International Asset Allocations and Capital Flows: The Benchmark Effect

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Abstract

Benchmark indexes have become important in financial markets for portfolio investment. In this paper, we study how international equity and bond market indexes impact asset allocations, capital flows, asset prices, and exchange rates across countries. We use unique monthly micro-level data of benchmark compositions and mutual fund investments during 1996-2014. We find that movements in benchmarks appear to have important effects on equity and bond mutual fund portfolio allocations, including passive and active funds. The effects persist after controlling for time-varying industry-level factors, country-specific effects, and macroeconomic fundamentals. Changes in benchmarks not only impact asset allocations, but also capital flows, abnormal returns in aggregate stock and bond prices, and exchange rates. These systemic effects occur not just when the benchmark changes are announced, but also later, when they become effective. By impacting country allocations, benchmarks explain apparently counterintuitive movements in capital flows and asset prices, as well as contagion effects.

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1. Introduction

Several papers argue that benchmark indexes are important for equity prices and how managers allocate their portfolios across firms.[5] In this paper, we show how benchmarks can matter in the international context as well, not only for asset allocations but also for capital flows, asset prices, and exchange rates.

The "benchmark effect" refers to various channels through which prominent international equity and bond market indexes (such as, the MSCI Emerging Markets Index or the MSCI World Index) affect asset allocations, capital flows, and prices across countries. Theoretical models predict that the investment strategy of these funds is pinned down by the composition of their benchmark indexes (Chakravorti and Lall, 2004; Basak and Pavlova, 2012; Deniz and Pinheiro, 2015). Therefore, changes in the country weights of a popular benchmark can trigger a similar rebalancing among the funds that track it and result in sizeable movements in financial markets.[6] In this paper we systematically document these effects using cross-country micro data.

According to the capital asset pricing (CAPM) model, if benchmark indexes perfectly reflected market weights, their components were atomistic, and their weights were adjusted instantaneously, investors would hold these indexes and the benchmarks themselves would not generate any distortion.[7] But benchmark indexes are imperfect and do not necessarily hold the market portfolio. There are many indexes covering overlapping sets of countries, so their composition and the decisions of the companies that construct them to include different countries in different benchmarks can matter for global asset allocations. Moreover, individual countries tend to have non-negligible weights and can distort different indexes when

[5] Several papers study the importance of benchmarks, focusing primarily on the performance evaluation of mutual funds relative to their benchmarks, in particular, on whether active management pays (Lehmann and Modest, 1987; Sharpe, 1992; Wermers, 2000; Cremers and Petajisto, 2009; Sensoy, 2009; Busse et al., 2014; Cremers et al., 2016). A related literature focuses on how benchmark redefinitions affect stock returns, pricing, and liquidity (Harris and Gurel, 1986; Shleifer, 1986; Chen et al., 2004; Barberis et al., 2005; Greenwood, 2005; Hau et al., 2010; Hau, 2011; Vayanos and Wooley, 2011, 2016; Claessens and Yafeh, 2012; Faias et al., 2012; Bartram at al., 2015; Chang et al., 2015).

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

[7] Still, price discovery might be hampered, which can exacerbate co-movement across assets (Wurgler, 2011).

included/excluded. As a growing number of international mutual funds and other institutional investors follow popular benchmarks more passively to cut costs, evaluate and discipline fund managers, increase transparency, and provide simple investment vehicles (such as, index funds and exchange-traded funds or ETFs), these effects are expected to increase and need to be understood and quantified.[8]

A clear practical example of the benchmark effect took place when Israel was moved from the MSCI Emerging Markets Index to the World Index (composed of developed markets). Although the upgrade was announced in advance and occurred because Israel's fundamentals had improved (Business Week, 2010), we show that Israel faced significant capital reallocations, capital outflows, and negative returns when the upgrade became effective due to the behavior of funds following these indexes. This counterintuitive effect occurred because Israel had a much lower weight in the Word Index than in the Emerging Markets Index. As the assets allocated to the two indexes were similar, the switch to the new index implied a much lower total capital allocation to Israel. These effects have prompted some to argue for South Korea and Taiwan not to be upgraded to developed market status (Bloomberg, 2014). Similar discussions have emerged with the actual and potential upgrades of Portugal (1997), Greece (2001), China (2015-2017), and Argentina (2017) and the downgrades of Venezuela (2006), Argentina (2009), and Greece (2013).[9] Another interesting example of the benchmark effect took place when Qatar and the United Arab Emirates (U.A.E.) were upgraded in 2014 from the Frontier to the Emerging Markets Index. Because these two countries represented a large fraction of the Frontier Market Index, their upgrade triggered significant reallocations of assets by international mutual funds specialized in frontier countries, prompting capital inflows and positive returns to the rest of the countries that shared the Frontier Market Index with Qatar and U.A.E. and resulting in positive contagion effects. One reason for the effects on capital flows is that a country's inclusion (exclusion) in a benchmark index should drive managers with index-tracking strategies to

[8] Other problems can arise due to the use of benchmark weights to overcome agency problems, but these issues are not examined in the empirical analysis of this paper.
[9] See, for example, Financial Times (2013a,b,c, 2017), BIS (2014), and The Economist (2014a).

rebalance their overall portfolios and direct flows into (out of) the affected countries (The Economist, 2012).

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

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.[10]

Our results show that benchmarks have statistically and economically significant effects on the allocations and capital flows of mutual funds across countries. Mutual funds follow benchmarks rather closely. For example, a 1 percent increase in a country's benchmark weight results on average in a 0.7 percent increase in the weight of that country for the typical mutual fund that follows that benchmark. Explicit indexing funds seem to follow benchmarks almost one-for-one, generating some mechanical effects in allocations and capital flows. Although the

[10] 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.

most active funds in our sample are less connected to the benchmarks, they still seem to be significantly influenced by their behavior. The effects on mutual fund portfolios appear relevant even after controlling for time-varying industry allocations and country-specific or macroeconomic factors, usually mentioned in the finance and international finance literatures. The results do not seem to be just the consequence of common shocks affecting both mutual fund weights and benchmark weights (via returns) or reverse causality (which could occur as mutual funds reallocate their portfolio, exerting pressure on returns and benchmark weights). Instead, exogenous events that modify indexes appear to affect both benchmark and mutual fund weights.

By influencing the asset allocations of mutual funds, benchmarks seem to have systemic effects. In particular, benchmarks can account for nearly 40 percent of capital flows from mutual funds, with this percentage increasing to 70 percent in times of large exogenous changes to benchmarks. Moreover, large benchmark changes (such as upgrades and downgrades of countries) are associated with abnormal returns in asset prices and exchange rates around those events. These abnormal returns behave as predicted by the mutual fund flows; they become positive (negative) when inflows to (outflows from) a country are expected. Notably, these effects are present both during the announcement and effective dates of these changes. For example, the cumulative asset price differential returns are 1.5 percent around the announcement date and 3.5 percent around the effective date. Our results suggest that, through the reallocations they trigger, benchmark changes affect prices beyond the information content of upgrades/downgrades. The evidence is also consistent with limits to arbitrage in the markets affected by benchmark changes.

2. Data

To conduct our study, we match various types of data from different sources. In particular, we work with mutual fund portfolios, benchmark indexes, and fund- and country-specific information.[11]

[11] For a more detailed explanation on the specific sources we use and the matching of different databases see Appendix 1.

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 are at a monthly frequency, and include open-end equity and bond funds classified according to their geographical investment scope. We use only funds with information for at least one year. Both sources have fund-specific information such as total net assets, the asset class, domicile, whether a fund is an ETF, its strategy (passive or active), and, crucially, its declared benchmark. We complement these data with information on the funds' net asset value (NAV) from Datastream and MS. The combination of the two databases provides us with an extensive cross-sectional and time-series coverage of funds (Online Appendix Table 1).

The data on the composition and returns of several major benchmark indexes come 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. 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. To complete our database, we use stock and bond market country indexes from J.P. Morgan and MSCI to compute the country returns. This information comes from Datastream and MSCI.

Our main matched database consists of: (i) country weights or weights, w_{ict}, which are the country portfolio allocations of international mutual funds (those investing in several countries) as a percentage of total assets; (ii) benchmark weights, w_{ict}^{B}, which are the value of each country's securities included in the relevant benchmarks as a percentage of the total value of all the securities included in those benchmarks; (iii) mutual fund-specific information, such as its assets (A_{it}), returns (R_{it}), and relevant benchmarks; (iv) country-specific information, such as stock and bond market index returns, R_{ct}.[12] The sub-index *i* refers to funds, *c* to countries, *t* to time, 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

[12] 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.

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

Our database contains 2,837 equity funds and 838 bond funds, including global, global emerging, and regional funds, whose total net assets (TNAs) have increased significantly over time.[13] 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.[14]

We also classify funds according to how active the fund manager is, following Cremers and Petajisto (2009) but using country weights instead of security weights. In particular, we classify funds as "explicit indexing," "closet indexing," "mildly active," and "truly active" funds.[15] 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

[13] In 2011, the equity (bond) funds in our sample had 1.2 trillion (303 billion) U.S. dollars in TNAs (Online Appendix Figure 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.
[14] The trends exhibited by the share of total assets of ETFs in our sample also appear in data on U.S. mutual funds from the Investment Company Institute (ICI), which does not identify closet indexing funds.
[15] One possible alternative to this measure is the root mean square error (RMSE), which penalizes large deviations from the benchmark index. But the measure of active share we use has been the standard in the literature on mutual fund activism since Cremers and Petajisto (2009), in part because it shows the percentage of the portfolio that is invested outside the benchmark.

percentage of a fund's portfolio that deviates from its benchmark.[16] We then define closet indexing funds as those that on average have an active share within two standard deviations of the active share of explicit indexing funds. Funds not belonging to the explicit indexing or closet indexing groups are classified into mildly active (truly active) if they are in the lower part (upper) of the distribution of the active share measure (using the median active share).[17]

3. Benchmarks and asset allocations

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

We start by estimating the parameters of the following specification:

$$w_{ict} = \theta_{ic} + \theta_{it} + \alpha_1 w_{ict}^B + \varepsilon_{ict}, \quad (1)$$

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 fund-country and fund-time fixed effects account for persistent differences in the weight that each fund holds in each country and for the shocks that funds receive at each point in time (such as, redemptions and injections or changes in the cash or other equity positions). The errors, ε_{ict}, are clustered at the benchmark-time level, which allows for unobserved correlation among all funds that declare a common benchmark. The results are robust to alternative clustering structures.[18] We run these regressions pooling all funds and separating them by how active the fund manager is.[19,20]

The results using all equity funds (Table 1, Panel A) show that, although there is variation in the estimated coefficients for benchmark weights (α_1 in Equation (1)) across groups, all types of funds seem to follow benchmarks to a significant extent. For the group of all funds

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

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

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

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

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

the coefficient obtained in the weight regressions is 0.77. The coefficients decline monotonically for more active fund managers. For example, explicit indexing funds move almost one-to-one with benchmarks and the percentage of the variance explained is also higher relative to all funds. Estimates for closet indexing funds are close to those of explicit indexing ones, with an estimated coefficient of 0.92, and similar R-squared estimates. In fact, they are much closer to explicit indexing than to mildly active funds, whose estimated coefficient is 0.82. Importantly, the results indicate that benchmark weights are significantly associated with the mutual fund portfolio allocations even for the most active funds in the sample. The coefficient for the truly active funds is 0.5, which is significant statistically and economically. Moreover, a significant part of the variance is captured in the different estimations.[21]

The results for bond funds are qualitatively similar (Table 1, Panel B). Although explicit indexing funds do not move one-to-one with benchmarks, the explained variation by the benchmarks is still 99 percent when including the fixed effects. This might be due to a small sample problem given that we have few explicit indexing bond funds in our sample. Moreover, fund managers might invest differently in bonds than in equities due to the different nature of these markets, which might explain the somewhat smaller coefficients for bond funds in general. For example, Raddatz and Schmukler (2012) show that bond funds hold more cash as a buffer against shocks, which could explain a smaller reaction to benchmarks.

Our results are very similar when controlling for both industry-level and country-level omitted variables. In particular, to control for the possibility that funds follow the industry given the use of relative performance to evaluate managers against their peers, we add the median weight across a specified segment of mutual funds to the previous regressions.[22] Furthermore, we exploit the fact that countries are included in more than one benchmark at the same time to account for the possibility that country-specific factors (like macroeconomic fundamentals) can play a role in cross-country investments. Namely, we use the variation across benchmarks for the

[21] In unreported estimations with no fixed effects we find that benchmark weights explain around 40 percent of the variation in country weights.
[22] For segments, we use: Asia excluding Japan, BRIC, Emerging Europe, Europe, Europe Middle East and Africa, Global, Global Emerging, Latin America, and the Pacific.

same country-time observation.[23] We control for the omitted country fundamentals by adding a set of country-time fixed effects, absorbing non-parametrically all possible time-varying, country-specific shocks.[24] Figure 1 illustrates the results including country-time fixed effects.

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

$$\Delta w_{ict} = \theta_{ic} + \theta_{it} + \alpha_2 \Delta w^B_{ict} + \varepsilon_{ict}. \quad (2)$$

The results suggest that, although the coefficients estimated for α_2 are a bit smaller (Table 1), they are similar to those estimated in levels.[25]

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

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

We can effectively isolate the buy-and-hold from the exogenous components in each benchmark weight. In the absence of exogenous reallocations, the benchmark weight of country *c* at time *t*, w^B_{ct}, would just follow a buy-and-hold pattern, $w^B_{ct} = w^B_{ct-1}(R_{ct}/R^B_t)$, where R_{ct} and R^B_t are the return of the country and the return of the benchmark, respectively. With exogenous

[23] There is a significant amount of variation in changes in benchmark weights for a given country at a particular point in time (Online Appendix Figure 2, Panel A).
[24] The results are qualitatively similar when using macroeconomic variables as controls instead of country-time fixed effects.
[25] 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.

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:

$$w_{ct}^{B} = w_{ct-1}^{B}(R_{ct}/R_{t}^{B}) + E_{ct}^{B}. \tag{3}$$

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

This decomposition is possible because relative returns are not the only important determinant of changes in benchmark weights, even when on average benchmark weights move almost one-to-one with relative returns (Table 2). In fact, after controlling for benchmark-country, benchmark-time, and country-time fixed effects (the identification comes exclusively from the time variation within a benchmark-country), the R^2 of the various regressions are between 0.3 and 0.6 at the monthly level.[26] A main reason for this result are the regular revisions to the indexes, leading to frequent re-weighting of all the countries.[27] These are exogenous reallocations that are independent of the performance of a country.

To formally study how regular exogenous changes to the benchmark indexes affect mutual fund weights, we substitute the benchmark weight in Equation (2) for its two components from Equation (3) and estimate the parameters of the following specification:

$$\Delta w_{ict} = \theta_{ic} + \theta_{it} + \alpha\Delta\left[w_{ict-1}^{B}\left(R_{ct}/R_{it}^{B}\right)\right] + \beta\Delta E_{ict}^{B} + \varepsilon_{ict}. \tag{4}$$

We test whether the coefficient for the exogenous shocks is significantly different from zero. This approach exploits all the variation in benchmark weights that is unrelated to the buy-and-hold component to identify their possible causal impact. The results show that the exogenous component has a significantly positive effect on mutual fund weights (Table 3). As expected, the relation is decreasing for more active funds, but even active fund allocations are positively correlated with this component of benchmark weights.

[26] 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.

[27] 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.

We then focus on large events. Because these large events are usually pre-announced, finding evidence of an impact on allocations when they take place provides evidence that actual, contemporaneous benchmark weights matter for international mutual funds. However, we face the problem that there are few events of whole country upgrades/downgrades to exploit, so we include episodes of large changes in the intensive margin to increase our statistical power. We identify these "exogenous event times/episodes" using the fact that changes in MSCI indexes are released in the months of February, May, August, and November. We compute the exogenous component during these months as in Equation (3) and assume that finding a large exogenous component (below the 25th and above the 75th percentile of the sample distribution) in any of these months is likely due to the announcement of an exogenous change in the calculation of the index.

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

$$\Delta w_{ict} = \theta_{ic} + \theta_{it} + \alpha_N \Delta w^B_{ict} D_N + \alpha_E \Delta w^B_{ict} D_E + \varepsilon_{ict}, \quad (5)$$

where D_N is a dummy indicating normal times and D_E is a dummy indicating times with large exogenous events. Finding that $\alpha_E < \alpha_N$ ($\alpha_E > \alpha_N$) would mean that the relation between benchmark weights and country weights weakens (strengthens) in months when benchmark weights are largely driven by exogenous episodes. Alternatively, not being able to reject the hypothesis that $\alpha_E = \alpha_N$ means that the exogenous movements in benchmark weights matter for country weights as much as those driven by relative returns. The results show that, while the difference is statistically significant in some cases, it is much lower in economic terms, and that the link between mutual fund weights and benchmark weights remains strong during exogenous episodes (Table 3). That is, funds do not tend to respond very differently to exogenous events or other changes in benchmark weights.

Lastly, we test how mutual funds responded to a particular MSCI methodological change event that implied an overall index redefinition (also exploited by Hau et al., 2010 and Hau, 2011). In December 2000, MSCI announced that it would change all its indexes to adjust the market capitalization by the free-float rate (the proportion of the stocks publicly available),

becoming effective in two steps, in November 2001 and May 2002. In fact, the changes in E_{ct}^{B} at those times were indeed much larger (due to the benchmark changes) than during the other months (Online Appendix Figure 2, Panel B). We regress the changes in mutual fund weights against the changes in the buy-and-hold component and the changes in the exogenous component for the months when MSCI made the change effective. With the exception of the truly active funds, mutual funds responded almost one-to-one to the exogenous changes at the time the indexes were readjusted (Table 3).[28]

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.

4. Benchmarks and capital flows

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

$$F_{ict} = w_{ict}F_{it} + \tilde{A}_{it}\left(w_{ict} - w_{ict}^{BH}\right), \tag{6}$$

where F_{ict} is the net flow (in dollars) from fund *i* in country *c* at time *t*. w_{ict} is the portfolio weight the fund decides to have in that country at time *t*, $\tilde{A}_{it} = R_{it}A_{it-1}$ is the value of the fund's assets at the beginning of time *t*, and w_{ict}^{BH} is the fund's buy-and-hold weight in that country resulting from movements in total and relative returns. F_{it} is the net flow (in dollars) to fund *i* at time *t*, also known as injections or redemptions.[29]

Then, using Equation (1) that links w_{ict} and w_{ict}^{B}, we decompose Equation (6) into:

$$F_{ict} = \alpha w_{ict}^{B}F_{it} + \Delta_{ict}^{B}F_{it} + \tilde{A}_{it}\left[\alpha w_{ict}^{B} - \alpha w_{ict-1}^{B}\frac{R_{ct}}{R_{it}}\right] + \tilde{A}_{it}\left[\Delta_{ict}^{B} - \Delta_{ict-1}^{B}\frac{R_{ct}}{R_{it}}\right], \tag{7}$$

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

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

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

The four terms in Equation (7) capture different components of mutual fund flows across countries. The first two terms measure how the manager allocates the injections/redemptions the fund faces. The first one captures how injections/redemptions are distributed according to the benchmark weight, the "benchmark flow," and the second one according to the active weight, the "active flow." The third and fourth terms relate to asset reallocations. The third term indicates how the manager reallocates assets when there is an exogenous change in the benchmark weight, the "benchmark reallocation." The fourth term shows how the manager actively reallocates assets, the "active reallocation." The first and third terms jointly capture the benchmark-related capital flows, while the second and fourth terms are associated with the active decisions of the manager.

A variance decomposition based on Equation (11) shows that benchmarks account for a sizable 38.7 percent of the variation of capital flows when considering all funds in the sample (Table 4, Panel A).[30] The benchmark flow explains 16.1 percent and the benchmark reallocation 22.6 percent of mutual fund flows. These percentages vary according to how active a fund is. The benchmark reallocation explains 67.8 percent of mutual fund flows for explicit indexing funds, while this percentage is 12.3 percent for truly active funds. There is also considerable variation across time. When considering months in which MSCI rebalances its indexes, benchmarks explain around 72.7 percent of mutual fund flows, while this percentage drops to 14.3 percent in the other months (Table 4, Panel B and C). Moreover, during the MSCI methodological change in 2001-2002 the percentage explained by the benchmark reallocation increases significantly.

Because the fraction of capital flows explained by benchmarks seems to be much more important when there are large exogenous changes in benchmark weights, we additionally compute the variance decomposition for four different countries that experienced an upgrade or downgrade in our sample, Argentina, Colombia, Israel, and Venezuela (Online Appendix Table 3). For these episodes, the benchmark reallocation explains a much larger fraction of capital flows, ranging from 27.5 percent (in Venezuela) to 62.9 percent (in Israel). This pattern is more accentuated when considering explicit indexing funds. In Israel, for instance, the benchmark

[30] For this variance decomposition, we first aggregate all the components in Equation (11) at the country-time level and then perform the variance decomposition.

reallocation term explains 88.7 percent of capital flows of explicit indexing funds, which shows the large importance of benchmark reallocation flows when there are large exogenous changes in benchmark weights.

5. Benchmarks, asset prices, and exchange rates

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

We conduct event study analyses of asset prices and exchange rates around episodes where the benchmark effect is clearly present, such as, country upgrades and downgrades in both debt and equity markets. For each episode, we identify both the announcement and effective dates. We use a range of 79 well-identified episodes across developed, emerging, and frontier countries (listed in Online Appendix Table 4).

This type of analysis presents at least four methodological advantages to study the effect of benchmarks vis-à-vis the informational effect revealed by the benchmark change itself, when incorporations into an index might anticipate excess returns (Shleifer, 1986; Denis et al., 2003). First, because most of these country reclassifications are announced with certainty from 3 to 12 months prior to the effective date, we are able to analyze when (and if) prices react. To the extent that asset prices react at the effective date, not only at the announcement date, it would indicate that not all investors fully act in anticipation of the benchmark change, even when the information about the change is known in advance.[31]

Second, our data allow us to distinguish the positive information the upgrade implies from the mechanical reallocations the benchmark change entails. In particular, when countries are reclassified across categories (developed, emerging, and frontier) their benchmark weight changes significantly, because countries typically receive a weight proportional to their market capitalization. Whereas an upgrade from the emerging to the developed category recognizes

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

sustained good economic performance, and tends to imply good news, the weight of the country gets reduced because the country is much larger among emerging economies than among developed ones. Given that the pool of assets managed across developed and emerging markets is roughly similar, the benchmark effect related to the reallocations could explain why an upgrade might generate capital outflows and a negative price effect, and a downgrade the opposite movements.

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

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

Second, we analyze the contagion effects of the upgrade of Qatar and U.A.E. from frontier to emerging market status in May 2014 on other frontier countries. As the announcement date we use April 1, 2014, when MSCI announced the definitive structure of the

new MSCI Frontier Markets Index. We also look at the rebalancing of the iShares MSCI Frontier Markets 100 ETF to pin down the exact date when explicit indexing funds started moving their portfolio to adjust to the large movements experienced in the two upgraded countries. As above, we analyze a window starting two weeks before the effective date, up to the following 30 business days. We use again the MSCI All Country World Index as a global factor. Because of the reallocations within the frontier market index during the effective date, capital outflows were expected in Qatar and U.A.E. (they had already entered into the emerging market funds) and capital inflows were expected in the rest of frontier markets.

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

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

three cases for which there is a distinct announcement date, we use both dates.[32] 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, the J.P. Morgan EMBI Country Index. As the global factor, we use the J.P. Morgan EMBI Global Index.

We use three different types of returns: raw returns, excess returns, and abnormal returns. Raw returns are the returns of the treated group. Excess returns are the returns of the country minus those of the global factor. Abnormal returns are the residuals of a regression of the returns of the country relative to the returns of the global factor during the 180 business days prior to the initial event. We compute the cumulative returns starting two days before the initial date and report a mean test of whether these average cumulative returns are different from zero.[33] We also estimate the same specifications but using the exchange rate instead. We exclude countries with hard or soft pegs (as taken from the IMF AREAER) and use as a global factor the average change in exchange rates from all the countries in our sample. We expect an appreciation (depreciation) for episodes when the benchmark change implies capital inflows (outflows). However, the effect on the exchange rate is expected to be lower than on the specific asset prices because the benchmark change involves only equity or debt. Therefore, we expect a softer movement of the exchange rate during these periods, as equity and debt flows might move in different directions (as shown in the next section for the case of Israel's balance of payments) and other factors might also play a role.

The results show that, when considering all the possible events (including the announcement and effective dates), there is a positive and significant reaction of returns during the event times that is maintained even for the subsequent 30 business days (Table 5, Panel A). Raw returns increase by 2.62 percent at their peak. Even excess and abnormal returns show an almost 1.52 and 1.83 percent increase at their peak during the event times, suggesting a significant effect of benchmark changes on asset prices.

[32] 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.
[33] We pool the negative and positive events by normalizing the negative events to be tested as positive ones.

When considering only the announcement dates (Table 5, Panel B), there are positive and statistically significant returns across all specifications during the event date and later, suggesting that the effect from benchmark changes is permanent. When considering only the effective date (Table 5, Panel C), there are no effects in the two weeks prior to the effective date.[34] However, during the week prior to the effective date, the average cumulative returns (of all types) increase significantly: these returns go from 3.5 to 4.3 across the different specifications. Even four weeks after the initial effective date, the effect does not tend to vanish, indicating that there is not a complete reversal of the effect.

We also observe a statistically significant effect in the exchange rates. At the peak, the average exchange rate appreciates/depreciates between 0.5 and 0.61 percent when considering both the announcement and effective dates of an upgrade/downgrade. These effects are present both separately during the announcement and effective dates. Although they keep the sign, after two weeks they are not statistically significant. One possible explanation is that some governments intervene to stabilize the exchange rate. Still, the effects are not negligible given that exchange rates have been hard to predict, capture many factors, and when predictability appears it does so for some countries and short time periods (Rossi, 2013).[35]

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.

[34] 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.

[35] It is useful to compare the size of the effect with the ones documented in the literature on exchange rate intervention. For instance, Evans and Lyons (2003) estimate that a 10 million U.S. dollars order flow has an impact of 0.44 basis points in the market of the Deutsche mark versus the U.S. dollar in 1996. A back-of-the-envelope calculation using their estimates and Israel's capital outflows around its upgrade to the MSCI World Index would imply a 33 basis points impact on the exchange rate, much lower than what we document in Table 5. While the likely lower liquidity of Israel's exchange rate market and the impact of foreign exchange hedging could explain the larger impact documented in Table 5, this simple exercise shows that the quantitative effects reported in that table are similar to those estimated in the literature.

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.

6. Case studies

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

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

In June 2009, MSCI announced its decision to upgrade Israel from emerging to developed market status. In May 2010, the benchmark weight of Israel in the MSCI Emerging Markets Index turned zero and its weight in the MSCI World Index became positive. Figure 2 shows the behavior of the average weight of Israel among the explicit indexing and truly active funds that declare to follow the MSCI Emerging Markets Index and the MSCI World Index. Explicit indexing funds track the benchmark very closely. At the time the upgrade became effective, the funds that tightly follow the MSCI Emerging Markets Index instantly dropped Israel's weight to zero, while those following the MSCI World Index incorporated Israel to their portfolios. However, when MSCI announced the upgrade decision, these funds did not significantly change their allocation in Israel; instead, they waited until the actual upgrade materialized. Truly active funds did not react so mechanically to the upgrade, but they still gradually adjusted their portfolio in a manner that is consistent with movements in the benchmark weights.

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

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

This effect at the mutual fund level is in fact similar in size with the movements registered in Israel's balance of payments (Figure 3, Panel A). Moreover, this outflow differs from the inflows in other quarters and in debt flows in the same quarter. In particular, during the previous three years to the effective date, there were significant inflows to equity securities, while during the second quarter of 2010 (the effective date) there were almost 2.3 billion U.S. dollars outflows in equities compared to 2 billion U.S. dollars inflows in debt. The magnitude and direction of the equity flows are consistent with mutual funds reallocating their portfolio and inconsistent with the overall positive inflows that Israel was receiving around the upgrade event. In other words, the good news entailed by Israel's upgrade would typically imply positive equity capital inflows, as investors become more attracted to the country's better prospects. However, the observed equity capital flows during the event were negative, pointing to the importance of the benchmark effect.

In terms of prices, the Israeli stocks in the MSCI index fell almost 4 percent in the week of the announcement and underperformed the MSCI All Country World Index, even when the news was an upgrade (Figure 3, Panel B). Moreover, the week prior to the effective date (when index funds rebalanced their portfolio) there was a 4.2 percent drop in the MSCI Israel Index.

Still a month after the effective date, there was a considerable gap between the MSCI Israel Index and the MSCI All Country World Index (Figure 3, Panel C).

Another interesting case is that of Colombia's sovereign debt market. On March 19, 2014, J.P. Morgan announced that it would add five Colombian Treasury (TES) bonds to its Global Bond Index-Emerging Markets and Global Bond Index-Emerging Markets Diversified. Colombia's benchmark weight would increase from 3.2 to 8 percent in the latter and from 1.8 to 5.6 percent in the former. Data from national sources show that, when the benchmark changed, the share of Colombian TES bonds held by foreigners increased by a factor of around 2.33 (Figure 4, Panel A). This was driven by an increase in the total purchases of these securities by foreigners, showing a marked difference with previous periods. This episode also shows that the benchmark effect is relevant not only during upgrades or downgrades (extensive margin), but also during significant revisions of the benchmark weight within an index (intensive margin). Three weeks after the announcement, the Colombian local currency bond Index was up 5 percent compared to the J.P. Morgan GBI (Figure 4, Panel B), showing a large benchmark effect.

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

Because Qatar and U.A.E. comprised around 40 percent of the MSCI Frontier Markets Index, the rest of the frontier markets were expected to have their benchmark weight increased

considerably as frontier market funds reallocated away from Qatar and U.A.E.[36] The country comparison shows that, when the upgrade was announced, there was an increase in prices of the stocks of the other frontier countries in the MSCI index (Figure 5, Panel B). Coinciding with the movements in capital flows described in Figure 5 around the effective date, the asset prices of these countries increased when compared to the MSCI All Country World (Figure 5, Panel C). These jumps occurred during the days when passive funds rebalanced their portfolios.

7. Conclusions

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

Although the results do not mean that benchmarks explain all the movements in capital flows, their impact can be particularly important at some points in time, for example, when benchmarks can in practice coordinate manager reactions across institutions and their individual decisions are felt at the systemic level.[37] Benchmark movements could explain not only some of the findings documented in the literature, but also counterintuitive and unexpected movements in cross-country investments and asset prices. For example, advanced emerging countries tend to

[36] Given the size of the expected reallocations 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).

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

have larger weights in emerging market indexes than in developed market ones, which can help explain why countries might face capital outflows (inflows) when they are upgraded (downgraded). Moreover, countries sharing the benchmark are faced with capital inflows and asset price increases when a large country is removed from the index, regardless of their fundamentals. This kind of contagion does not involve leverage and is different from other types of contagion described in the literature.[38]

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

Although this paper presents several new findings, the research on the effects of benchmarks is just at the early stages. The evidence suggests that funds worldwide are becoming less active (Cremers et al., 2013; The Economist, 2014b; Financial Times, 2015) and the number of benchmarks are increasing rapidly. Therefore, the types of mechanisms documented here are expected to grow over time and the literature might start incorporating them.

One issue that remains to be understood is whether the use of benchmarks can provide an explanation for the momentum and feedback loop theories.[39] A shock to a country's return could lead to a higher benchmark weight, a larger mutual fund allocation, and larger capital flows if funds are receiving inflows and capital is slow moving, perpetuating these loops. Benchmarks might also explain why international mutual funds behave pro-cyclically, herd, and affect financial markets, increasing volatility and disconnecting asset prices from fundamentals.[40] Moreover,

[38] Calvo and Mendoza, 2000; Kodres and Pritsker, 2002; Manconi et al., 2012; Hau and Lai, 2013.
[39] See, for example, Barberis et al. (1998), Daniel et al. (1998), Shiller (2000), Gervais and Odean (2001), and Vayanos and Wooley (2013).
[40] See, for example, Kaminsky et al. (2004), Gelos and Wei (2005), Khorana et al. (2005), Broner et al. (2006), Shiller (2008), Hellwig (2009), Mishkin (2011), Maug and Naik (2011), Forbes et al. (2012),

given that some funds try to replicate their benchmark index almost mechanically, do other funds or sophisticated investors anticipate or compensate for their reaction? Or do they also follow these benchmarks? And what are the effects of benchmarks on small and large firms' capital market financing and real activity?

Fratzscher (2012), Jotikasthira et al. (2012), Levy Yeyati and Williams (2012), Raddatz and Schmukler (2012), Gelos (2013), Stein (2013), IMF (2014), Ahmed et al. (2015), Cerutti et al. (2015), Goldstein et al. (2015), and Shek et al. (2015).

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Appendix 1. Data Construction and Matching

This appendix provides a detailed account of all the sources we use to construct our main database, and the matching procedure between the different databases.

Our two main sources for country portfolio allocations of international mutual funds are EPFR (Emerging Portfolio Fund Research) and Morningstar Direct (MS). Both sources include dead and live mutual funds. The data from EPFR are at a monthly frequency, and include open-end equity and bond funds classified according to their geographical investment scope. Global funds invest anywhere in the world, global emerging funds only in emerging countries, and regional funds in groups of countries within a specific geographical region.[41] The data also comprise portfolios of ETFs. We use only funds with information for at least one year. For each fund *i* and each month *t,* the data contain information on the share of the fund's assets invested in each of 124 countries and cash, as well as its TNAs. We also have information on static characteristics, for example, the asset class, domicile, whether a fund is an ETF, its strategy (passive or active), and, crucially, its declared benchmark. We complement these data with information on the funds' net asset value (NAV) from Datastream and MS. We match the funds from these different databases.

We use similar data from MS to complement the EPFR data. That is, we use data on country weights, TNAs, NAVs, and static fund characteristics for additional international mutual funds not included in EPFR with at least one year of monthly data.[42] 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.[43] The combination of the two databases provides us with an extensive cross-sectional and time-series coverage of funds (Online Appendix Table 1). MS contains a large number of funds after 2007 but very few in earlier years, while EPFR has a

[41] While global funds theoretically can invest anywhere in the world, a large proportion of them track the MSCI World Index, which only has developed countries as constituents. A minor proportion of these funds track the MSCI All Country World Index, which contains both developed and emerging countries.
[42] Although MS includes funds that report quarterly, almost 90 percent of the original MS sample reports allocations on a monthly frequency.
[43] In our estimations, we only use country allocations and, thus, do not include the residual category of other countries (those not explicitly reported in the EPFR or MS databases) nor cash.

more balanced number of funds dating back to 1996.[44] 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).[45] This information comes 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. The benchmarks indexes we use have different scope and are listed in Online Appendix Table 2. For each of the benchmark indexes in MS and MSCI, we collect data on price returns, gross returns, and net returns. We rely heavily on the MSCI benchmark indexes because 86 percent of our data on equity mutual funds declare to follow them.[46] Moreover, we gather data on daily returns to analyze the impact of benchmark changes in asset prices from Datastream.

To match the data on international mutual funds with the benchmark indexes, we assign to each fund the index declared in its prospectus. For funds with no declared index, we impute the benchmark assigned to it by industry analysts, as reported by MS, although the results reported below are similar when considering only funds that explicitly declare a benchmark. We were able to match 88 percent of the equity funds and 18 percent of the bond funds in our database. The reduced matching of bond funds with their benchmarks is not because of matching problems but for lack of information on the detailed portfolio composition of their benchmark indexes.[47,48] We do not use the rest of the funds because it is not clear whether the

[44] 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.

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

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

[47] 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.

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).[49] 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 allocations of that same country at the same time for the assigned benchmark, plus fund-specific information.

[48] There is no agreement on how to assign benchmarks. Papers use the declared benchmark, the one assigned by analysts, and/or the one that yields the smallest deviation from the fund portfolio (Cremers and Petajisto, 2009; Sensoy, 2009; Cremers et al., 2013; Jiang et al., 2014; Busse et al., 2014).

[49] 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.

Figure 1
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). The vertical axis shows the mutual fund country weight for a certain benchmark minus the mutual fund average country weight across all the funds that invest in that country. The horizontal axis shows the benchmark weight of a country in a certain benchmark minus the average benchmark weight for the same country across all the benchmarks where the country is included.

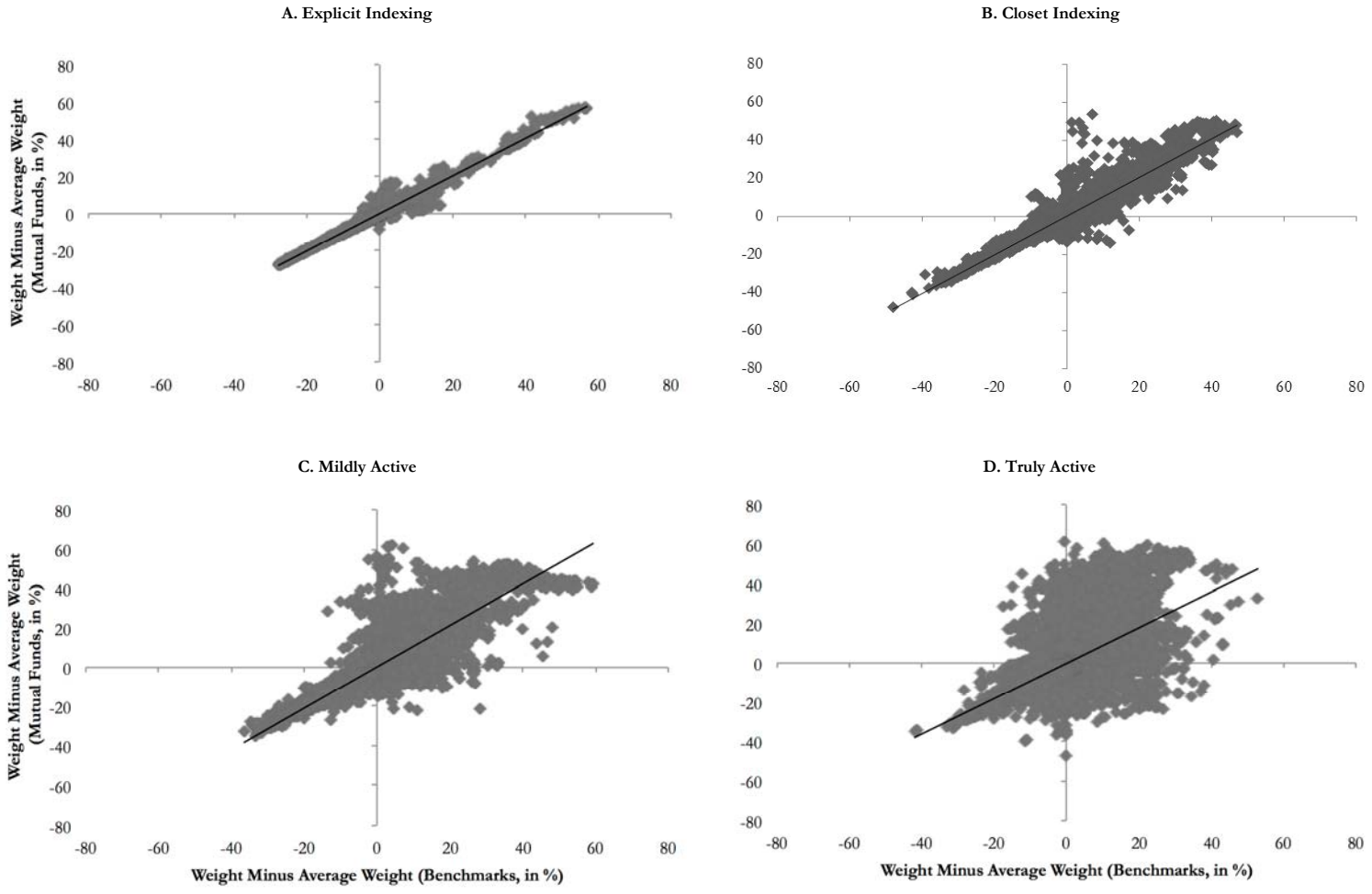


Figure 2
The Upgrade of Israel from Emerging to Developed Market

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

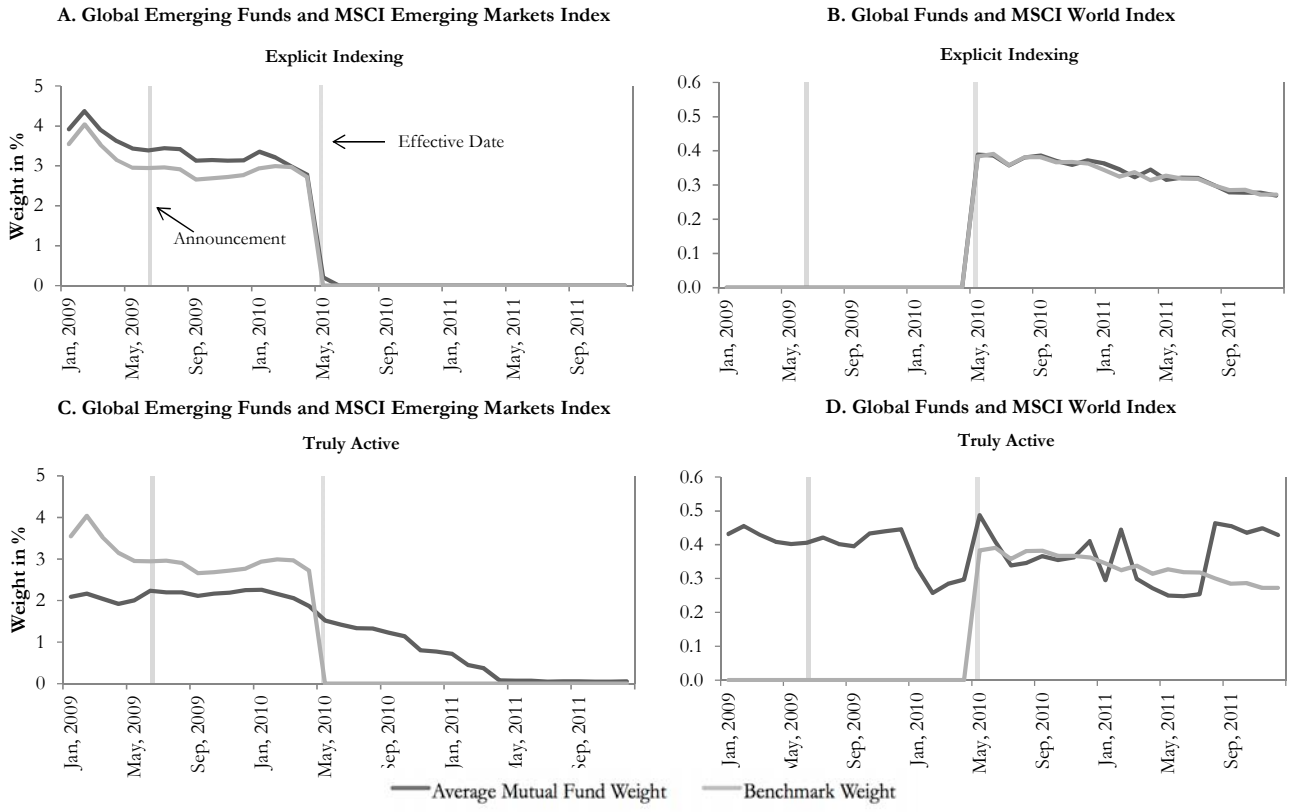
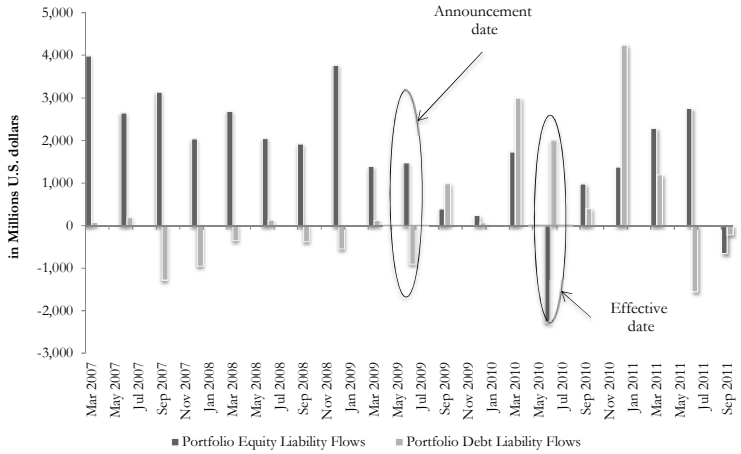


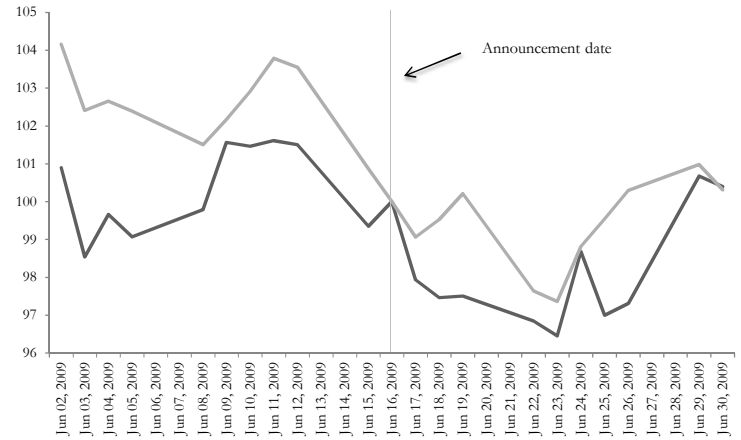
Figure 3
Benchmark Effect: Israel MSCI Upgrade

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

A. Israel Balance of Payments



B. Announcement Date



C. Effective Date

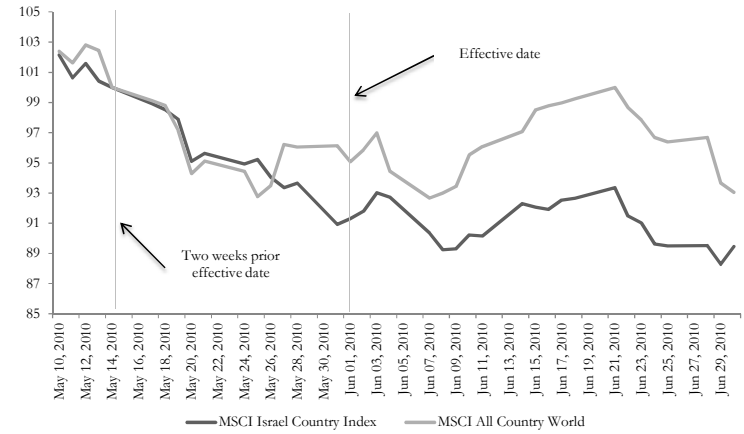
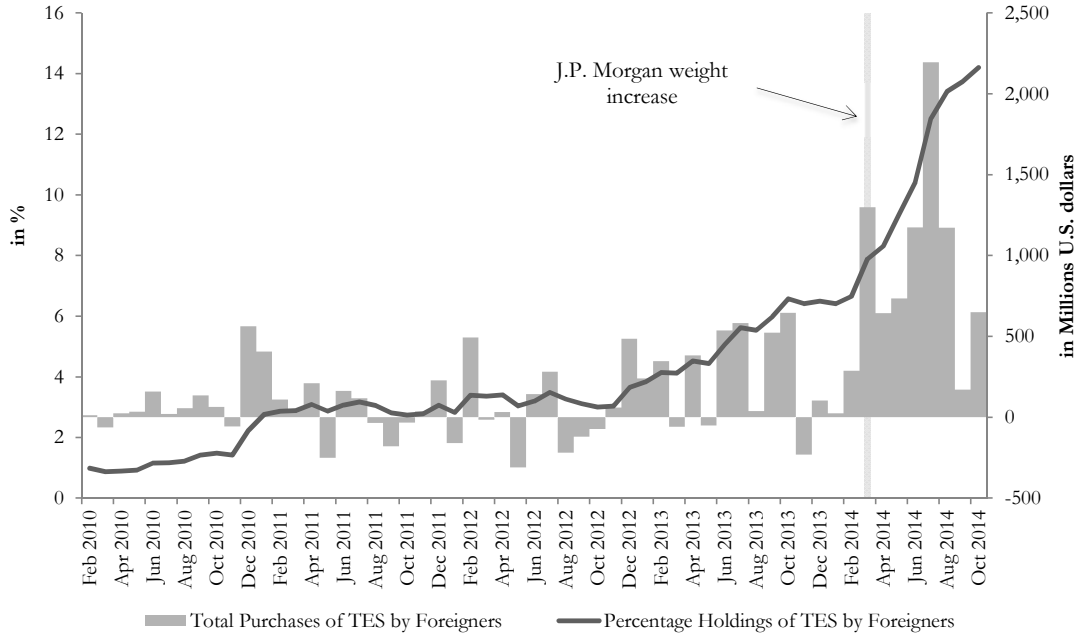


Figure 4
Benchmark Effect: Colombia Sovereign Debt Market

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

A. Participation of Foreigners in TES bonds in Colombia



B. Sovereign Debt Prices

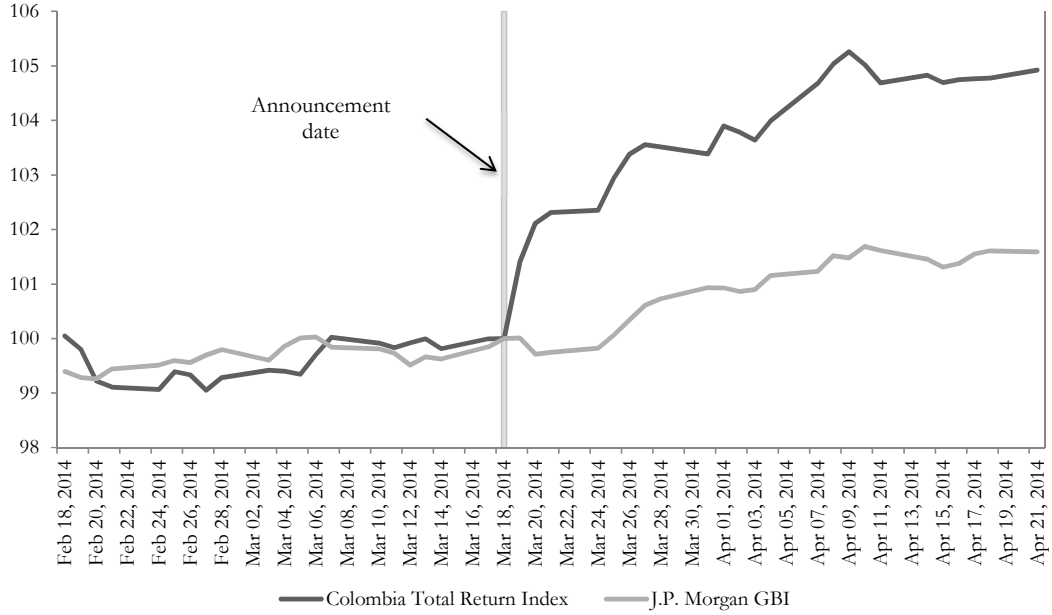
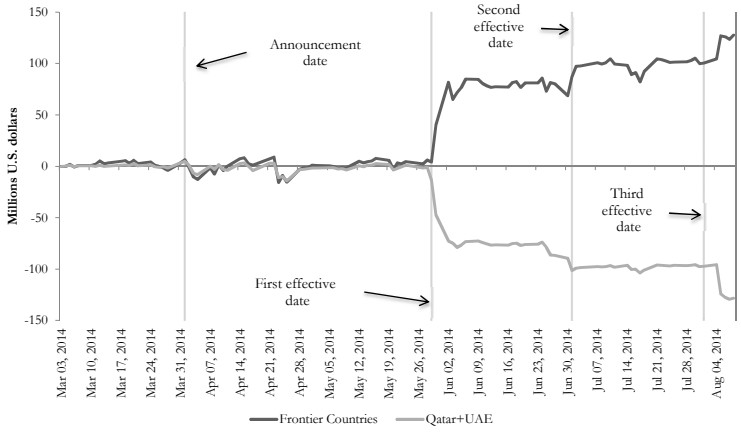


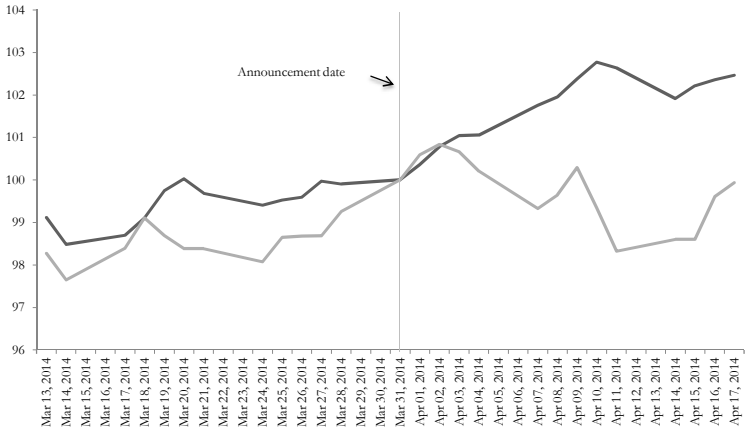
Figure 5
Contagion in Frontier Markets

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

A. Cumulative Flows from Frontier Passive Funds



B. Announcement Date



C. Effective Date

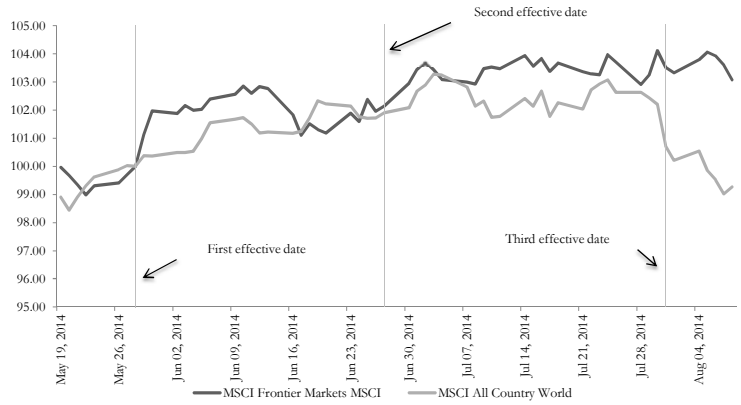


Table 1
Weights vs. Benchmark Weights

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

		Active Share Classification			
Explanatory Variables	Total Sample	Explicit Indexing	Closet Indexing	Mildly Active	Truly Active
A. Equity Funds					
Dependent Variable: Weights					
Benchmark Weights	0.773 ***	0.921 ***	0.919 ***	0.819 ***	0.499 ***
	(0.008)	(0.013)	(0.011)	(0.010)	(0.009)
Fund-Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Fund-Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
Country-Time Fixed Effects	No	No	No	No	No
Number of Observations	2,524,798	42,029	577,241	988,198	917,330
R-Squared	0.912	0.989	0.966	0.907	0.842
Dependent Variable: Weights					
Benchmark Weights	0.673 ***	0.846 ***	0.890 ***	0.648 ***	0.347 ***
	(0.011)	(0.018)	(0.012)	(0.014)	(0.011)
Industry Weights	0.358 ***	0.196 ***	0.168 ***	0.444 ***	0.497 ***
	(0.011)	(0.023)	(0.017)	(0.013)	(0.011)
Fund-Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Fund-Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
Country-Time Fixed Effects	No	No	No	No	No
Number of Observations	2,524,798	42,029	577,241	988,198	917,330
R-Squared	0.914	0.989	0.967	0.910	0.845
Dependent Variable: Weights					
Benchmark Weights	0.743 ***	0.981 ***	0.928 ***	0.680 ***	0.423 ***
	(0.010)	(0.018)	(0.009)	(0.017)	(0.014)
Fund-Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Fund-Time Fixed Effects	No	No	No	No	No
Country-Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
Number of Observations	1,665,785	37,764	458,745	657,672	511,604
R-Squared	0.929	0.997	0.976	0.922	0.864
Dependent Variable: Changes in Weights					
Changes in Benchmark Weights	0.679 ***	0.792 ***	0.787 ***	0.726 ***	0.522 ***
	(0.011)	(0.016)	(0.015)	(0.014)	(0.011)
Fund-Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Fund-Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
Number of Observations	2,166,004	35,647	483,721	858,626	788,010
R-Squared	0.113	0.481	0.162	0.108	0.089
B. Bond Funds					
Dependent Variable: Weights					
Benchmark Weights	0.697 ***	0.424 ***	0.935 ***	0.843 ***	0.223 ***
	(0.022)	(0.032)	(0.015)	(0.023)	(0.040)
Fund-Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Fund-Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
Number of Observations	153,402	723	57,338	57,335	38,006
R-Squared	0.750	0.991	0.834	0.741	0.689
Dependent Variable: Weights					
Benchmark Weights	0.369 ***	0.466 ***	0.552 ***	0.328 ***	0.027
	(0.025)	(0.075)	(0.034)	(0.035)	(0.053)
Industry Weights	0.378 ***	0.133 ***	0.349 ***	0.430 ***	0.348 ***
	(0.018)	(0.030)	(0.022)	(0.026)	(0.039)
Fund-Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Fund-Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
Number of Observations	76,405	606	31,835	28,851	15,113
R-Squared	0.752	0.983	0.778	0.732	0.745
Dependent Variable: Weights					
Benchmark Weights	0.412 ***	-	0.737 ***	0.053	0.718 ***
	(0.038)	-	(0.052)	(0.050)	(0.085)
Macro Variables as Controls	No	-	No	No	No
Fund-Country Fixed Effects	Yes	-	Yes	Yes	Yes
Fund-Time Fixed Effects	No	-	No	No	No
Country-Time Fixed Effects	Yes	-	Yes	Yes	Yes
Number of Observations	88,918	-	37,132	33,577	17,533
R-Squared	0.770	-	0.849	0.780	0.726
Dependent Variable: Changes in Weights					
Changes in Benchmark Weights	0.517 ***	0.347 ***	0.576 ***	0.499 ***	0.421 ***
	(0.038)	(0.054)	(0.053)	(0.047)	(0.102)
Fund-Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Fund-Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
Number of Observations	77,386	635	32,409	29,076	15,266
R-Squared	0.156	0.241	0.116	0.142	0.196

Table 2
Log Difference Country Benchmark Weights

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

	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 3
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 no-event and exogenous event times. Exogenous event times are those beyond the 25th and 75th tails of the distribution of the sample during the months that MSCI revises the indexes. No-event times are observations within those tails plus all the months with no revisions. Test difference coefficients is a linear tests with the difference of coefficients for normal and event times. All regressions are estimated in differences. The bottom part for equity funds reports OLS regressions for equity funds of the changes in mutual fund country weights against the changes in buy-and-hold benchmark weights and the changes in the exogenous component, with different sets of fixed effects. The estimations are only for December 2001-June 2002, when MSCI conducted changes in the construction of its equity indexes. Panel A displays results for equity funds and Panel B for bond funds. Funds are divided by their active share classification. Results are presented in levels and in differences. Estimations in levels do not contain observations where both weights and benchmark weights are zero. Standard errors are in parenthesis and clustered at the benchmark-time level.*, **, and *** denote statistical significance at 10, 5, and 1 percent, respectively.

		Active Share Classification			
Explanatory Variables	Total Sample	Explicit Indexing	Closet Indexing	Mildly Active	Truly Active
A. Equity Funds					
Dependent Variable: Changes in Weights					
Change in Buy-and-Hold Benchmark Weight	0.707 ***	0.816 ***	0.847 ***	0.712 ***	0.511 ***
	(0.016)	(0.029)	(0.023)	(0.023)	(0.015)
Change in Exogenous Component	0.378 ***	0.505 ***	0.477 ***	0.371 ***	0.253 ***
	(0.034)	(0.034)	(0.050)	(0.042)	(0.025)
Fund-Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Fund-Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
Number of Observations	2,092,625	34,739	479,150	834,466	744,270
R-Squared	0.086	0.237	0.157	0.080	0.055
Dependent Variable: Change in Weights					
Change in Benchmark Weights*Normal Times	0.720 ***	0.923 ***	0.851 ***	0.740 ***	0.557 ***
	(0.030)	(0.083)	(0.048)	(0.043)	(0.042)
Change in Benchmark Weights*Event Times	0.651 ***	0.731 ***	0.746 ***	0.625 ***	0.526 ***
	(0.022)	(0.030)	(0.028)	(0.029)	(0.022)
Fund-Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Fund-Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
Number of Observations	1,583,029	36,498	443,711	627,069	475,751
R-Squared	0.925	0.995	0.969	0.910	0.867
Test of Difference in Coefficients	0.069 **	0.192 **	0.105 *	0.115 **	0.031
Dependent Variable: Changes in Weights					
Changes in Buy-and-Hold Benchmark Weight	0.707 ***	-	0.837 ***	0.709 ***	0.644 ***
	(0.093)	-	(0.116)	(0.217)	(0.182)
Changes in Exogenous Component	0.904 ***	-	1.081 ***	1.022 ***	0.483 ***
	(0.248)	-	(0.303)	(0.367)	(0.118)
Fund-Country Fixed Effects	Yes	-	Yes	Yes	Yes
Fund-Time Fixed Effects	Yes	-	Yes	Yes	Yes
Number of Observations	3,387	-	934	1,553	885
R-Squared	0.701	-	0.665	0.717	0.739
B. Bond Funds					
Dependent Variable: Change in Weights					
Change in Buy-and-Hold Benchmark Weight	0.477 ***	-	0.598 ***	0.428 ***	0.290 *
	(0.051)	-	(0.060)	(0.053)	(0.155)
Change in Exogenous Component	0.409 ***	-	0.542 ***	0.385 ***	0.142
	(0.048)	-	(0.059)	(0.051)	(0.133)
Fund-Country Fixed Effects	Yes	-	Yes	Yes	Yes
Fund-Time Fixed Effects	Yes	-	Yes	Yes	Yes
Number of Observations	70,924	-	29,603	26,552	14,165
R-Squared	0.298	-	0.115	0.134	0.450
Dependent Variable: Change in Weights					
Change in Benchmark Weights*Normal Times	0.758 ***	-	0.960 ***	0.835 ***	0.319
	(0.148)	-	(0.167)	(0.237)	(0.292)
Change in Benchmark Weights*Event Times	0.320 ***	-	0.489 ***	0.233 ***	0.064
	(0.052)	-	(0.061)	(0.051)	(0.178)
Fund-Country Fixed Effects	Yes	-	Yes	Yes	Yes
Fund-Time Fixed Effects	Yes	-	Yes	Yes	Yes
Number of Observations	84,913	-	35,594	32,058	16,621
R-Squared	0.227	-	0.199	0.119	0.299
Test of Difference in Coefficients	0.438 ***	-	0.471 ***	0.602 **	0.255

Table 4

Capital Flows Variance Descomposition

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

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

Table 5

Event Study Analysis: Cumulative Returns

This table presents the results from an event study of all episodes of large benchmark changes. All returns are cumulative returns starting at the first day presented in the table. Raw returns are the net returns of the stock/debt market index or the exchange rate for the country. Excess returns are returns minus a global factor. Abnormal returns are residuals of a one factor CAPM model. The global factors used are the MSCI All Country World for equity, the J.P. Morgan GBI for local currency bonds, the J.P. Morgan EMBI for investment/non-investment grade, and the average change in exchange rates for all countries. Panel A presents the returns for the pooled events from the announcement and effective date. Panel B shows results for the announcement date(T_A). Panel C depicts results for the effective date (T_E). Positive currency returns denote a depreciation. Standard errors are in parentheses. *, **, and *** denote statistical significance at 10, 5, and 1 percent, respectively.

	Asset Prices			*Exchange Rates*		
Time	Raw Returns	Excess Returns	Abnormal Returns	Raw Returns	Excess Returns	Abnormal Returns
A. Announcement (T_A) and Effective Date (T_E)						
Returns on (T_A-2) and Returns on (TE-12)	0.05	-0.339	-0.223	0.04	0.063	0.172
	(0.261)	(0.242)	(0.211)	(0.110)	(0.071)	(0.194)
Cumulative Returns between (T_A-2) and (T_A) and Cumulative Returns between (T_E-12) and (T_E-10)	0.788 ***	0.205	0.431 **	-0.266 ***	-0.292 ***	-0.326 ***
	(0.262)	(0.214)	(0.220)	(0.103)	(0.091)	(0.102)
Cumulative Returns between (T_A-2) and (T_A+5) and Cumulative Returns between (T_E-12) and (T_E-5)	1.244 ***	0.583 **	0.745 ***	-0.274 **	-0.204 **	-0.247 **
	(0.307)	(0.276)	(0.274)	(0.125)	(0.107)	(0.119)
Cumulative Returns between (T_A-2) and (T_A+10) and Cumulative Returns between (T_E-12) and (T_E)	2.356 ***	1.932 ***	1.884 ***	-0.610 ***	-0.529 ***	-0.51 ***
	(0.430)	(0.384)	(0.408)	(0.199)	(0.166)	(0.191)
Cumulative Returns between (T_A-2) and (T_A+15) and Cumulative Returns between (T_E-12) and (T_E+5)	2.621 ***	1.521 ***	1.833 ***	-0.489 **	-0.358 **	-0.319
	(0.507)	(0.502)	(0.522)	(0.249)	(0.219)	(0.261)
Cumulative Returns between (T_A-2) and (T_A+20) and Cumulative Returns between (T_E-12) and (T_E+15)	2.224 ***	1.325 ***	1.34 **	-0.141	-0.184	-0.229
	(0.544)	(0.583)	(0.655)	(0.254)	(0.231)	(0.274)
Number of Observations	79	79	79	65	65	65
B. Announcement Date (T_A)						
Returns on (T_A-2)	-0.025	-0.346	-0.155	-0.006	0.004	-0.041
	(0.193)	(0.187)	(0.179)	(0.093)	(0.073)	(0.057)
Cumulative Returns between (T_A-2) and (T_A)	1.27 ***	0.613 ***	0.925 ***	-0.329 **	-0.394 ***	-0.447 ***
	(0.278)	(0.239)	(0.222)	(0.150)	(0.130)	(0.144)
Cumulative Returns between (T_A-2) and (T_A+5)	1.43 ***	1.073 ***	1.048 ***	-0.245 *	-0.171	-0.273 *
	(0.340)	(0.315)	(0.317)	(0.178)	(0.153)	(0.176)
Cumulative Returns between (T_A-2) and (T_A+10)	1.709 ***	1.686 ***	1.167 **	-0.59 ***	-0.413 **	-0.457 **
	(0.592)	(0.490)	(0.520)	(0.233)	(0.171)	(0.217)
Cumulative Returns between (T_A-2) and (T_A+15)	2.302 ***	1.678 ***	1.587 **	-0.513 **	-0.411 **	-0.465 *
	(0.647)	(0.609)	(0.662)	(0.271)	(0.239)	(0.309)
Cumulative Returns between (T_A-2) and (T_A+20)	1.94 ***	1.431 **	1.176 *	-0.206	-0.218	-0.383
	(0.637)	(0.684)	(0.742)	(0.345)	(0.313)	(0.361)
Number of Observations	47	47	47	39	39	39
C. Effective Date (T_E)						
Returns on (T_E-12)	-0.045	-0.266	-0.377	-0.063	0.035	0.307
	(0.363)	(0.319)	(0.317)	(0.079)	(0.057)	(0.231)
Cumulative Returns between (T_E-12) and (T_E-10)	0.082	-0.369	-0.278	-0.172 *	-0.141	-0.142
	(0.483)	(0.371)	(0.401)	(0.127)	(0.116)	(0.132)
Cumulative Returns between (T_E-12) and (T_E-5)	0.974 **	-0.104	0.31	-0.317 **	-0.252 **	-0.208 *
	(0.574)	(0.474)	(0.483)	(0.167)	(0.140)	(0.139)
Cumulative Returns between (T_E-12) and (T_E)	4.348 ***	3.174 ***	3.543 ***	-0.608 **	-0.679 **	-0.54 **
	(0.893)	(1.008)	(1.074)	(0.354)	(0.305)	(0.296)
Cumulative Returns between (T_E-12) and (T_E+5)	3.090 ***	1.301 *	2.185 ***	-0.452	-0.279	-0.097
	(0.820)	(0.862)	(0.856)	(0.479)	(0.419)	(0.465)
Cumulative Returns between (T_E-12) and (T_E+10)	2.64 ***	1.174	1.576 *	-0.043	-0.134	0.021
	(0.972)	(1.034)	(1.203)	(0.375)	(0.343)	(0.425)
Number of Observations	32	32	32	26	26	26