total Sample	Degree of Activism			
Explanatory Variables		Explicit Indexing	Closet Indexing	Mildly Active	Truly Active
A. Equity Funds					
Dependent Variable: Weights					
Benchmark Weights	0.823 ***	0.971 ***	0.961 ***	0.867 ***	0.598 ***
	(0.002)	(0.003)	(0.002)	(0.002)	(0.004)
Fund-Country Fixed Effects	No	No	No	No	No
Fund-Time Fixed Effects	No	No	No	No	No
Number of Observations	2,524,798	42,029	577,241	988,198	917,330
R-Squared	0.725	0.975	0.941	0.817	0.401
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
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: 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
B. Bond Funds					
Dependent Variable: Weights					
Benchmark Weights	0.714 ***	0.671 ***	0.876 ***	0.750 ***	0.392 ***
	(0.006)	(0.008)	(0.006)	(0.007)	(0.013)
Fund-Country Fixed Effects	No	No	No	No	No
Fund-Time Fixed Effects	No	No	No	No	No
Number of Observations	153,402	723	57,338	57,335	38,006
R-Squared	0.360	0.863	0.679	0.419	0.077
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: 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

Table 3. Weights vs. Benchmark Weights, Controlling for Omitted Variables

This table presents OLS regressions of mutual fund country weights against benchmark country weights and different control variables. 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. Macro variables include four-month lagged industrial production growth, two-month lagged inflation, exchange rate growth, and stock market returns. Panel A displays results for equity funds and Panel B for bond funds. Funds are divided by degree of activism. Standard errors are in parentheses and clustered at the benchmark-time level. *, **, and *** denote statistical significance at 10, 5, and 1 percent, respectively.

	Total Sample	Degree of Activism			
Explanatory Variables		Explicit Indexing	Closet Indexing	Mildly Active	Truly Active
A. Equity Funds					
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
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	0.792 ***	0.928 ***	0.902 ***	0.766 ***	0.582 ***
	(0.007)	(0.010)	(0.009)	(0.010)	(0.010)
Macro Variables as Controls	Yes	Yes	Yes	Yes	Yes
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	1,164,590	26,558	321,412	464,292	352,328
R-Squared	0.943	0.997	0.976	0.929	0.898
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)
Macro Variables as Controls	No	No	No	No	No
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
B. Bond Funds					
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	0.779 ***	0.529 ***	0.921 ***	0.804 ***	0.385 ***
	(0.021)	(0.041)	(0.021)	(0.031)	(0.047)
Macro Variables as Controls	Yes	Yes	Yes	Yes	Yes
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	62,266	532	26,103	23,415	12,216
R-Squared	0.822	0.991	0.867	0.810	0.772
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

Table 4. Weights vs. Benchmark Weights: Exogenous Events

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 normal times 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. Normal times are observations within those tails plus all the months with no revisions. Test of difference in coefficients is a linear test between the coefficients of benchmark weights in normal times and event times. The bottom part for equity funds reports OLS regressions 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 degree of activism. Estimations in levels do not contain observations where both weights and benchmark weights are zero. Standard errors are in parentheses and clustered at the benchmark-time level.*, **, and *** denote statistical significance at 10, 5, and 1 percent, respectively.

	Total Sample	Degree of Activism			
Explanatory Variables		Explicit Indexing	Closet Indexing	Mildly Active	Truly Active
A. Equity Funds					
Dependent Variable: Weights					
Buy-and-Hold Benchmark Weight	0.813 ***	0.924 ***	0.906 ***	0.799 ***	0.628 ***
	(0.007)	(0.012)	(0.009)	(0.009)	(0.010)
Exogenous Component	0.494 ***	0.531 ***	0.587 ***	0.499 ***	0.326 ***
	(0.041)	(0.085)	(0.046)	(0.054)	(0.066)
Fund-Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Fund-Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
Number of Observations	1,377,388	31,620	383,187	549,793	412,788
R-Squared	0.932	0.996	0.972	0.918	0.880
Dependent Variable: Weights					
Benchmark Weights*Normal Times	0.830 ***	0.933 ***	0.924 ***	0.829 ***	0.637 ***
	(0.008)	(0.012)	(0.010)	(0.010)	(0.010)
Benchmark Weights*Event Times	0.835 ***	0.929 ***	0.926 ***	0.836 ***	0.641 ***
	(0.008)	(0.012)	(0.010)	(0.010)	(0.010)
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	0.005 **	0.004 **	-0.002	-0.007 **	-0.004
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
B. Bond Funds					
Dependent Variable: Weights					
Buy-and-Hold Benchmark Weight	0.800 ***	-	0.950 ***	0.837 ***	0.375 ***
	(0.019)	-	(0.018)	(0.029)	(0.043)
Exogenous Component	0.731 ***	-	0.927 ***	0.742 ***	0.240 **
	(0.052)	-	(0.052)	(0.074)	(0.117)
Fund-Country Fixed Effects	Yes	-	Yes	Yes	Yes
Fund-Time Fixed Effects	Yes	-	Yes	Yes	Yes
Number of Observations	76,964	-	32,043	28,861	15,420
R-Squared	0.799	-	0.850	0.781	0.754
Dependent Variable: Weights					
Benchmark Weights*Normal Times	0.812 ***	-	0.962 ***	0.849 ***	0.393 ***
	(0.019)	-	(0.017)	(0.028)	(0.044)
Benchmark Weights*Event Times	0.811 ***	-	0.944 ***	0.846 ***	0.428 ***
	(0.019)	-	(0.017)	(0.028)	(0.044)
Fund-Country Fixed Effects	Yes	-	Yes	Yes	Yes
Fund-Time Fixed Effects	Yes	-	Yes	Yes	Yes
Number of Observations	87,302	-	36,500	32,863	17,263
R-Squared	0.778	-	0.840	0.759	0.724
Test of Difference in Coefficients	0.001	-	0.018 **	0.002	-0.034 **

Table 5. Country Flows vs. Benchmark Flows

This table presents OLS regressions of country flows in billions of U.S. dollars against benchmark weights multiplied by fund flows with different sets of fixed effects. Panel A displays results for equity funds and Panel B for bond funds. Funds are divided by fund type and degree of activism. Explicit indexing bond funds are not included due to the low number of observations. Standard errors are in parentheses and clustered at the benchmark-time level. *, **, and *** denote statistical significance at 10, 5, and 1 percent, respectively.

Explanatory Variables	Total Sample	Degree of Activism			
		Explicit Indexing	Closet Indexing	Mildly Active	Truly Active
A. Equity Funds					
	Dependent Variable: Country Flows				
Benchmark Weight*Fund Flows	0.744 ***	0.839 ***	0.690 ***	0.547 ***	0.407 ***
	(0.028)	(0.036)	(0.014)	(0.014)	(0.017)
Fund-Country Fixed Effects	No	No	No	No	No
Fund-Time Fixed Effects	No	No	No	No	No
Country-Time Fixed Effects	No	No	No	No	No
Number of Observations	962,344	12,895	286,890	378,626	283,933
R-Squared	0.296	0.627	0.177	0.081	0.045
	Dependent Variable: Country Flows				
Benchmark Weight*Fund Flows	0.700 ***	0.794 ***	0.644 ***	0.468 ***	0.254 ***
	(0.035)	(0.043)	(0.018)	(0.018)	(0.018)
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	962,344	12,895	286,890	378,626	283,933
R-Squared	0.410	0.700	0.299	0.192	0.214
	Dependent Variable: Country Flows				
Benchmark Weight*Fund Flows	0.739 ***	0.854 ***	0.676 ***	0.532 ***	0.381 ***
	(0.031)	(0.045)	(0.013)	(0.015)	(0.016)
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	960,928	12,895	285,897	378,101	284,035
R-Squared	0.331	0.770	0.213	0.132	0.130
B. Bond Funds					
	Dependent Variable: Country Flows				
Benchmark Weight*Fund Flows	0.634 ***	-	0.730 ***	0.610 ***	0.615 ***
	(0.036)	-	(0.036)	(0.043)	(0.082)
Fund-Country Fixed Effects	No	-	No	No	No
Fund-Time Fixed Effects	No	-	No	No	No
Country-Time Fixed Effects	No	-	No	No	No
Number of Observations	59,415	-	25,327	23,440	10,648
R-Squared	0.066	-	0.099	0.068	0.049
	Dependent Variable: Country Flows				
Benchmark Weight*Fund Flows	0.369 ***	-	0.683 ***	0.371 ***	0.120
	(0.051)	-	(0.053)	(0.065)	(0.113)
Fund-Country Fixed Effects	Yes	-	Yes	Yes	Yes
Fund-Time Fixed Effects	Yes	-	Yes	Yes	Yes
Country-Time Fixed Effects	No	-	No	No	No
Number of Observations	59,415	-	25,327	23,440	10,648
R-Squared	0.251	-	0.236	0.236	0.274
	Dependent Variable: Country Flows				
Benchmark Weight*Fund Flows	0.551 ***	-	0.748 ***	0.586 ***	0.585 ***
	(0.045)	-	(0.035)	(0.050)	(0.101)
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	59,773	-	25,327	23,440	10,648
R-Squared	0.147	-	0.242	0.186	0.230

Table 6. Quantitative Benchmark Effects on Capital Flows

This table presents the calibration for each of the effects presented in Section 5. Parameters are calibrated according to the median values in our sample. Panel A presents the calibration for each parameter and Panel B displays the quantitative benchmark effects for shocks on different variables.

A. Calibration

Parameters	
α	0.8
γ_{it}	1.0
w_{ict}^{B}	4.0
w_{ict-1}^{B}	4.0
R_{ct}	1.01
R_{it}^{B}	1.01

B. Quantitative Effects

	Shock	Value (percentage points)	Δf_{ict}	$\Delta(f_{ict}/w_{ict-1}^{B})$ (in %)
Direct Benchmark Effect	Δw_{ict}^{B}	1.5	1.212	30.3
Sensitivity Effect	Δf_{it}	4.0	0.128	3.2
Amplification Effect	ΔR_{ct}	10.0	0.307	7.7
Contagion Effect	$\Delta R_{c't}$	10.0	-0.307	-7.7

Table 7. Event Study Analysis: Cumulative Returns

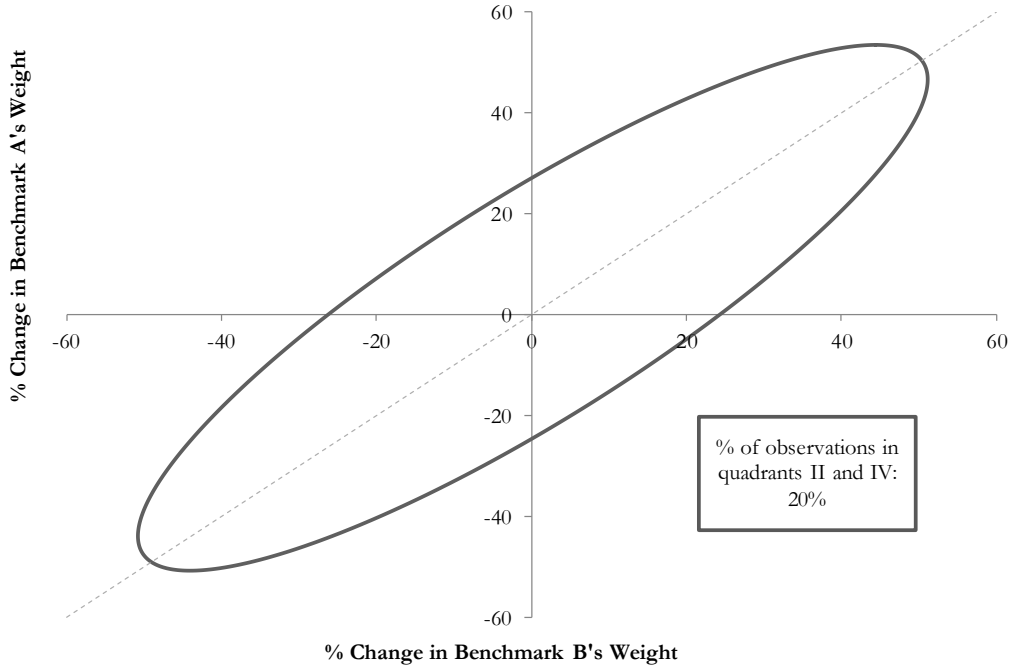
This table presents the results from an event study analysis of all the episodes of large direct benchmark changes. All returns are cumulative returns starting at the first day presented in the table. Raw returns are the net returns of the stock/debt market index for the country. Excess returns are stock/debt market returns minus the control group index. Abnormal returns are residuals of an OLS regression of the stock/debt market index returns versus the control group returns. Panel A presents the returns for the pooled events from the announcement and effective dates. Panel B shows results for the announcement dates. Panel C depicts results for the effective dates. Announcement and effective dates are denoted by tA and tE, respectively. Standard errors are in parentheses. *, **, and *** denote statistical significance at 10, 5, and 1 percent, respectively.

Time	Raw Returns	Excess Returns	Abnormal Returns
A. Announcement (t_A) and Effective Date (t_E)			
Returns on (t_A-2) and Returns on (t_E-12)	0.065	-0.011	-0.164
	(0.291)	(0.277)	(0.203)
Cumulative Returns between (t_A-2) and (t_A) and Cumulative Returns between (t_E-12) and (t_E-10)	0.916 ***	0.633 ***	0.455 **
	(0.312)	(0.256)	(0.232)
Cumulative Returns between (t_A-2) and (t_A+5) and Cumulative Returns between (t_E-12) and (t_E-5)	1.481 ***	1.105 ***	0.839 ***
	(0.360)	(0.320)	(0.276)
Cumulative Returns between (t_A-2) and (t_A+10) and Cumulative Returns between (t_E-12) and (t_E)	2.700 ***	1.629 ***	1.442 ***
	(0.501)	(0.431)	(0.416)
Cumulative Returns between (t_A-2) and (t_A+15) and Cumulative Returns between (t_E-12) and (t_E+5)	2.971 ***	2.047 ***	1.644 ***
	(0.593)	(0.485)	(0.462)
Cumulative Returns between (t_A-2) and (t_A+20) and Cumulative Returns between (t_E-12) and (t_E+15)	2.480 ***	1.793 ***	1.207 **
	(0.641)	(0.502)	(0.569)
Cumulative Returns between (t_A-2) and (t_A+30) and Cumulative Returns between (t_E-12) and (t_E+20)	2.282 ***	1.819 ***	0.911 *
	(0.698)	(0.556)	(0.596)
Number of Observations	66	66	66
B. Announcement Date (t_A)			
Returns on (t_A-2)	-0.033	-0.193	-0.178
	(0.233)	(0.212)	(0.193)
Cumulative Returns between (t_A-2) and (t_A)	1.525 ***	0.990 ***	0.958 ***
	(0.319)	(0.176)	(0.164)
Cumulative Returns between (t_A-2) and (t_A+5)	1.748 ***	1.185 ***	1.075 ***
	(0.388)	(0.278)	(0.252)
Cumulative Returns between (t_A-2) and (t_A+10)	2.045 ***	1.033 **	0.871 *
	(0.703)	(0.517)	(0.555)
Cumulative Returns between (t_A-2) and (t_A+15)	2.614 ***	1.706 ***	1.309 **
	(0.703)	(0.588)	(0.561)
Cumulative Returns between (t_A-2) and (t_A+20)	2.695 ***	1.525 ***	0.966 **
	(0.762)	(0.574)	(0.490)
Cumulative Returns between (t_A-2) and (t_A+30)	2.234 ***	1.863 ***	1.053 **
	(0.753)	(0.634)	(0.538)
Number of Observations	39	39	39
C. Effective Date (t_E)			
Returns on (t_E-12)	-0.024	-0.353	-0.419
	(0.425)	(0.407)	(0.342)
Cumulative Returns between (t_E-12) and (t_E-10)	0.035	0.116	-0.271
	(0.573)	(0.563)	(0.488)
Cumulative Returns between (t_E-12) and (t_E-5)	1.096 **	0.988 *	0.497
	(0.680)	(0.680)	(0.568)
Cumulative Returns between (t_E-12) and (t_E)	4.925 ***	3.509 ***	3.543 ***
	(1.017)	(0.828)	(1.056)
Cumulative Returns between (t_E-12) and (t_E+5)	3.370 ***	2.540 ***	2.129 ***
	(0.956)	(0.831)	(0.790)
Cumulative Returns between (t_E-12) and (t_E+15)	2.835 ***	2.179 **	1.555 *
	(1.142)	(0.913)	(1.209)
Cumulative Returns between (t_E-12) and (t_E+20)	2.038 *	1.755 **	0.707
	(1.311)	(1.020)	(1.248)
Number of Observations	27	27	27

Figure 1. Identification through Benchmarks

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 the 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 bandwidth of 0.85.

A. Benchmark Changes for the Same Country: Ellipse Encircling 90 Percent of the Observations



B. Exogenous MSCI Event versus Normal Times

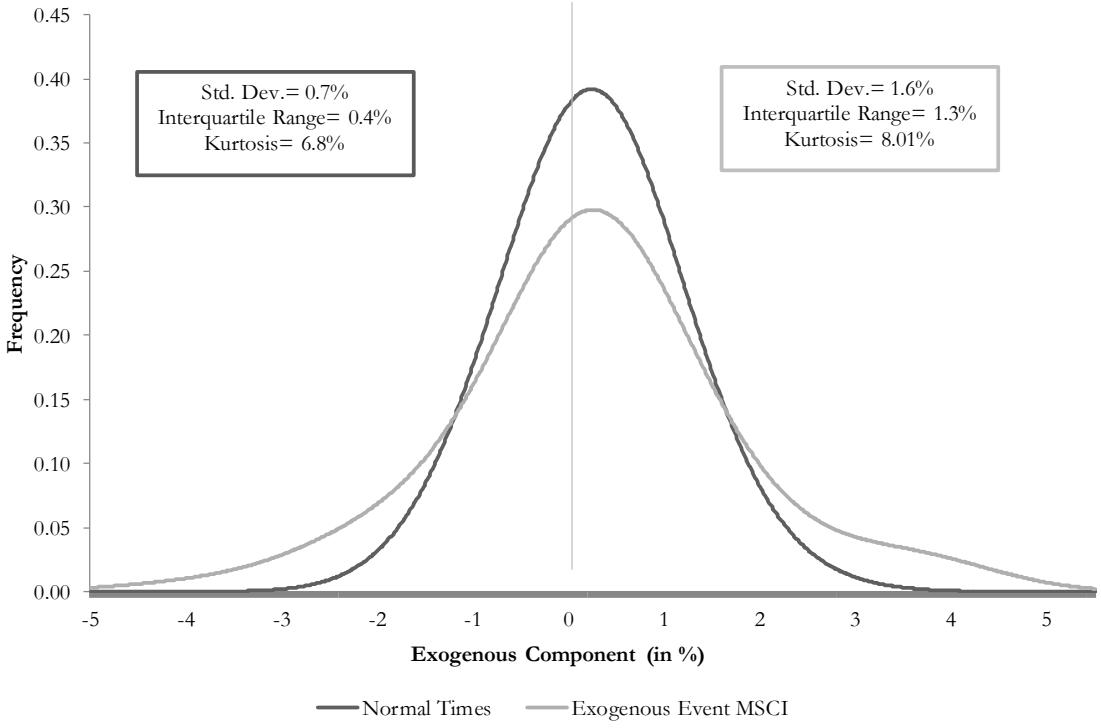


Figure 2. The Upgrade of Israel from Emerging to Developed Market

This figure shows the mean mutual fund and benchmark weight around the upgrade of Israel from emerging to developed market in the MSCI indexes in May 2010. The average mutual fund 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. Each case includes the corresponding benchmark weight (MSCI Emerging Markets or MSCI World). The first grey vertical bar indicates the month of the announcement and the second grey vertical bar indicates the month the upgrade took place.

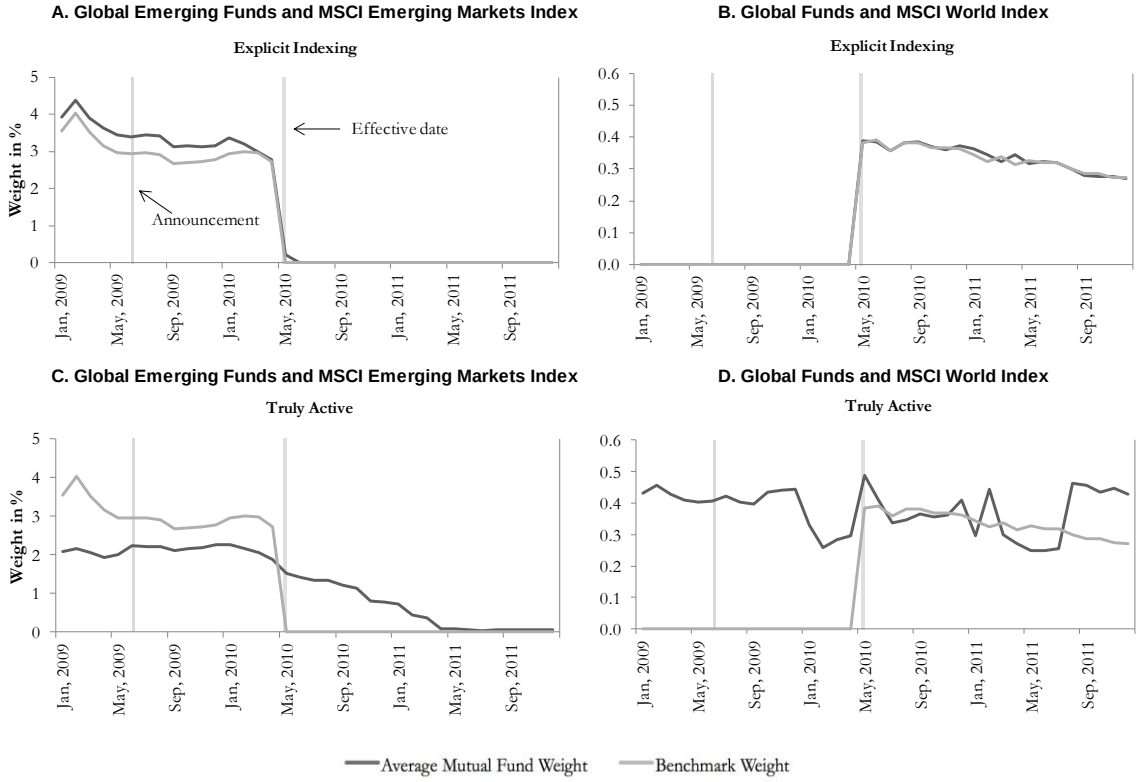


Figure 3. Deviations in Mutual Fund and Benchmark Weights

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). For each panel, the vertical axis shows the mutual fund country weight for a certain benchmark minus the average mutual fund 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 in which the country is included.

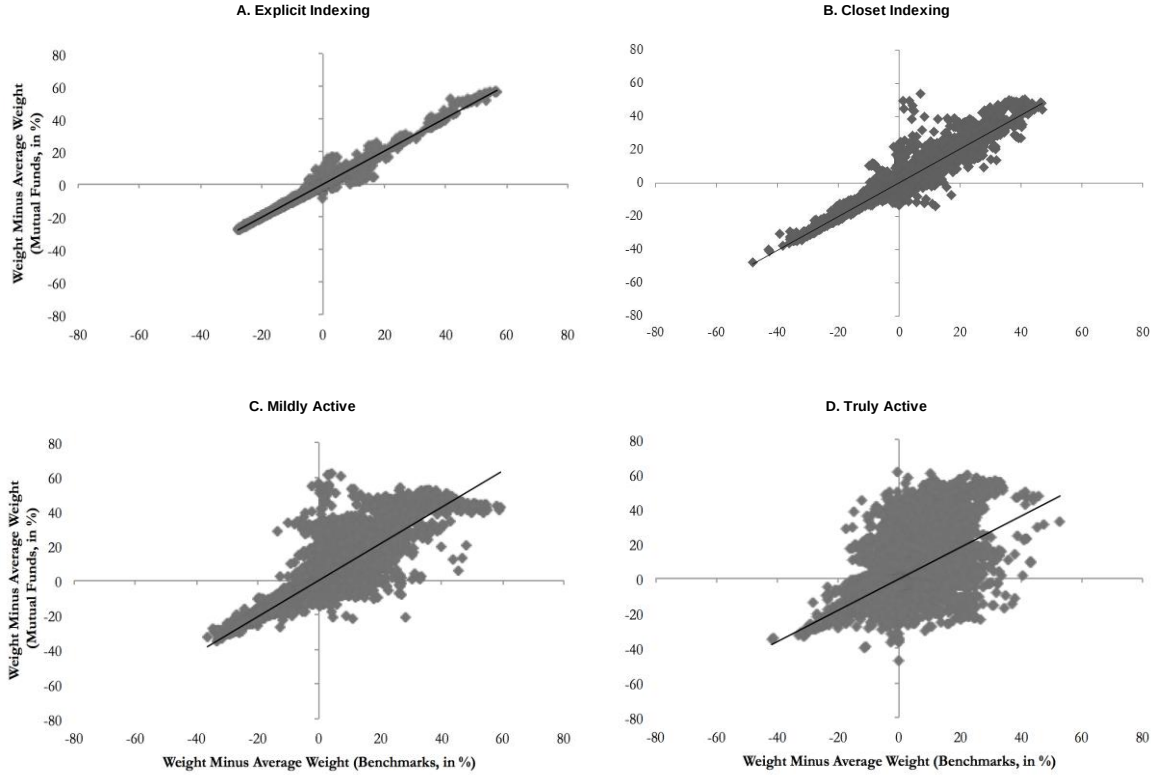
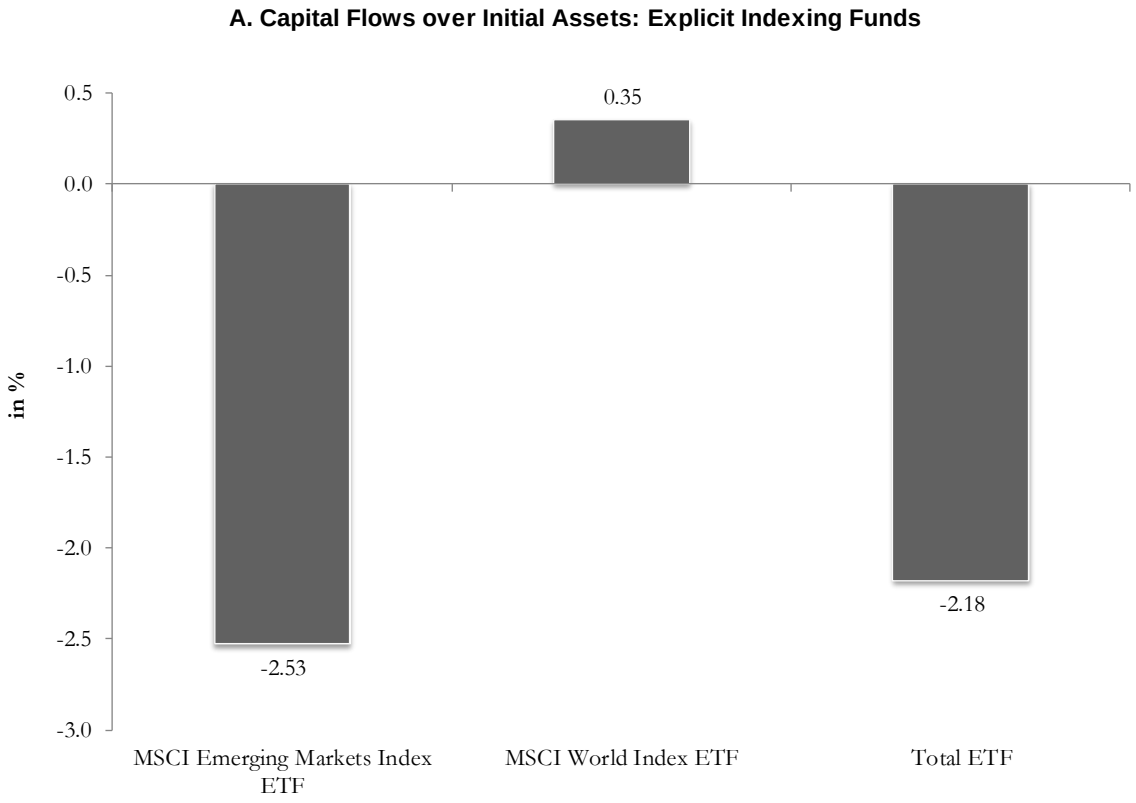


Figure 4. Direct Benchmark Effect: The Case of Israel

This figure shows the direct benchmark effect during the upgrade of Israel from emerging to developed market in the MSCI indexes. The direct benchmark effect is the response of country flows to an exogenous change in the benchmark weight. Panel A shows the capital flows over initial assets of explicit indexing funds during the month of the upgrade, May 2010. Total ETF is the sum across the MSCI World Index ETF and the MSCI Emerging Markets Index ETF. Panel B shows, for the same month, the total capital flows from emerging market funds and developed market funds in levels. They include explicit indexing, closet indexing, mildly active, and truly active funds.



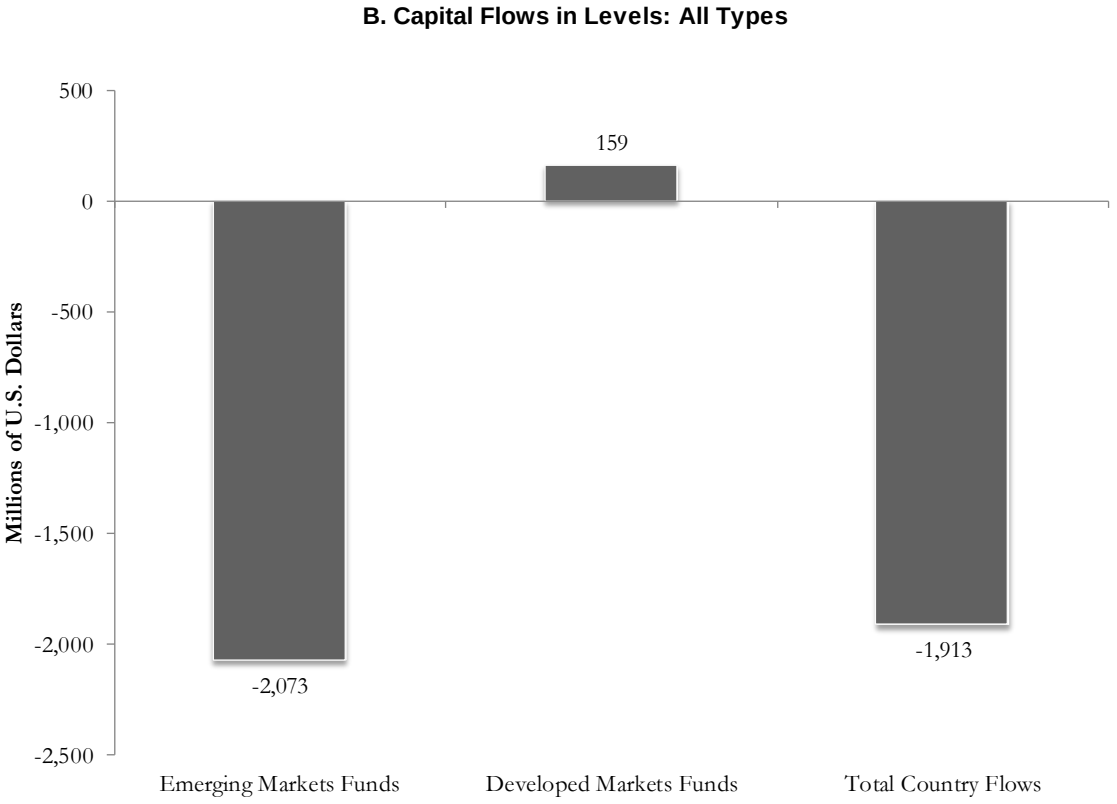


Figure 5. Cumulative Flows in Frontier Markets

This figure shows the impact of the MSCI upgrade of Qatar and United Arab Emirates on the capital flows of passive funds. The figure depicts the total cumulative flows (starting in March 2014) due to the reallocation, measured in millions of U.S. Dollars. The figure is divided into all frontier countries after the upgrade and Qatar plus United Arab Emirates.

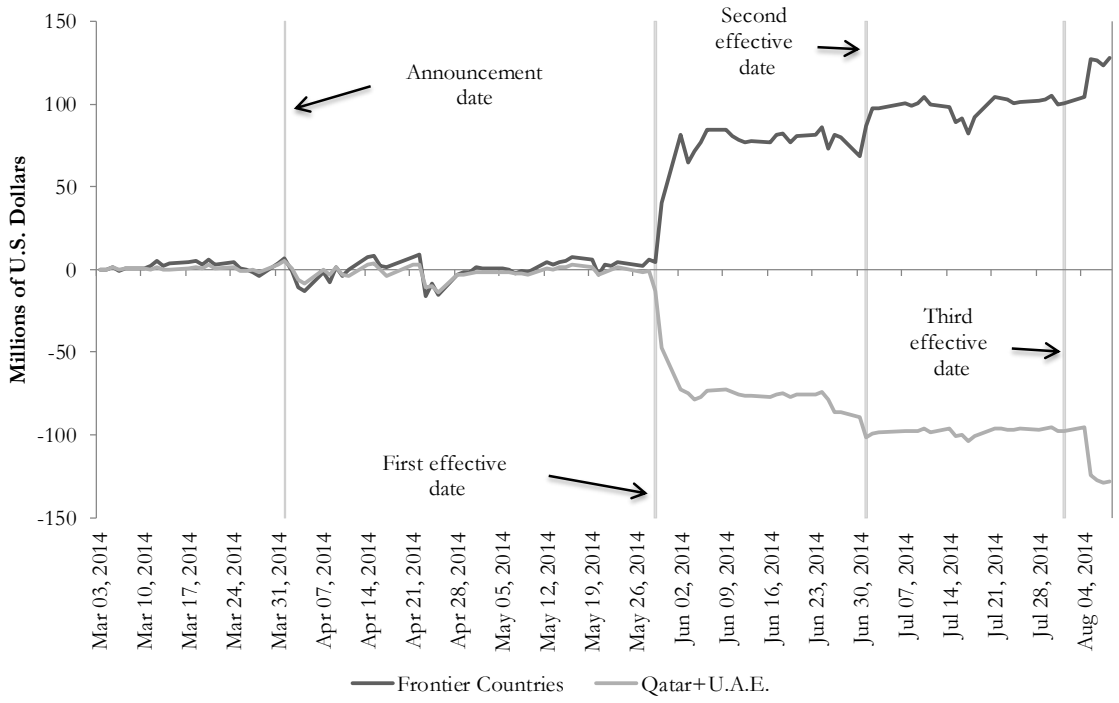


Figure 6. Sensitivity Effect of Country Flows

This figure shows the sensitivity effect for Brazil (Panel A) and India (Panel B) in the MSCI Emerging Markets Index. Each panel displays the scatter plot of country flows against fund flows in millions of U.S. dollars for different equity funds for an initial date (in grey) and a later date (in black). The figure also shows the benchmark weight at each point in time.

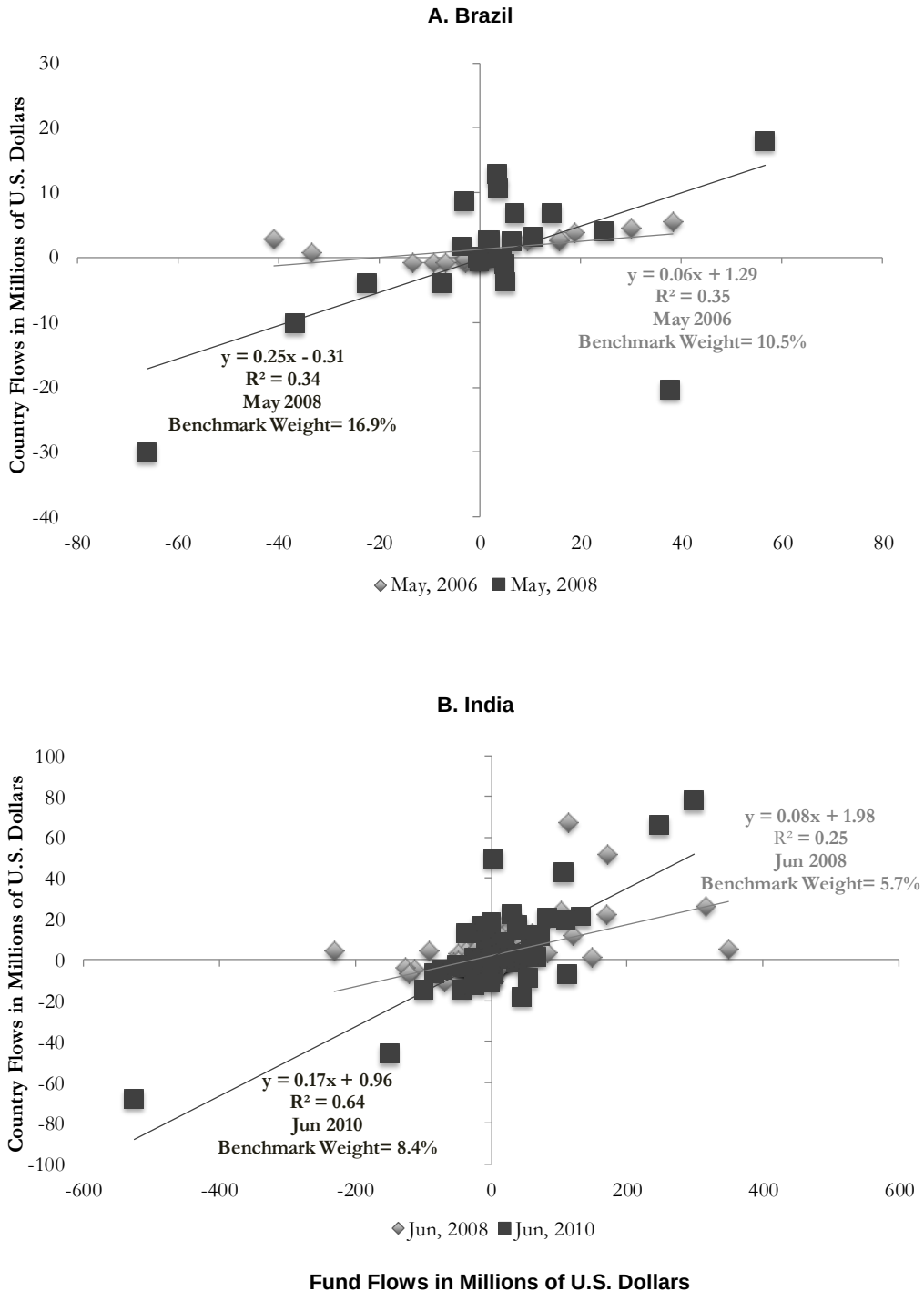


Figure 7. Capital Flows and Benchmark Weights

This figure shows the relation between mutual fund country flows and benchmark weights during periods of injections to mutual funds (pre-crisis) and redemptions from mutual funds (crisis and post-crisis). Panel A shows the case of the MSCI Emerging Markets Index ETF and Panel B the case of the MSCI Europe, Australasia, and Far East Index ETF. We consider the periods defined by the peak (figures on the left) or trough (figures on the right) of flows over total assets for each fund. For the MSCI Emerging Markets Index ETF these periods are May 2003-May 2004 and September 2010-September 2011, respectively. For the MSCI Europe, Australasia, and Far East Index ETF these periods are February 2006-February 2007 and December 2008-December 2009, respectively. On the left axis the figure shows the inflows (outflows) to the respective countries during the corresponding period and on the right axis the benchmark weight at the end of the period.

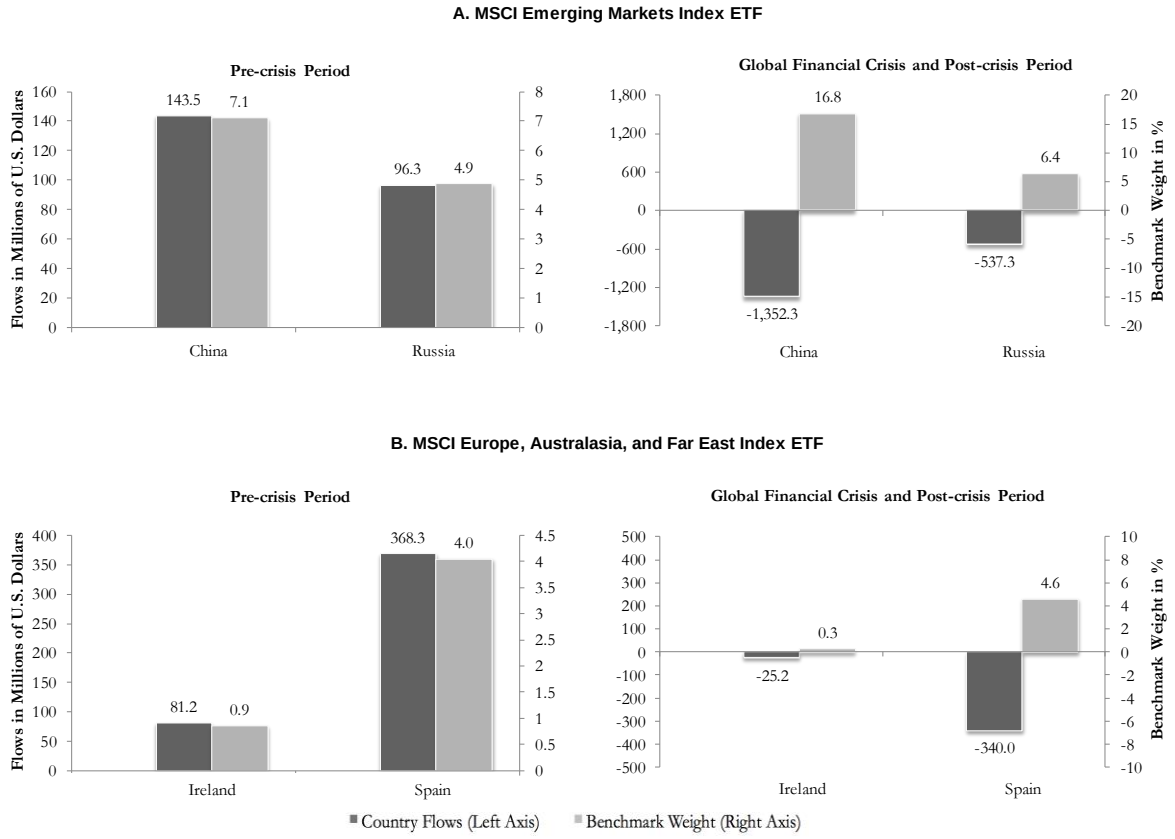
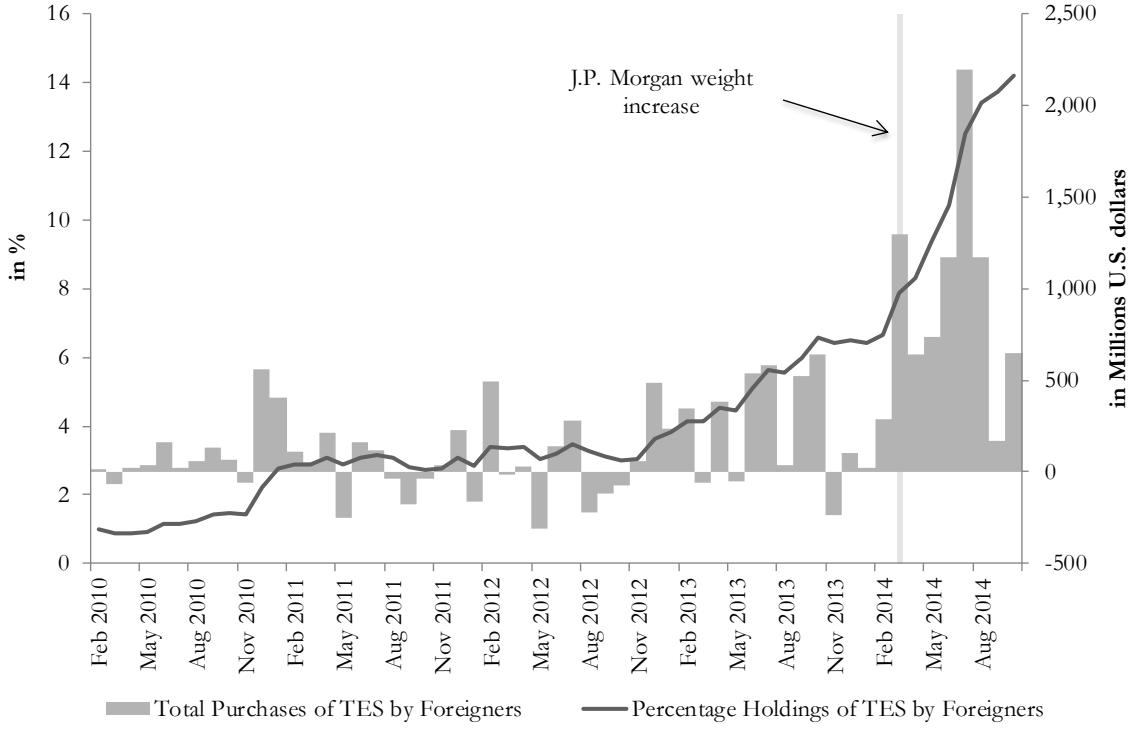


Figure 8. Direct Benchmark Effect: Colombia and Israel Aggregate Flows

This figure shows the aggregate flows in Colombia and Israel around the time of large benchmark weight changes. In March 2014, J.P. Morgan increased the weights for Colombia in its benchmarks for debt markets. In May 2010, MSCI moved Israel from emerging to developed markets. Panel A presents the percentage held and purchased of Colombian Treasury Bonds (TES) by foreigners after the J.P. Morgan announcement. Panel B shows data for portfolio equity and portfolio debt inflows for Israel from the Balance of Payments at quarterly frequency between 2007 and 2011.

A. Participation of Foreigners in Colombian TES bonds



B. Israel - Balance of Payments

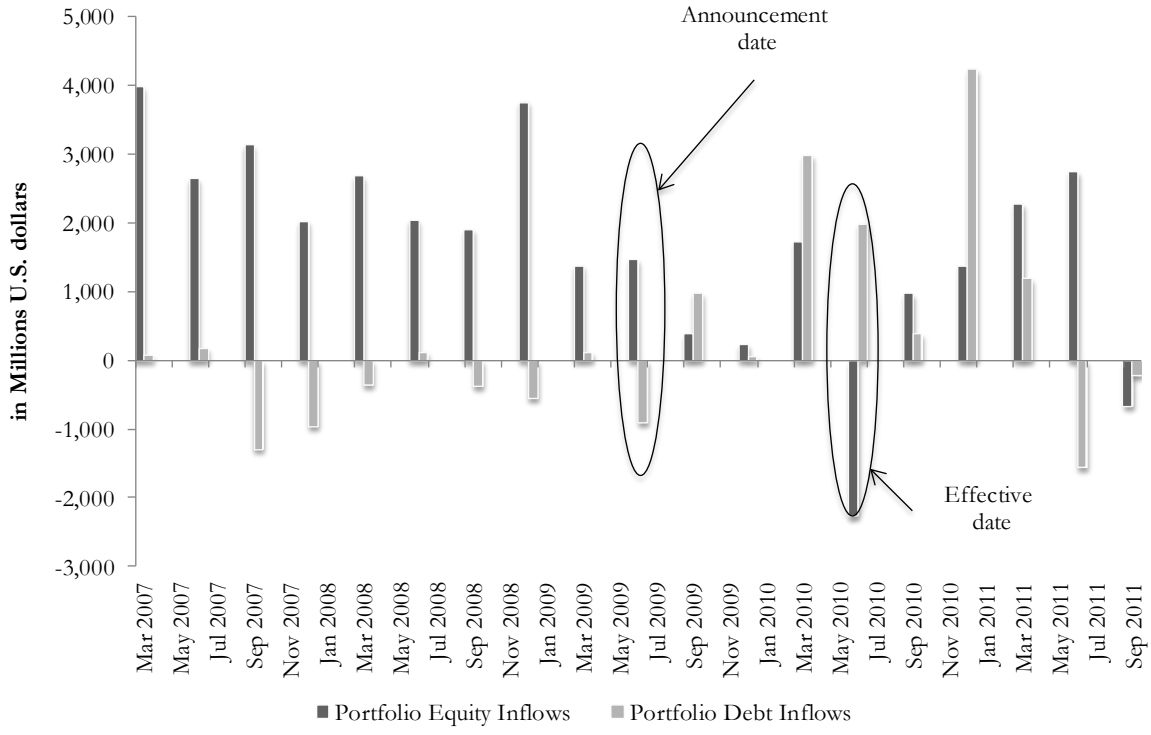


Figure 9. Israel's Upgrade: Stock Market Returns

This figure shows the stock market prices of Israeli firms around Israel's upgrade. Panel A shows the prices around the announcement date and Panel B around the effective date. Index returns stand for a market capitalization price index of firms covered by MSCI. Non Index returns stand for a market capitalization price index of firms not covered by MSCI.

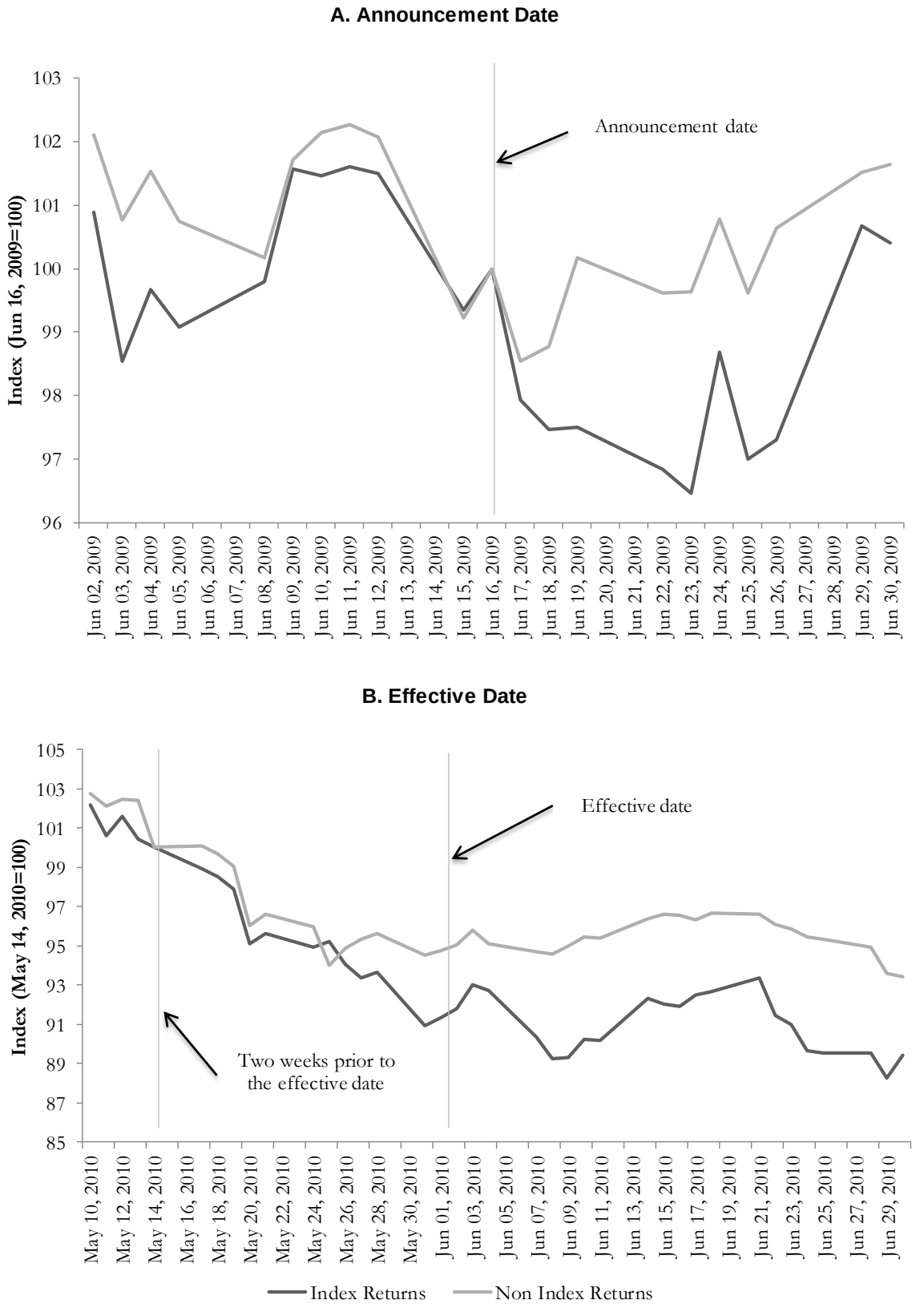


Figure 10. Direct Benchmark Effect and Asset Prices: Argentina Equity Market and Colombia Debt Market

This figure displays the reaction of Argentina's equity market and Colombia's sovereign debt market to changes in the MSCI and J.P. Morgan benchmarks. Panel A illustrates the log difference between the stock price of the firms entering Argentina's MSCI index (ADRs) and the stock price of the firms going out of the index (the underlying stocks). Panel B shows the debt market of Colombia during the J.P. Morgan increase in weights for Colombia's sovereign debt index. Index returns is a local currency debt index (in USD) containing all the bonds entering the benchmark. Non index returns is a local currency debt index (in USD) of the bonds not affected by the benchmark change.

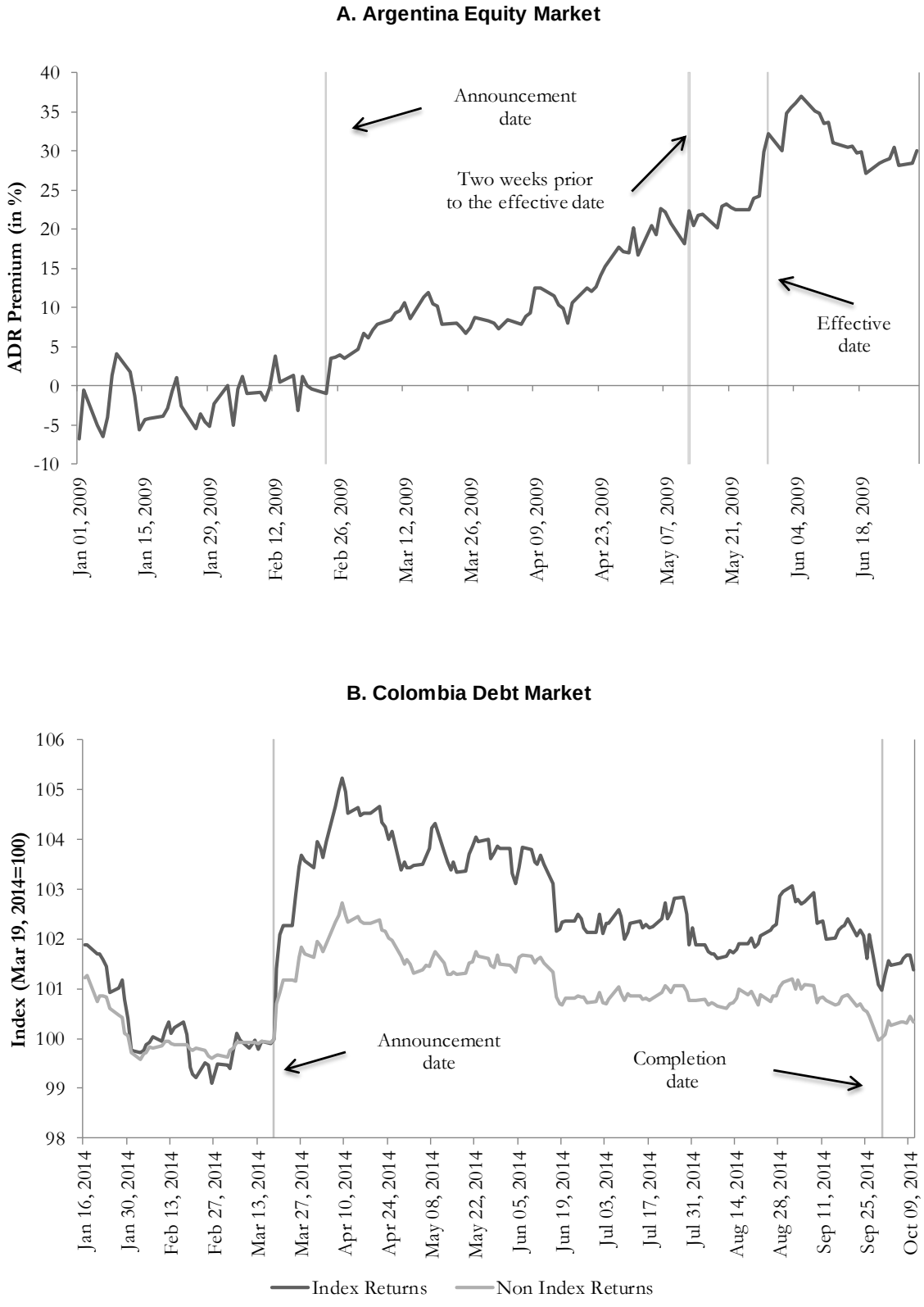


Figure 11. MSCI Upgrade of Qatar and United Arab Emirates

This figure shows the stock markets in Qatar and United Arab Emirates around the time of both the announcement and effective dates of the MSCI upgrade. Panel A shows data for Qatar and Panel B for United Arab Emirates. Index returns stand for a stock market capitalization price index of the firms in the MSCI equity indexes. Non index returns stand for a stock market capitalization price index of the listed firms not covered by MSCI in the respective country indexes.

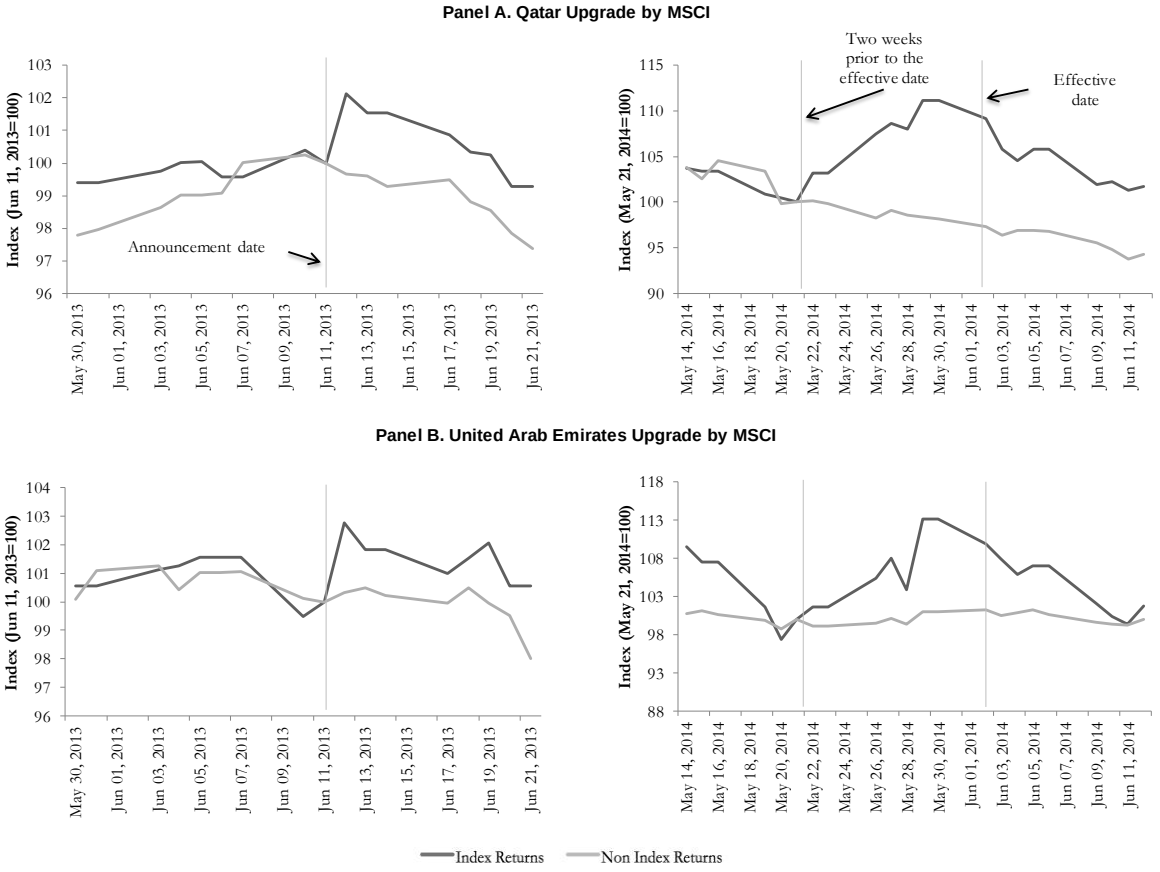
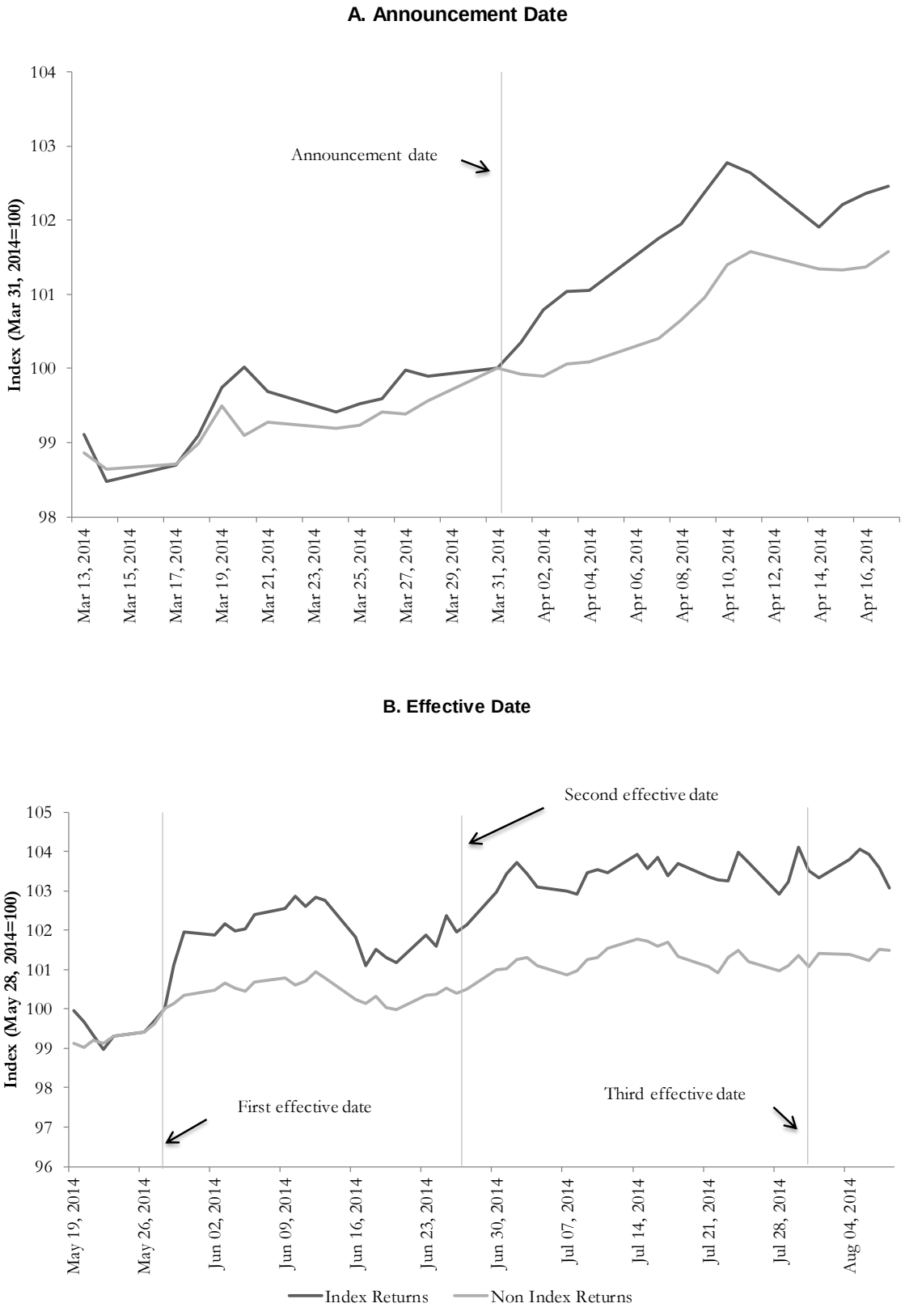


Figure 12. Returns in Frontier Markets during the Upgrade of Qatar and U.A.E. Event

This figure shows the impact on the stock markets of other frontier countries (excluding Qatar and U.A.E.) due to the MSCI upgrade of Qatar and United Arab Emirates. Panel A shows the returns of the stocks in the MSCI Frontier Market Index versus the stocks that do not belong to the benchmark around the announcement date . Panel B shows the same indexes during the three effective dates in our sample.



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 $w_{ic}^B \in [0,1], c = \{1, \dots, N\}$, $\sum_{c=1}^{N} w_{ic}^B = 1$. 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

$$w_{ic} = w_{ic}^B + w_{ic}^h \tag{A1}$$

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

$$-w_{ic}^B \leq w_{ic}^h \leq 1 - w_{ic}^B, \qquad c = \{1, \dots, N\}, \tag{A2}$$

$$\sum_{j=1}^{N} w_{ic}^h = 0 \tag{A3}$$

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

$$w_{ic} = \alpha + \beta w_{ic}^{B} + \varepsilon_{ic} \tag{A4}$$

As it is well known, the estimated coefficient $\hat{\beta}$ is given by

$$\hat{\beta} = \frac{Cov(w_{ic}^{B}, w_{ic})}{Var(w_{ic}^{B})} = 1 + \frac{Cov(w_{ic}^{B}, w_{ic}^{h})}{Var(w_{ic}^{B})} \tag{A5}$$

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 (A3). 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 of activism. Following Cremer and Petajisto (2009), we define the degree of activism as the sum of the absolute value of the portfolio deviations from the benchmark:

$$Active\ Share_i = \frac{1}{2}\sum_{c=1}^{N} |w_{ic} - w_{ic}^{B}| = \frac{1}{2}\sum_{c=1}^{N} |w_{ic}^{h}| \tag{A6}$$

Equation (A6) 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 adverse manager or one allowed more tracking error will deviate more from the benchmark and have a higher measured activism. 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 degree of activism 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 (A4), 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 (A1).

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.

Appendix Table 1. Mutual Fund Summary Statistics

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 funds from 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.

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			

Appendix Table 2. List of Benchmarks Used

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.

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 Dom	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

Appendix Table 3. List of Direct Benchmark Effect Episodes

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 MSCI upgrade of Qatar and United Arab Emirates. Panel C details debt upgrades and downgrades from Citigroup and J.P. Morgan. Panel D shows upgrades and downgrades from rating agencies.

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

Appendix Figure 1. Total Net Assets

This figure shows the average total net assets (TNAs) per year in the database and how these 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, we exclude the years up to 2001 due to the few observations available.