Benchmark Indexes, Firm Financing, and Real Effects: Evidence from a Global Natural Experiment

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Abstract

This paper studies how inclusion in benchmark indexes affects firms' cost of capital, financing activity, and investment. For identification, it exploits one of the largest methodological changes in the global equity benchmark index by MSCI, reweighting 2,508 firms in 49 countries. Consistent with the literature, firms that see their weight increase experience positive equity market returns relative to those that see their weight decrease. In the years following the index rebalancing, firms that experience an increase in their index weight: (i) raise both more equity and debt financing, (ii) maintain a stable financial structure, and (iii) have higher capital expenditures. Our findings provide systematic evidence on the effects of benchmark indexes at the micro level. They are consistent with the view that index inclusion entails a financial subsidy and has real consequences.

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1. Introduction

Asset managers have become an important intermediary in global financial markets, with an estimated portfolio of 85 trillion U.S. dollars (USD). The majority of funds in this industry track their performance against benchmark indexes (Ma et al., 2019). These indexes have become more important over time because of the growth of passive and exchange-traded funds (Anadu et al., 2019). Even active funds are following benchmark indexes more closely in their investment strategies (Cremers et al., 2014, Raddatz et al., 2017).

At the theoretical level, being part of a benchmark can have important consequences for firms. Benchmark firms experience a permanent institutional investors demand for their stocks, independent of their risk characteristics. Benchmark stocks do not have close substitutes for investors and are not arbitraged away by other investors. This increased demand for their stocks generates an "index inclusion subsidy" that leads to more investment (Kashyap et al., 2019). Although institutional investor demand plays an important role in asset pricing, firms do not need to respond by changing the number of shares available in the market (Koijen and Yogo, 2019).

At the empirical level, several papers show that inclusion in an index has important effects on the prices of the securities included in the index (Chen et al., 2004; Calomiris et al., 2019; Dathan and Davydenko, 2019). Moreover, whereas some papers show that firms in the index respond by investing more, the mechanism through which this investment is financed is unclear. Some firms might choose to raise more of the highly priced securities included in the index (Massa et al., 2005; Cao and Gustafson, 2018). Other firms might choose to obtain additional financing through other financial intermediaries, most notably, banks (Williams, 2018). Other firms might even decide to finance their investment with internal sources or through cash holdings, in response to the stricter disciplinary role imposed by foreign investor ownership (Bena et al., 2017).

In this paper, we take advantage of a natural experiment to systematically document the effects of benchmarks on firm financing decisions and corporate investment. In particular, we exploit one of the largest rebalancing in a global benchmark index to provide systematic evidence

on the importance of benchmark indexing for the cost of capital, firm financing decisions, and corporate investment. We use the index rebalancing in the Morgan Stanley Capital International (MSCI) global equity indexes that took place in 2000, previously employed by Hau et al. (2010) and Hau (2011) to study the impact on prices and exchange rates.

This event helps us study the evolution of firms' cost of capital, issuance activity in equity and debt loan markets, and financial statements. The event has a number of appealing features for identification. First, the rebalancing was due to a methodological decision by MSCI to move from market capitalization-based to free float market capitalization-based weights, and thus, was not related to a change in firms' fundamentals. Second, it was unexpected by market participants and firms. Third, it led to important variation in benchmark weights (i.e. the relative importance of firms in the index) for 2,508 firms in 49 countries, exogenously resorting firms in terms of how much they should matter for investors following a widely used benchmark.

Relative to previous research, this event is attractive to identify the financial and real effects of benchmarking. Most of the research analyzing how benchmark indexes affect stock prices focuses on the effects of additions (and deletions) of firms in (from) relevant benchmark indexes. These studies exploit the announcement of these events and study how stock prices respond in the days after the announcement. These types of studies are well suited to identify changes in returns measured at high frequency data. However, there are at least two problems to identify changes in firms' corporate decisions, which typically respond at lower frequencies (months or years). First, the inclusion (exclusion) in the index might be due to good (bad) past performance. If that is the case, it is difficult to separate whether the change in corporate decisions is a result of good (bad) prior performance or the inclusion (exclusion) in the benchmark. Second, as corporate decisions are observed at lower frequencies, there might be other events affecting firms that might confound the empirical exercise. The latter is especially problematic when few firms are affected, which is typically the case when studying with additions and deletions from indexes. In this case, the problem is finding an appropriate counterfactual for firms included/excluded from indexes.

We use this global natural experiment with a difference-in-difference strategy that exploits the variation in benchmark weights across firms caused by the MSCI's decision to rebalance their indexes to study the effects of benchmark indexing in corporate financing and investment. Our main findings can be summarized as follows. First, firms positively reweighted during the index redefinition experience higher equity returns relative to negatively reweighted firms in the years following the benchmark redefinition. Specifically, upweighted stocks experienced a revaluation of about 14 percent relative to downweighted stocks following MSCI's redefinition announcement (2000-02). In contrast, bond trading prices of upweighted and downweighted firms followed an almost identical trend before and after MSCI's announcement (1998-2002).

Second, benchmark firms react to the changes in benchmark weights by changing their issuance activity behavior. The probability of issuing equity grew 12 percentage points faster for upweighted firms than for downweighed firms following the MSCI redefinition. Interestingly, the MSCI redefinition also seemed to affect firms' borrowing behavior through banks. The probability of issuing syndicated loans increased by 9 percentage points faster for upweighted firms than for downweighted firms following the benchmark redefinition. The total amount of debt accumulated in firms' balance sheets grew 17 percent faster for upweighted firms than for downweighted firms in the years following the redefinition. We do not find any differential trends between upweighted and downweighted firms in their issuance activity in public debt markets (bond markets), operating income, and cash savings. Therefore, we can attribute most of the changes in investment to changes in equity and debt financing (external sources of financing) and most of the changes in debt to changes in firms' bank borrowing behavior.

Third, we show that the benchmark rebalancing ends up having important real effects for firms. The amount of assets and capital expenditures grew 10 percent and 19 percent faster for upweighted firms than for downweighted firms in the years following the benchmark redefinition. These effects were relatively larger for relatively riskier firms in terms of cash flows. Because changes in assets and debt were of similar magnitude, firms' leverage ratios remained constant, so

firms maintained their capital structure positions. Moreover, since the increase in debt was intermediated through banks, firms changed their debt structure positions towards more bank debt relative to public debt. Importantly, firms experiencing a different rebalancing during the MSCI redefinition followed similar time trends in equity prices, issuance probabilities, and capital expenditures in the period before the rebalancing.

Overall, our results provide plausible causal evidence on the importance of benchmark indexes. We show that a firm experiencing an increase in its relative importance in the equity benchmark index experiences a decline in its equity cost of capital and a higher demand for external financing, which leads to an increase in investment. The firm seems to find value in raising debt in a similar proportion to the increase in its equity value, and to do so through banks rather than public debt markets. Interestingly, the firms included in our analysis have, by definition, access to public equity markets, which suggest that these firms are not likely to be financially constrained. The evidence in this paper suggests that even for mature firms, changes in the equity cost of capital due to equity benchmark indexing are an important determinant of the level of equity financing, debt financing, debt structure, investment, and firm growth.

In line with the previous research, we find that higher importance of a firm in a benchmark leads to more investments. However, our results on the effects of changes in benchmark weights across constituents provide alternative evidence on the financial effects associated to benchmarking. We show that an increase in the benchmark weight of a firm leads to a decline in its cost of capital and an increase in its probability of issuing equity and borrowing debt from banks. The discrepancies between our results and the results in the literature might be due to the nature of index additions, which compose firms that might have had a high propensity to issue before their inclusion in the indexes. In our paper we do not analyze additions, but rather a change in index weights, which provides a cleaner environment to test the effects of benchmarking on firms' issuance activity behavior.

A related strand of the literature encompasses the empirical firm-level papers studying to what extent changes in the supply side of capital influences the demand side (firms' issuance activity).[5] Most of this literature focuses on debt markets and find evidence consistent with the notion that changes in the supply-side of debt affect firms' debt issuance behavior (Kashyap et al., 1993; Bolton and Freixas, 2006; Leary 2009; Lemmon and Roberts, 2010; Jiménez et al., 2012; Erel et al., 2012; Adrian et al., 2013; Becker and Ivashina, 2014; Crouzet, 2018). Fewer papers focus on the financing and real effects associated to supply-side expansions in equity markets. An exception is the financial liberalization literature, which studies changes in stock prices and investments of firms in emerging economies after the opening of domestic equity markets to foreign investors during the 1980s and 1990s. The main finding is that firms most affected by the equity market liberalizations experience stock revaluations in the following years, but there is no evidence that this change in the cost of capital translated in higher issuance activity and more investments (Stulz, 1999; Chari and Henry, 2004, 2008). We know even less about how variations in the supply of equity capital affect firms' debt issuance activity behavior. The type of shock that we study is similar to a stock market liberalization as it that leads to an expansion in the equity investor base. We contribute to this literature by showing that even in open and liberalized equity markets, expansions of the equity investor base for non-financially constrained firms can affect firm financing in equity and debt markets as well as investment policies.

Our paper adds to the literature studying capital and debt structure dynamics. One of the most influential theories of capital structure is that firms aim at optimal leverage ratios after considering the tax benefits of debt and the costs of financial distress (Taggert, 1977; Jalilvand and Harris, 1984; Myers, 2001; DeAngelo and Whited, 2011). The main prediction is that firms close to their optimal leverage positions would manage liabilities to stay at the target, issuing additional debt after positive shocks to the firm equity value and reducing borrowing after negative shocks

[5] In a frictionless financial system (Modiliani-Miller theorem) firms' issuance activity behavior should be independent of supply-side capital conditions. However, supply-side shocks may be transmitted to borrowing firms in the presence of financial frictions.

(Leary and Roberts; Malenko and Tsoy, 2020). However, the empirical evidence on whether firms rebalance their capital structure to stay close to a target is mixed, which might be due to heterogeneous samples of firms analyzed (not all firms would be close to the target), readjustment costs, and/or the inadequacy of the techniques used (Myers, 2001; Leary and Roberts, 2005; Korteweg, 2010; Graham and Leary, 2011). The literature on debt structure typically studies the factors affecting the amount of bank loans and market bonds that firms use. This distinction is important because bank loans reduce information asymmetries and provide more financial flexibility, whereas bonds might constitute a cheaper form of financing for firms with access to capital markets (Diamond,1991; Bolton and Scharfstein, 1996; Hackbarth et al., 2007; Ivashina et al., 2011; Colla et al., 2020; Schwert, 2020). This literature argues that changes in firms' values might affect the loan-bond debt composition that firms might find optimal to use. However, the predictions about the direction of the switch in debt composition are mixed. For instance, firms' preference for bank debt might decline as firms' values increase because information asymmetry problems between borrowers and lenders become less important (Hoshi et al., 1993; Chemmanur and Fulghieri, 1994; Houston and James, 1996; Hackbarth et al., 2007; Rauh and Sufi, 2010; Colla et al., 2013). Another possibility is that the preference for bank debt increases with firms' values because of the benefits associated to the more efficient liquidations made by banks and/or cheaper bank financing associated to the higher firms' collateral (Berlin and Loeys, 1988; Park, 2000; Lin, 2016; Cerqueiro et al., 2014).

Our paper provides an ideal setup to study whether firms change their capital and debt structures after a shock to their equity values because of four main reasons: (i) We analyze large and mature firms that were arguably close to their optimal leverage and debt structures ratios; (ii) we use an incremental approach that analyzes equity, bonds, and loan issuances, instead of just focusing on the balance-sheet composition of firms at one point in time; (iii) we exploit an exogenous shock that only affected the cost of capital in equity markets; and (iv) the time period is long enough to estimate whether these firms reacted to that shock by changing their debt

financing behavior and debt structure positions. Our results that benchmark constituents quickly increase debt and equity issuances, and in similar proportions, after a supply expansion in equity markets is consistent with the idea that these firms find value on keeping their leverage positions stable. Our findings are also consistent with the notion that bank debt becomes relatively more attractive than bond debt when firms decide to raise new capital after a positive shock to the firms' equity values.

The rest of the paper is organized as follows. Section 2 provides a theoretical framework to understand how benchmark indexes affect firms' decisions. Section 3 describes our empirical strategy. Section 4 details the institutional setting and describes the MSCI global rebalancing. Section 5 presents the data and summary statistics. Section 6 reports our results for asset prices and issuance activity. Section 7 describes our findings for capital expenditure and other balance sheet variables. Section 8 concludes.

2. Theoretical Framework

Several important propositions in finance rely on the traditional idea that investors can buy and sell stocks without significantly affecting the price, as any abnormal returns should quickly reverse (Shleifer, 1986). For instance, the efficient market hypothesis on asset pricing states that there is one-to-one link between the expected return of a stock and the fundamental economic risk of the underlying asset, which leads to the capital asset pricing model (CAPM). These propositions rely on the idea that different stocks have close substitutes, and thus movements in stock prices do not depend on changes in the supply of funds (investors' demand). Thus, the demand-price curve for a security would be nearly horizontal. However, excess of demand may affect prices if stocks do not have close substitutes. In this case, changes in investors demand might affect asset prices, generating a price pressure effect and a downward-sloping demand curve (Scholes, 1972; Shleifer, 1986). Building on this idea, the market timing literature argues that there are temporary deviations from the correct asset pricing arising from changes in demand by irrational investors. Because the

net present value of investments varies with the cost of capital (discount rate of investment projects), rational managers can take advantage of the mispricing to issue equity and invest (Stein, 1996).

More recently, Kashyap et al. (2019) develop a capital asset pricing model in which a substantial part of the price variation across stocks is not risk related but caused by fundamental differences in demand by the fund management industry. They propose a two-factor CAPM model where asset pricing accounts for the presence of portfolio managers. Because fund managers performance is typically measured against benchmarks, firms included in benchmarks have an inelastic demand for their stocks regardless of firms' cash flows (risk) characteristics. As a result, firms included in a benchmark are effectively subsidized by asset managers. Due to the benchmark subsidy, firms in the benchmark have lower cost of capital and thus value investment projects higher than otherwise identical firms outside the benchmark. The inelastic demand of managers for benchmark firms benefits the investment on riskier projects relatively more. As cash-flow riskiness decreases, so does the benchmark inclusion subsidy, converging to zero for risk-free projects.

Therefore, with portfolio managers, benchmarking is an important factor that influences expected returns and firms in the benchmark should, in theory, account for the subsidy. This model is also in contrast with the corporate finance literature and traditional asset pricing models where the value of an investment is independent of the entity considering it. Under the Kashyap et al. (2019) model, the cost of capital (discount rate) for a given investment opportunity differs across firms depending on whether or not they are included in the benchmark. These arguments imply that cost of capital models that do not account for the presence of fund managers are misspecified because with portfolio managers, benchmarking is a key factor affecting expected returns. Under this framework the size of the asset management industry has important consequences for real corporate decisions.

We use the framework in Kashyap et al. (2019) as the main reference model to set hypotheses on how changes in benchmarks can have implications on firms' asset prices and investment decisions. We use the literature on capital structure and debt structure to set hypotheses on how changes in benchmarks might affect firms' issuance activity in different capital markets.

Since asset managers around the world measure their performance relative to the global benchmark index, an increase in the relative importance of a firm in that benchmark index (the benchmark weight), will lead to an increase in the demand for that stock, which would increase its price. Under this framework, this is a result of the portfolio managers' inelastic demand for stocks in the index, which leads to our first hypothesis.

H1. An increase in a firm's benchmark weight leads to an increase in its stocks' prices

The decrease in the equity cost of capital because of the increase in the benchmark inclusion subsidy could have consequences for corporate issuance activity. Notice that if the increase in the benchmark inclusion subsidy affects stock prices and financial markets are imperfect, this might affect the relative cost of issuing equity relative to bonds. Therefore, our next hypothesis is that firms take advantage of the decline in the equity cost of capital by issuing more equity.

H2. An increase in a firm's benchmark weight leads to an increase in its equity issuance activity

A non-rejection of H2 would raise a new set of hypotheses. If firms decide to raise external financing in response to the changes in benchmark weights, will they issue only equity, or would they find value on issuing debt as well? If they issue debt, what type of debt would firms find more valuable market bonds or bank loans?

Most of the research on capital structure is devoted to understanding the proportion of debt and equity financing used by firms. One of the most influential theories in this field, the trade-off theory, argues that a value-maximizing firm would target an optimal leverage ratio that trades off the present values of tax benefits of debt against the costs of financial distress (Taggert, 1977; Jalilvand and Harris, 1984; Myers, 2001; DeAngelo and Whited, 2011). In contrast, the pecking

order theory argues that managers do no try to maintain a capital structure, but their financing decisions are highly influenced by the costs of adverse selection. In the presence of financing needs, this theory predicts that firms would prefer to use internal (rather than external) financing and debt (rather than equity) when raising external financing (Myers, 1984, 2001).

The tradeoff theory translates into the empirical prediction that a firm would manage liabilities to stay at the target, issuing additional debt after positive shocks to the firm equity value and reducing borrowing after negative shocks (Malenko and Tsoy, 2020). To accurately test this prediction, one must focus on mature firms, which are arguably close to their optimal levels of leverage and have easy access to equity and debt markets (Myers, 2001; Hovakimian et al., 2004; Graham and Leary, 2011). Because we analyze large and mature firms, issuance activity data, a long time period, and a shock only affecting firms' equity values, our study provides a good setup to analyze whether firms find value on keeping their capital structure stable by coupling equity issuances with debt issuances. This leads to the following hypothesis.

H3. An increase in a firm's benchmark weight leads to an increase in its debt issuance activity

Most of the research on capital structure discusses the optimal amount of leverage, but it does not provide information on the type of debt used. This issue is important because the two primary sources of debt for firms, bank loans and market bonds, have quite different characteristics. One key difference is that banks are better than markets in monitoring and gathering information about borrowers than bond investors, and thus banks reduce information asymmetry problems and can provide more financial flexibility when firms are in financial distress through lower renegotiation costs or more efficient liquidations (Diamond,1991; Bolton and Scharfstein, 1996; Ivashina et al., 2011; Colla et al., 2020). However, bank debt is not always preferred because costly monitoring is embedded in debt contracts (Hackbarth et al., 2007; Schwert, 2020). The predictions in the literature on how a shock to the firms' values might affect debt structures are mixed. To the extent that collateral values are affected by asset prices (Kiyotaki and Moore, 1997), firms' preference for

bank debt might decline as firms' values increase because information asymmetry problems become less important (Hoshi et al., 1993; Chemmanur and Fulghieri, 1994; Houston and James, 1996; Hackbarth et al., 2007; Rauh and Sufi, 2010; Colla et al., 2013). In contrast, other papers argue that the benefits of efficient liquidations made by banks, and thus the value of bank debt, increases with the collateral value of the borrowers (Berlin and Loeys, 1988; Park, 2000; Lin, 2016). Another reason why bank debt might be preferred as firms' collateral values increase is that banks are senior to bond holders in the event of default, and thus increasing collateral might translate into relatively cheaper bank financing for firms (Cerqueiro et al., 2014). In our setting, the increase in the equity values imply higher collateral values, which might lead to changes in the firms' bond-loan debt composition if firms decide to raise new debt, which is our next hypothesis. Given the mixed predictions in the literature about the type of debt issued, we see this issue as an empirical question that needs of further evidence to be resolved.

H4. An increase in a firm's benchmark weight leads to a change in its bond-loan debt composition

If an increase in benchmark weights translates in a reduction in the firms' cost of capital (H1), these firms might be more likely to increase their capital expenditures as their valuation of investments increases. Therefore, an increase in the benchmark inclusion subsidy could lead to an increase in investments, which is our next hypothesis. Given that the reduction in the cost of capital in our event study is triggered by a supply-side expansion by investors rather than by new investment opportunities for firms, another possibility is that the reduction in the cost of capital translates in an increase in the firms' cash savings rather than an increase in investments (Erel et al., 2012; Bruno and Shin, 2017; Acharya et al., 2020).

H5. An exogenous increase in a firm's benchmark weight leads to an increase in investments

One last hypothesis stems from Kashyap et al. (2019) model and regards the riskiness of the firms' cash flows. Specifically, riskier types of firms, as measured by their cash flow volatility, would have a larger benefit from the benchmark inclusion subsidy, which leads to the last hypothesis.

H6. An exogenous increase in a firm's benchmark weight increases investments more for firms with a riskier cash flow

3. Empirical Strategy

Testing the hypotheses in the theoretical framework is inherently challenging. For that, we need a change in the benchmark inclusion subsidy that is both unanticipated by firms and not due to firms' past performance. Much of the existing literature on how changes in benchmark indexes affect financial markets is based in index additions and deletions. These types of events can be studied with high frequency data, where one can exploit the timing of the announcements of additions and deletions to gauge their price effects. However, additions and deletions are generally caused by firms' past performance. As a firms' stock price gradually increases (decreases) a firm is more likely to enter (exit) a benchmark index. In those cases, using these events to analyze changes in corporate financing and investment becomes a more difficult task since it is impossible to distinguish whether changes in capital raising or investments comes from the past performance or from the benchmark entrance/exit. Ideally, one would like to have a setting where an index provider decides to change the relative importance of firms in an index, for reasons that are unrelated with firms' performance.

In this paper, we exploit the MSCI index redefinition in 2000, where MSCI decided to change their benchmark indexes from market capitalization-based indexes to free float market capitalization-based indexes. MSCI decided to move to this type of indexes in order to better represent the world stock markets based on the available shares of each company. Thus, the change was not due to the previous performance of firms around the world. Additionally, this rebalancing was unexpected by market participants and firms as highlighted in Hau et al. (2010) and Hau (2011). Importantly for our empirical strategy, this decision led to important variation in firms' benchmark weights, which allows to test the different hypotheses in our theoretical framework. Thus, we use this global natural experiment with a difference-in-difference strategy that exploits

the variation in benchmark weights due to this event in order to study how firms' asset prices, issuance activity, and investments respond to changes in the benchmark subsidy.

The baseline empirical framework that we use is a fixed effect ordinary least squares regression with a difference-in-difference approach. We use the following type of specification throughout the analysis,

$$y_{it} = \theta_i + \theta_t + \beta X_i D_i^{Post} + Z_{cjt} + \varepsilon_{it} \quad (1)$$

where y_{it} is our variable of interest (asset prices, probability of issuing securities, and balance-sheet variables) for firm i at time t. X_i is our treatment intensity variable, where we use two different alternatives. In the first alternative, X_i is an indicator variable that is 1 if a firm has a positive change in the benchmark weight due to MSCI's rebalancing (upweighted firms), and 0 otherwise (negative change in weight, or "downweighted firms"). In our second alternative, X_i represents the percent change in the benchmark weight due to the rebalancing, defined as $\Delta w_i = (w_i^n - w_i^0)/w_i^0$, where w_i^n and w_i^0 represent the old and new index weights for each index stock i.[6] D_i^{Post} is an indicator variable that is 1 in the period after the rebalancing is announced and 0 otherwise. Additionally, θ_i is a firm fixed effect and θ_t are time fixed effects, Z_{cjt} are controls that might vary at the country-industry-time level, while ε_{it} is an error term.

Notice that the coefficient β estimates the differential change in the variables of interest for firms affected by the treatment, comparing the post and pre period around the index rebalancing. There are two important identifying assumptions in this strategy. First, that firms that differ in the intensity of the treatment are similar in terms of unobservable variables.[7] To analyze the extent to which this assumption might hold, we analyze the pre-trends of the variables of interest to see if there is a parallel time evolution for firms with different exposure to our treatment

[6] As robustness, we also follow Hau et al., (2010) and Hau (2011) and construct the change in percentage terms relative to the midpoint as $\Delta w_i = {w_i^n - w_i^0}\Big/{\frac{1}{2}(w_i^n + w_i^0)}$.

[7] They could potentially be different in terms of observable firm characteristics and in that case on would try to control for differences in observables characteristics.

variable. This helps to support the assumption by providing evidence that the potential observable or unobservable characteristics that might be different, are not affecting them in a differential way in the pre-rebalancing period. The second identifying assumption is that that during the time of the reform, there are no other shocks happening at the country or at the industry level that might differentially affect firms in a way that is correlated with the treatment intensity. One noticeable feature of our data is that we have variation in different dimensions that might help provide support to this assumption. For instance, we have the data of firms outside the benchmarks as well as firms with different treatment intensity within the same industry and the same country. Therefore, one can control for shocks that are happening at the same time of the MSCI rebalancing that vary at the industry-time or country-time level.

4. The MSCI Global Index Redefinition

Morgan Stanley Capital International (MSCI) indexes are the most widely followed benchmarks by institutional investors around the world (Hau, 2011; Cremers et al., 2016). The index with the largest international coverage is the MSCI All Country World Index (ACWI), which includes 49 developed and emerging equity markets. In February 2000, MSCI communicated that it was considering reviewing its index weights policy. In December 2000, MSCI officially announced a major redefinition of its international equity indices.

The MSCI index methodology changed in two aspects. First, the stock selection and index weights changed from being based total market capitalization to be based on free-float market capitalization. The free float of a security is the proportion of shares outstanding available for purchase by international investors. Free-float securities include those held by households, investment funds, mutual funds, pension funds, insurance funds, social security funds, and security brokers. Non-free-floating shares include those held by governments, companies, banks (excluding trusts), principal officers, board members, and employees. Non-free float is also defined in terms of foreign ownership restrictions. Hence, the redefinition meant a change in weights

throughout the stocks composing the global index. The second goal of this change in methodology was to enhance total market representation. In its new indices, MSCI targeted a free-float-adjusted market representation of 85 percent within each industry and country, compared to the 60 percent share based on market capitalization in the old index. Both changes entail rule-based weight changes that do not involve subjective judgments about the growth prospects of a stock. The exogenous changes in weights across index stocks implied de facto changes in portfolio allocations of institutional investors around the world.

The implementation took place in two steps. In the first phase, effective on November 31, 2001, MSCI implemented half of the change resulting from the free float adjustment for all existing index constituents and, simultaneously, include all the new constituents resulting from the increase in coverage to 85% at half of their free float-adjusted market capitalization. The second phase took place in May 31, 2000, when the remaining adjustments to fully account for the change in methodology were implemented.

5. Data and Summary Statistics

We retrieved firm-level data on the constituents' ISIN codes and individual change weights due to the change in methodology in 2000 by directly requesting the data to MSCI. This dataset includes 2,508 MSCI constituents from 49 countries. Appendix Table 1 shows the number of MSCI constituents per country and the changes in weights due to the change in MSCI methodology in 2000. A total number 1,742 of stocks were reweighted during the index revision process. The new index methodology also led to an addition of 480 new stocks and the removal of 286 stocks.

To compute the changes in benchmark weights for each of the firms composing the index we use the provisional weights announced in May 2001. An important feature of this event is that most of the variation in benchmark weights occurred across the downweighted stocks (Appendix Figure 1). All upweighted firms experienced an increase in their benchmark weight of about 1 percent, whereas there was more heterogeneity across downweighted firms. The average change

in weight for these firms was of minus 46 percent, with a standard deviation of 30 percentage points (Table 1). Another important feature is that the changes in stock weights led to aggregate changes in weights at the country level, which comes from the fact that the proportion of free float shares varied across countries (Appendix Table 1).

To analyze the effects of the MSCI rebalancing on firms' issuance activity, we merge the MSCI dataset with transaction-level data on equity and debt issuances in domestic and international (cross-border) markets. The data come from Refinitiv's Security Data Corporation (SDC) Platinum, which provides transaction-level information on new issuances of common and preferred equity, syndicated loans, as well as publicly and privately placed bonds. Because the analysis focuses on corporate financing, we exclude all public-sector issuances, comprising issuances by national, local, and regional governments, government agencies, regional agencies, and multilateral organizations. We also exclude mortgage-backed securities and other asset-backed securities. We retrieve daily data on equity and bond trading prices data from Datastream. To analyze firms' balance sheet data, we merge the MSCI constituent's dataset and the transaction-level data from SDC with annual balance sheet information for publicly listed firms from Worldscope.

The transaction-level dataset covers 2,029 firms (about 81 percent of the total benchmark constituents) and 82,742 daily security issuances: 9,187 equity issuances, 55,114 bond issuances, and 18,441 syndicated loan issuances (Table 1). This dataset is organized as an unbalanced firm-level panel of daily observations with positive issuances during 1989-2016. We generate a completely balanced panel dataset by collapsing issuances at the monthly level and then adding zeros to the firm-monthly observations without issuance activity. The balance sheet dataset is organized as a balanced panel of 1,863 constituents and annual balance sheet information for each firm during 1991-2016.

6. The Benchmark Effect on Asset Prices and Issuance Activity

The MSCI redefinition in 2000 seemed to trigger a cross-sectional shock to the stock prices of the firms composing the benchmark index. Before the MSCI redefinition, stock prices of upweighted and downweighted stocks followed similar trends (Figure 1, Panel A).[8] In contrast, bond prices of upweighted and downweighted firms followed an almost identical trend before and after the MSCI redefinition (Figure 1, Panel B). The benchmark effect on stock prices is consistent with the notion that the news of the MSCI redefinition was unanticipated by investors and thus exogenous to any other type of embedded information.[9]

Upweighted and downweighed firms also followed similar trends in terms of equity issuance activity up to the MSCI redefinition announcement. Since then, upweighted firms increased their equity issuance behavior relative to downweighted constituents (Figure 2, Panel A). Upweighted firms captured 40 percent of the total equity raised (by upweighted and downweighted firms) during 1997-99. This share increased to 54 percent during the MSCI announcement and implementation period (2000-02), and bounced back to pre-reform levels (41 percent) during 2003-05 (Table 2). In contrast, bond issuances by both group of firms followed similar trends before and after the MSCI reform (Figure 2, Panel B). Interestingly, the MSCI redefinition not only seemed to affect the firms' probability of issuing equity, but also the firms' borrowing behavior through bank credit (Figure 2, Panel C).

We use difference-in-difference estimations to formally assess the cross-sectional changes in trading prices and issuance activity after the MSCI redefinition in the early 2000. We estimate different regressions for different financial markets (equity, bonds, syndicated loans), which we show in different panels. For each variable, we estimate the same specification as in Equation 1, where the dependent variable y_{it} is the trading price or the probability of issuing: a dummy that equals 1 if a firm issued equity/bonds/syndicated loans and 0 otherwise (no issuance), and a

[8] Appendix Figure 2 shows the same trends for the stock returns (instead of prices).
[9] These results are also consistent with Hau et al. (2010) and Hau (2011) and with the notion that changes in investors demand affect stock prices.

continuous variable that includes the amount raised (log of 1 + the amount raised), for firm i at time t. All variables are collapsed within two periods, each composed by ten quarters (prior and post the MSCI change in methodology in the first quarter of 2000): "pre period: 1997Q4 – 2000Q1" and "post-period: 2000Q2 – 2002Q3." In some regressions, the change in weight, Δw_i, is a dummy variable that equals 1 if a firm obtained a positive reweight and zero otherwise (negative reweight). In this specification, β_1 measures the changes trading prices and issuance activity for the negative shocked firms after the MSCI redefinition, whereas β_2 measures the differential effects for the firms with positive reweight. In alternative specifications, Δw_i is the percent change in weight, which provides continuous measure of the change in weight for each constituent. In this specification, β_2 measures the changes in trading prices and issuance activity linked to one hundred percentual points change in benchmark weight. We quantify the latter as the effects linked to changes of one standard deviation (33 percentage points) in benchmark weights.[10] Under Hypothesis 1 and Hypothesis 2, β_2 should be positive. We show the results for trading prices (equity and bonds) and issuance activity (equity, bonds, and syndicated loans) in two different tables (Table 3 and Table 4, respectively).

We remove index inclusions (entrants) and deletions (exits) from the estimations. As explained before, MSCI decision to redefine weights was motivated by a better market representation, and not by firms' past performances. However, there might be a mechanical correlation between the new firms added to the benchmark index and their past issuance activity. The reason is that the more the firms issued equity before the MSCI redefinition, the larger their market capitalization and thus their probability to enter the benchmark index. This might generate a negative time-issuance correlation for these types of firms. Although deleted firms do not have

[10] Because we have zeros and ones (or issuance quantities) in our dependent and independent variables, we run three different types of regression models as robustness tests: Poisson Pseudo Maximum Likelihood (PPML) regressions and Logit regressions. For simplicity, we only report OLS results in the main tables. The results were similar for the three types of regressions.

this problem, we also removed them from the analysis for symmetry. Figure 3 shows the equity issuance patterns separately for the four groups of firms: entrants, upweighted firms, downweighted firms, and exits. The figure shows that entrant firms tended to issue more equity pre-redefinition than post-redefinition (Figure 3, Panel A). Moreover, the figure shows how issuance activity patterns between upweighted and downweighted firms are not driven by entrant and/or exit firms (Figure 3, Panel B).

The regression estimates support the notion that the benchmark redefinition affected stock prices, but not bond prices. Specifically, upweighted stocks experienced an average revaluation of 6 percent relative to downweighted firms. Moreover, the estimates imply that an increase of one standard deviation in benchmark weight was associated with a 14 percent increase in stock price (Table 3). The effect on prices is consistent with Hypothesis 1, a price pressure effect caused by a permanent change in investors demand following the new benchmark weights. Furthermore, the regression results confirm that probability of issuing equity substantially changed across firms in the quarters following the MSCI announcement. The baseline probability of issuing equity, that is, the average probability of issuing equity before the MSCI redefinition (1997Q4 – 2000Q1) was 25 and 27 percent for upweighted and downweighed firms, respectively. After the redefinition (2000Q2 – 2002Q3), the probability of issuing equity increased 12 percentage points (p.p) faster for upweighted firms than for those with negative reweighting. The amount of equity raised by upweighted firms post redefinition increased by 69 percent relative to that raised by downweighted firms (Table 4, Panel A). These changes in issuance probabilities were proportional to the changes in benchmark weights. The regressions estimates imply that one standard deviation increase in benchmark weight triggered a 7.1 p.p. increase in the probability of equity issuance (Table 5, Panel A). These results are consistent with Hypothesis 2 that an increase in a firm's benchmark weight leads to an increase in its equity issuance activity.

Consistent with the graphical evidence, the regression estimates imply that probability of issuing bonds remained unchanged after the MSCI redefinition, while the probability of issuing

syndicated loans changed across firms. In fact, the cross-sectional changes in syndicated loan issuances were of similar magnitude to those in equity issuances. The probability of issuing syndicated loans and the amount raised grew 9 p.p. and 89 percent for upweighted firms relative to firms with negative reweighting after the benchmark redefinition (Table 4, Panel B). The results also imply that one standard deviation increase in weight increase the probability of issuing syndicated loans by 7.9 p.p. (Table 5, Panel B). These results are consistent with Hypothesis 3 and Hypothesis 4 that an increase in a firm's benchmark weight leads to an increase in its debt issuance activity and a change in the bond-loan debt composition of firms.

Robustness

The MSCI reform was coincidental with an economic crisis originated in the technology sector of the United States. Hence, we could expect that this crisis negatively affected U.S. firms. Because U.S. firms compose a large bulk of firms in MSCI benchmarks, this crisis could be affecting our issuance activity results. For robustness, we estimate alternative specifications of our main regression after removing United States. The magnitude and significance of the coefficients of interest remain fairly unchanged (Table 4 and Table 5).[11]

More generally, we want to control for country-specific trends that were coincidental with the MSCI reform. That is, we want to address the concern that our results could be driven by different trends across countries during the years following the reform. A typical solution to address this problem would be to add country-time fixed effects to the regression analyses. However, as already argued, the nature of the MSCI redefinition event implied country-time variation in weights and issuances. We thus expect a positive correlation between positively reweighted countries and issuance activity that we do not want to eliminate with the country-time dummies (Appedix Figure 3). Hence, we recur to another strategy to address this issue, which

[11] Results are very similar when removing the technology sector from the analysis.

consists on analyzing the issuance activity behavior of firms outside the MSCI benchmark index (non-constituents). Specifically, we compute the overall change in issuance probabilities at the country level between the pre- and post-reform periods by using all issuing firms for each of the countries composing the benchmark index. We then extract the average country-period probabilities and use them as controls in our baseline regressions. We do the same exercise to extract country-industry trends in issuance probabilities, which we also add to the regressions as controls. The results hold in both significance and magnitude (Table 4 and Table 5).

Another concern with our identification strategy is that there could be unobservable shocks (that are neither at the country or industry level) in the post period that correlate with the change in benchmark weights and cause the probability of issuance and stock prices to change. To alleviate this concern, we take a closer look at the pre-trends in the variables of interest. If firms that experience different changes in benchmark weights have a similar evolution in their issuance probabilities and stock prices in the pre period, one could assume that unobservable shocks did not affect these firms in a differential way. To analyze this, we plot the quarterly returns and probability of issuance estimated as the beta coefficients from the regressions in Equation 1, but we run these regressions at the quarterly level instead of using two aggregate periods. Figure 4 plots the cumulative differences in probabilities over the two periods: pre- and post-reform. The results confirm the similar cross-sectional pre-trends and the post-reform variation in issuances.[12]

7. The Benchmark Effect on Investment

So far, our results show how cross-sectional changes in benchmark weights translated in proportional changes in equity issuance activity and debt borrowing through syndicated loans. In

[12] In addition to the evidence in Figure 4, we plot the quarterly returns for upweighted and downweighted firms and the difference in returns associated to positive weight rebalancing before and after the MSCI redefinition (Appendix Figure 4, Panel A). We also plot the quarterly average returns and the difference in returns due to one hundred percentual points increase in benchmark weight (Appendix Figure 4, Panel B). Appendix Figure 5 plots the quarterly probability of issuance by upweighted and downweighted firms. Appendix Figure 6 plots the quarterly average probability of issuance and the difference in issuance probability due to one hundred percentual points increase in weight.

this section, we use balance sheet data from Worldscope to examine the effects of the MSCI redefinition on firms' investment policies. Under Hypothesis 5, we expect that changes in benchmark weights lead to proportional changes in investment. Alternatively, firms could use the proceeds from capital raisings to build cash buffers for future negative shocks.

Capital Expenditures

We use the same type of empirical framework as in Equation 1 to quantify the cross-sectional changes in firms' investments after the MSCI redefinition in the year 2000. For this analysis, y_{it} is the log of capital expenditures (CAPEX) for firm i at year t. We first plot the trends in the levels capital expenditures (CAPEX) for upweighted and downweighted firms with similar balance-sheet characteristics before 2000 (Figure 5).[13] The figure shows how both types of firms followed similar trends in terms of CAPEX before the MSCI redefinition. Since then, upweighted firms significantly increased their level of CAPEX relative to those that were downweighted.

Through the difference-in difference estimations in two periods we can quantify the overall effect the MSCI redefinition on firms' investments. In this case, the dependent variable $post$ is a dummy that equals 1 for the 2000-02 period and 0 for the 1997-99 period.[14] Results show that capital expenditures by upweighted firms increased 19 percent faster than those by downweighted firms during the post-reform period (Table 6, Panel A). The estimates also imply that one standard deviation increase in weight was associated with a 15 percent increase in CAPEX (Table 6, Panel B). These results are consistent with Hypothesis 5 that an increase in benchmark weight leads to an increase in investments. Moreover, to explore the prediction in Hypothesis 6 that the benchmark effect on firms' investments is expected to be larger for riskier firms (in terms of cash flows), we re-estimate the regressions after splitting the sample between high-risk and low-risk

[13] We use propensity score matching method to adjust for pre-treatment observable differences between a upweighted and downweighted firms.
[14] The yearly level of CAPEX for each firm is averaged within the two periods for these regressions.

firms.[15] We find that the effects on investments were substantially larger for the relatively riskier firms, which is consistent with Hypothesis 6.

Sources of Finance and Capital Structure

Besides capital expenditures, we want to learn how other important balance-sheet variables changed after the MSCI index rebalancing. Specifically, we are interested on learning whether the changes in firms' investments after the redefinition were completely financed through external sources of financing (debt and equity) or whether the internal sources (cash and income) also played a role. This exercise also allows us to estimate the changes in total debt in firms' balance sheet statements and whether the MSCI redefinition affected firms' capital structures. To this end, we use the same difference-in-differences specification to estimate the changes in the variables recording firms' external sources of financing (book value of total shares and total debt), internal sources of financing (net income, dividends, and cash reserves), and capital structure (leverage, defined as debt over equity).

The results imply that total assets accumulated by upweighted firms increased 10 percent faster than for downweighted firms during the post-reform period (Table 6, Panel A). The estimates also show how the external sources of financing changed across firms after the MSCI redefinition, but not the internal sources. Consistent with the issuance patterns shown before, the total amount of equity and debt outstanding grew 10 percent and 17 percent faster for upweighted firms than for downweighted firms in the years following the redefinition. The estimates also imply that an increase of one standard deviation in benchmark weights translated in 21 percent increase in the total equity value and 33 percent increase in credit, whereas the differences in internal sources (net income, dividends, and cash) remained fairly constant across firms after the benchmark redefinition. As we learned in previous sections, the benchmark effect on credit was

[15] We define cash flows as income over average assets pre-reform (1991-99). Then, we estimate the standard deviation of firms' cash flows per country and industry and divide firms between high risk (above the median standard deviation) and low risk (below the median).

not driven by higher borrowing through bond markets. Thus, we can attribute most of the change in debt to changes in the firms' bank borrowing behavior. The results also show that changes in assets and debt were of similar magnitude, and thus firms' leverage ratios remained constant across firms.

8. Conclusion

In this paper, we explore the effects of indexing on the cost of capital, firm financing, and investment policies. The existing literature has focused extensively on the effects of indexing on asset prices, but there is little systematic evidence on how these changes in asset prices affect firms' financing and investment decisions. Part of this lack of empirical evidence could be attributed to an identification challenge. We overcome this challenge by exploiting the largest rebalancing in a global benchmark index by MSCI in 2000.

Using this event, we find that firms positively affected by the index rebalancing experience higher equity returns relative to negatively affected firms after the announcement of the rebalancing. Firms take advantage of this decrease in the cost of equity capital and raise more external financing, especially equity and bank debt. Our findings show that this rebalancing ends up having important effects for firms' growth. Firms with a higher increase in their benchmark weight have a higher growth of capital expenditures and total assets in the years following the rebalancing. Overall, we provide systematic and plausible causal evidence on the importance of indexing for firms' decisions, even for mature firms with access to public equity markets.

These findings are consistent with recent corporate finance theories with asset managers that track their performance against benchmark indexes (Kashyap et al., 2020). Moreover, our results are probably a lower bound on the effects of indexing and are probably much larger nowadays. The importance of institutional investors tracking their performance against benchmark indexes has grown considerably since the 2000s. Additionally, both passive and exchange-traded funds experienced a considerable increase in their asset under management.

The results in this paper also highlight the important role that index providers play for firms' financing and ultimately for investment and growth. Due to this importance, the decision-making process should be as objective and transparent as possible, to avoid the possibility of being lobbied by firms to enter into these indexes.

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Figure 1. Equity and Bond Prices in Secondary Markets

This figure shows equity and bond prices of upweighted and downweighted MSCI Global Index constituents during the methodology redefinition of international equity indices in 2000-02. The figures show changes in trading prices for the median firm (fourth quarter of 1999 =1).

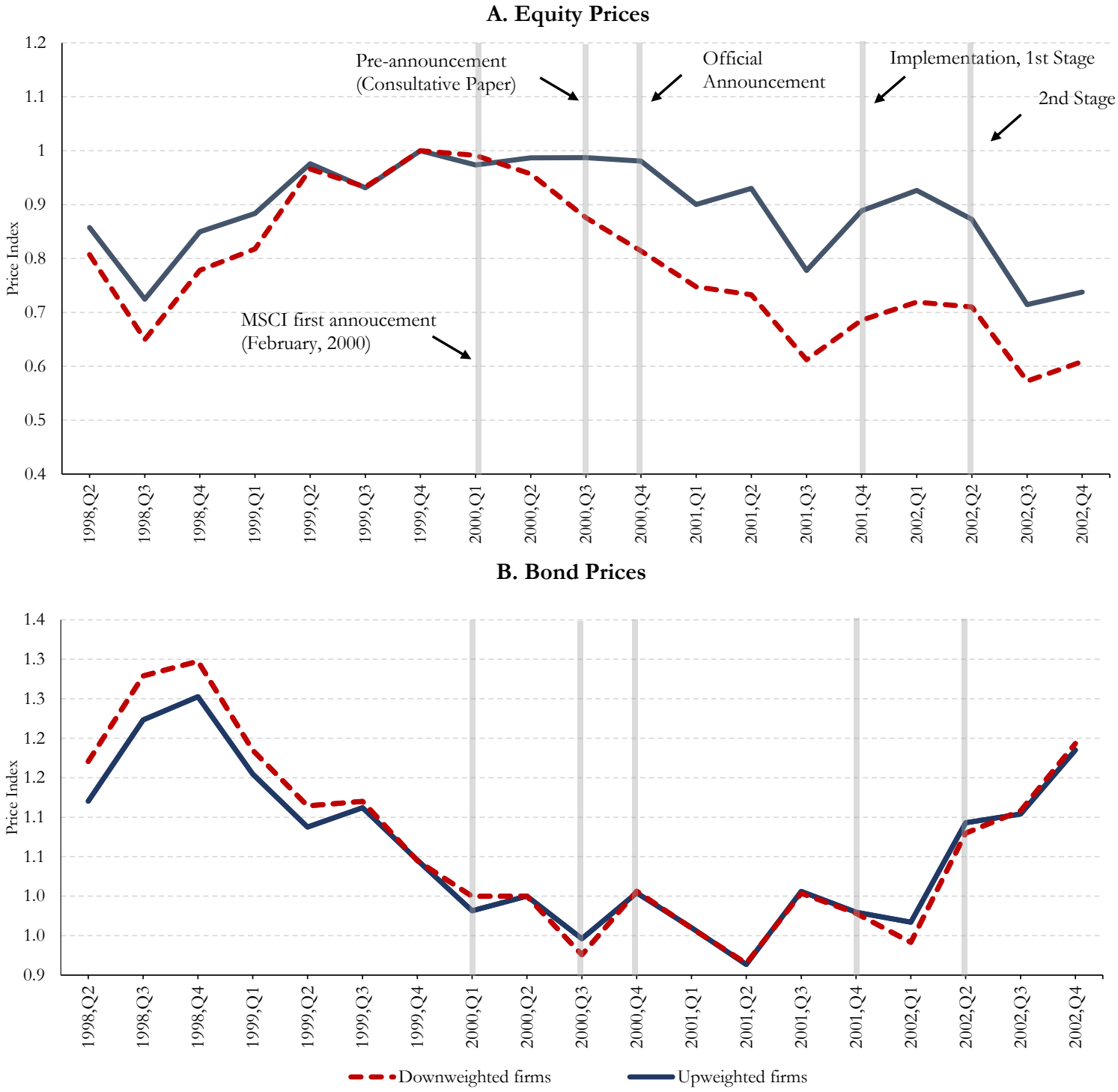


Figure 2. Number of Quarterly Issuers

This figure shows the number of MSCI constituents issuing equity (Panel A), bonds (Panel B), and syndicated loans (Panel C) per quarter. Firms are splitted between those with positive and negative weight rebalancing during the methodology redefinition of MSCI international equity indices in 2000-02.

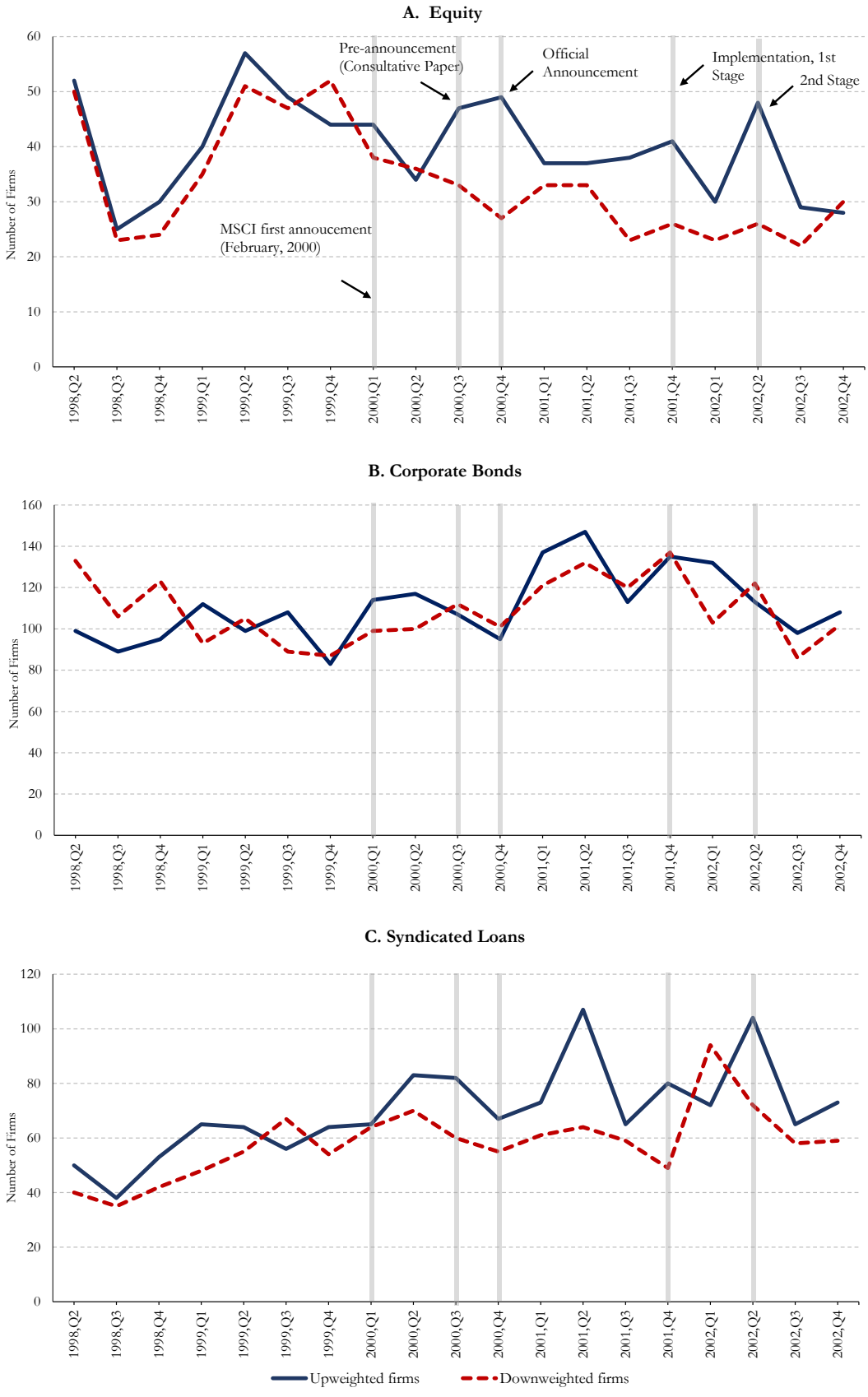


Figure 3. Probability of Issuance in Equity Markets, Four Types of MSCI Constituents

This figure shows the trends in the probability of issuance of MSCI Global Index constituents around the methodology redefinition in 2000-02. The figure distinguishes across the four types of MSCI consituents pre and post-redefinition: entrants, exits, upweighted, and downweighted.

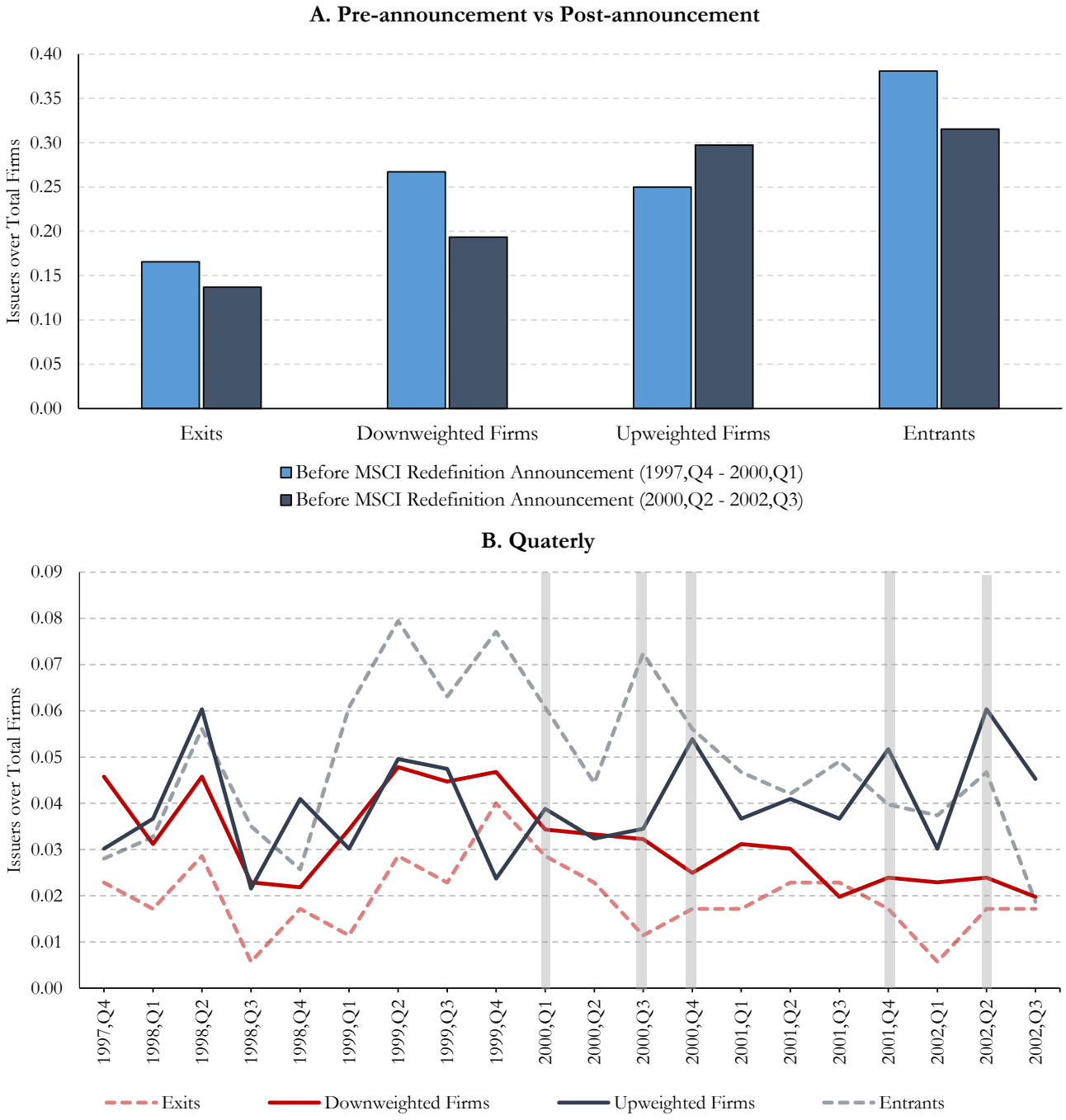
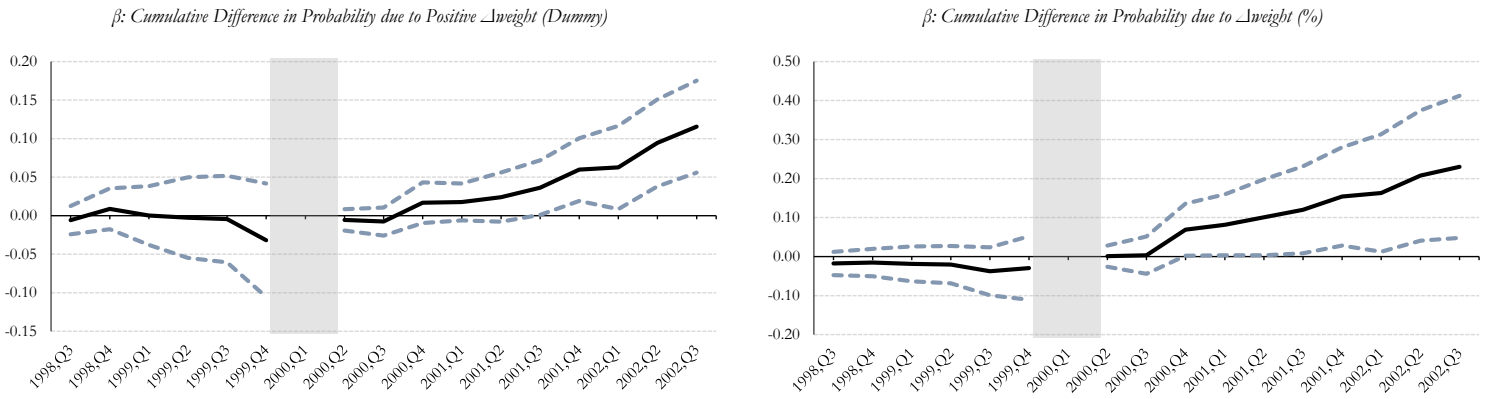


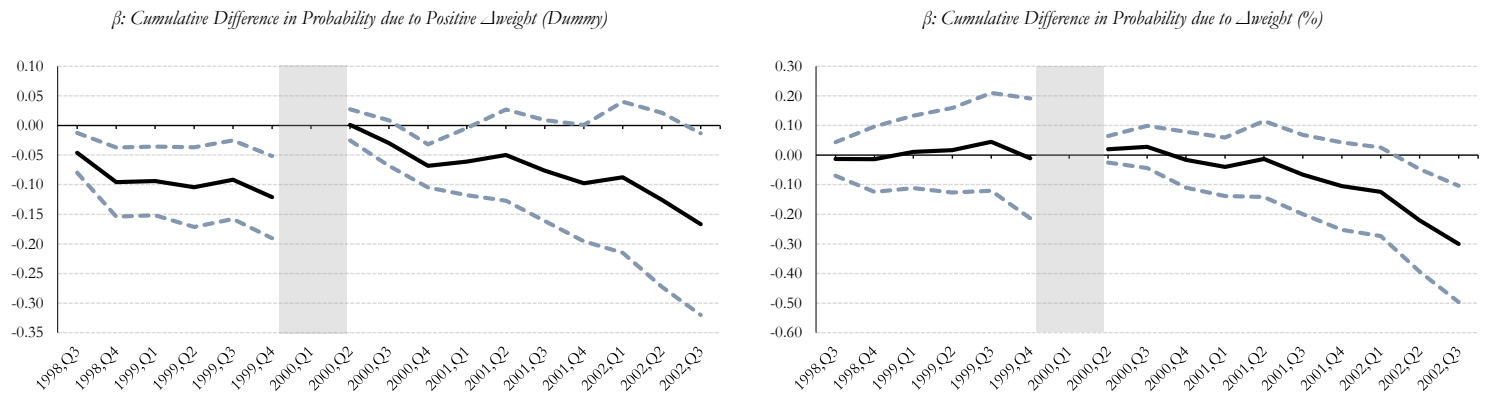
Figure 4. Probability of Issuance, Regression Coefficient Plots

This figure shows the quarterly probability of issuance and the difference in issuance probability due to one hundred percentual points increase in index weight during the methodology redefinition of MSCI international equity indices in 2000-02. The estimates are extracted from the regressions of the issuance probability on dummies for each quarter and the interaction of each quarter with a dummy that equals one for upweighted firms (left-side panels) and the percent change in weight (right-side panels). The figures show the cumulative difference in issuance probability and the 90% confidence interval. The regressions have firm fixed effects. New and deleted MSCI stocks during the redefintion (entrant and exit firms) are excluded.

A. Equity



B. Corporate Bonds



C. Syndicated Loans

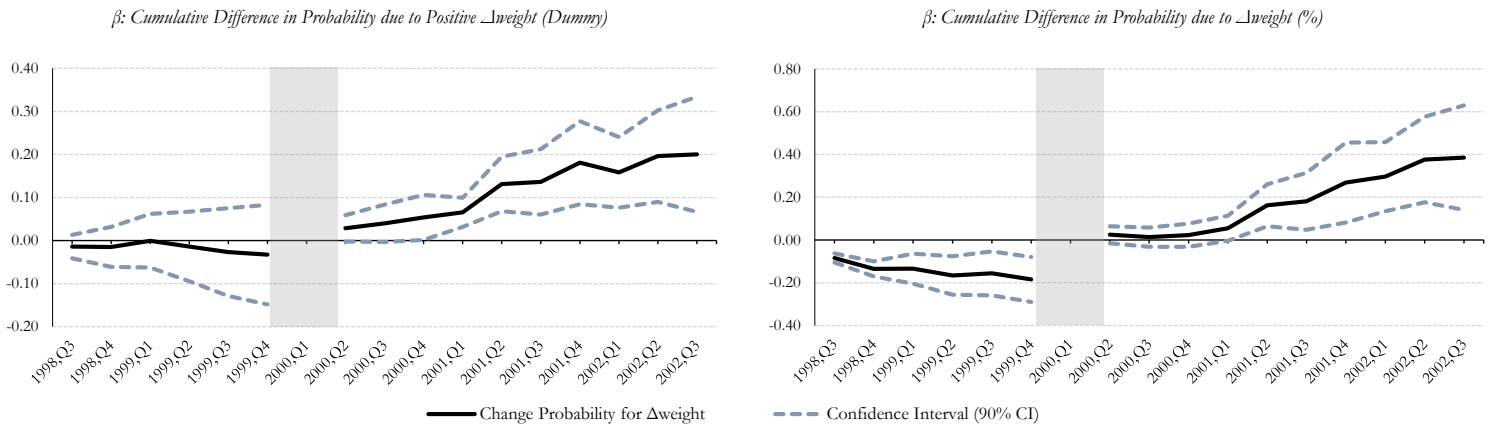


Figure 5. Effects on Investment

This figure shows capital expenditures trends of MSCI firms around the methodology redefinition of MSCI international equity indices in 2000-02. The estimates are extracted from regressions of the annual amount of CAPEX (in logs) on dummies for each year and the interaction of each year with a dummy variable that equals one for upweighted firms (zero for downweighted firms) during the index redefinition. Right-side panels report the difference in CAPEX due to positive change in weight and the 90% confidence intervals. New and deleted MSCI stocks during the redefintion (entrant and exit firms) are excluded. Upweighted and downweighted firms are matched using the level of assets, debt, CAPEX in 1999.

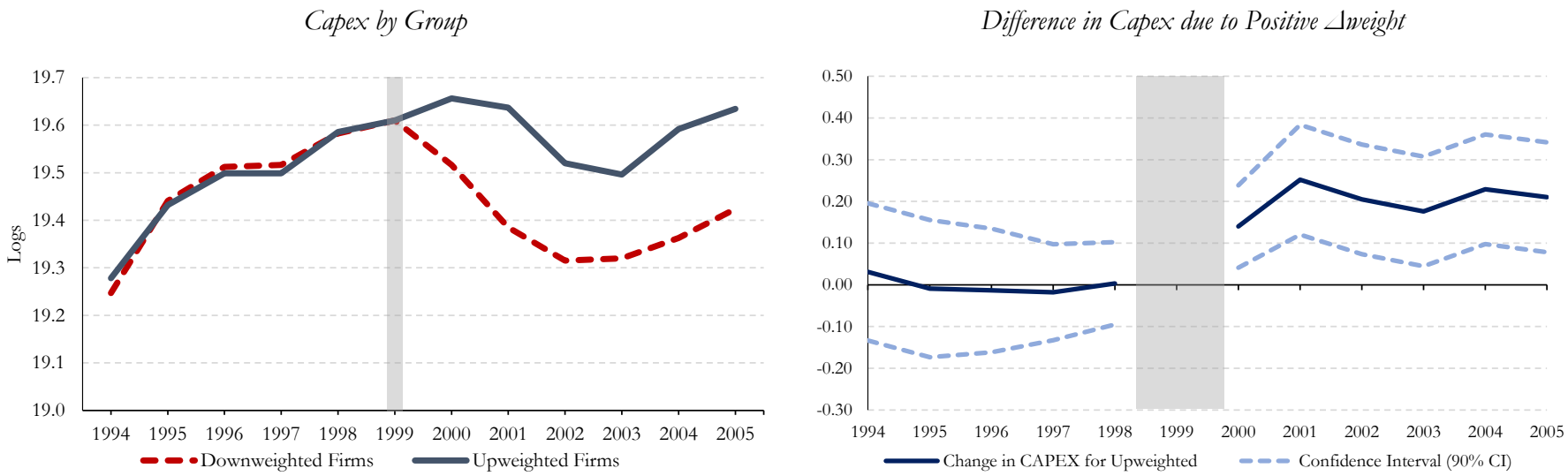


Table 1. MSCI Global Index Issuers, Summary Statistics

This table shows summary statistics for MSCI Global Index constituents. Firms with positive shock include upweighted firms and new firms added to the index during the methodology redefinition of international equity indices in 2000-02. Firms with negative shock include downweighted firms and firms removed from the index during the methodology redefinition of international equity indices in 2000-02.

	Issuance Activity				Change in Index Weight				
Type of Firm	No. of Issuers	No. of Equity Isssuances	No. of Bond Isssuances	No. of Syndicated Loan Isssuances	Mean ΔWeight	P25 ΔWeight	P50 ΔWeight	P75 ΔWeight	Standard Deviation ΔWeight
All MSCI Constituents	2,029	9,187	55,114	18,441	-0.31	-0.49	-0.21	0.01	0.33
Firms with Postive Shock									
- Upweighted Firms	464	2,631	20,525	5,533	0.01	0.01	0.01	0.01	0.02
- Added Firms	428	1,961	9,744	3,317	.	.	.	.	.
Firms with Negative Shock									
- Downweighted Firms	962	4,065	23,804	8,671	-0.46	-0.36	-0.65	-0.21	0.30
- Exit Firms	175	530	1,041	920	.	.	.	.	.

Table 2. Capital Raising Activity around the MSCI Redefinition

This table shows summary statistics of the equity issuance activity by MSCI constituents during the 1997-2005 period.

Period	No. of Equity Issuers (% of Total)		No. of Equity Issuances (% of Total)		Amount of Equity Raised (% of Total)	
	(+ΔW)	(-ΔW)	(+ΔW)	(-ΔW)	(+ΔW)	(-ΔW)
1997-1999	48%	52%	48%	52%	40%	60%
2000-2002 (MSCI Redefinition)	**55%**	**45%**	**60%**	**40%**	**53%**	**47%**
2003-2005	44%	56%	46%	54%	41%	59%

Table 3. Effects on Stock and Bond Prices

This table shows regression estimates of the change in equity and bond prices in secondary markets around the methodology redefinition of MSCI international equity indices in 2000-02. Stock and bond prices are regressed on a period dummy that equals one for the post-reform period (2000,Q2-2002,Q3) and zero for the pre-reform period (1997,Q4-2000,Q1), and an interaction term (post x change in weight) that shows the differencial trend due to changes in weights during the post-reform period (dummy variable for upweighted firms and in percent terms). New and deleted MSCI stocks during the redefintion (entrant and exit firms) are excluded. Prices are averaged within periods and then transformed to logs. Standard errors are clustered at the industry (two-digit SIC) level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Market:	Equity		Bond	
Change in Weight:	Dummy	Percent Change	Dummy	Percent Change
Post	-0.07 ***	-0.02	-0.27 **	-0.14
	[0.02]	[0.02]	[0.10]	[0.09]
Post x Δweight	0.06 **	0.14 ***	0.17	0.28
	[0.02]	[0.04]	[0.17]	[0.29]
Firm FE	Yes	Yes	Yes	Yes
No. of Observations	2,584	2,584	76	84
R-squared	0.99	0.99	0.99	0.99
No. of Clusters	64	64	.	.

Table 4. Issuance Effects: Upweighted vs. Downweighted Firms

This table shows regression estimates of the change in firms' issuance activity around the methodology redefinition of MSCI international equity indices in 2000-02. Issuance activity variables are regressed on a period dummy that equals one for the post-reform period (2000,Q2-2002,Q3) and zero for the pre-reform period (1997,Q4-2000,Q1), and an interaction term (post x change in weight) that shows the differencial trend of positively reweighted firms with respect negatively reweighted firms during the post-reform period. New and deleted MSCI stocks during the redefintion (entrant and exit firms) are excluded. Firm issuance variables are aggregated within the two periods. Standard errors are clustered at the industry (two-digit SIC) level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

A. Equity

Dependent Variable:	Log (1 + Equity Raised)				Dummy=1 if Firm Issued Equity			
Sample:	All Firms	Excl. U.S.	All Firms	All Firms	All Firms	Excl. U.S.	All Firms	All Firms
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post	-0.45 ***	-0.38 ***	-0.52 ***	-0.45 ***	-0.07 ***	-0.06 ***	-0.09 ***	-0.07 ***
	[0.08]	[0.09]	[0.09]	[0.08]	[0.02]	[0.02]	[0.02]	[0.02]
Post x Upweighted	0.69 **	0.78 **	0.87 ***	0.69 **	0.12 ***	0.15 ***	0.15 ***	0.12 ***
	[0.29]	[0.30]	[0.28]	[0.29]	[0.04]	[0.05]	[0.04]	[0.04]
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-Time Control	No	No	Yes	No	No	No	Yes	No
Country-Industry-Time Control	No	No	No	Yes	No	No	No	Yes
No. of Observations	2,860	2,331	2,861	2,860	2,860	2,331	2,861	2,860
R-squared	0.60	0.613	0.60	0.60	0.59	0.59	0.59	0.59
No. of Clusters	64	62	64	64	64	62	64	64

B. Corporate Bonds

Dependent Variable:	Log (1 + Bonds Raised)				Dummy=1 if Firm Issued Bonds			
Sample:	All Firms	Excl. U.S.	All Firms	All Firms	All Firms	Excl. U.S.	All Firms	All Firms
Post	0.18	0.18	0.23 *	0.19	0.03	0.03	0.04 *	0.03
	[0.14]	[0.15]	[0.12]	[0.14]	[0.02]	[0.02]	[0.02]	[0.02]
Post x Upweighted	0.37 *	0.33	0.26	0.38 *	0.03	0.04	0.01	0.03 *
	[0.20]	[0.25]	[0.18]	[0.20]	[0.03]	[0.04]	[0.03]	[0.03]
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-Time Control	No	No	Yes	No	No	No	Yes	No
Country-Industry-Time Control	No	No	No	Yes	No	No	No	Yes
No. of Observations	2,860	2,331	2,861	2,860	2,860	2,331	2,861	2,860
R-squared	0.78	0.76	0.78	0.78	0.73	0.71	0.73	0.73
No. of Clusters	64	62	64	64	64	62	64	64

C. Syndicated Loans

Dependent Variable:	Log (1 + Syndicated Loans Raised)				Dummy=1 if Firm Issued Syndicated Loans			
Sample:	All Firms	Excl. U.S.	All Firms	All Firms	All Firms	Excl. U.S.	All Firms	All Firms
Post	0.44 ***	0.46 ***	0.44 ***	0.45 ***	0.07 ***	0.07 ***	0.06 ***	0.07 ***
	[0.10]	[0.10]	[0.10]	[0.10]	[0.02]	[0.02]	[0.02]	[0.02]
Post x Upweighted	0.83 ***	0.53 **	0.84 ***	0.83 **	0.09 ***	0.06 *	0.09 ***	0.09 ***
	[0.20]	[0.24]	[0.21]	[0.20]	[0.03]	[0.03]	[0.03]	[0.03]
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-Time Control	No	No	Yes	No	No	No	Yes	No
Country-Industry-Time Control	No	No	No	Yes	No	No	No	Yes
No. of Observations	2,860	2,331	2,861	2,860	2,861	2,331	2,861	2,860
R-squared	0.76	0.72	0.76	0.76	0.76	0.70	0.72	0.72
No. of Clusters	64	62	64	64	64	62	64	64

Table 5. Issuance Effects: Percent Change in Index Weight

This table shows regression estimates of the change in firms' issuance activity around the methodology redefinition of MSCI international equity indices in 2000-02. Issuance activity variables are regressed on a period dummy that equals one for the post-reform period (2000,Q2-2002,Q3) and zero for the pre-reform period (1997,Q4-2000,Q1), and an interaction term (post x change in weight) that shows the differencial trend associated to the change in weight (in %) during the post-reform period. New and deleted MSCI stocks during its redefintion (entrant and exit firms) are excluded. Firm issuance variables are aggregated within the two periods. Standard errors are clustered at the industry (two-digit SIC) level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

A. Equity

Dependent Variable:	Log (1 + Equity Raised)				Dummy=1 if Firm Issued Equity			
Sample:	All Firms	Excl. U.S.	All Firms	All Firms	All Firms	Excl. U.S.	All Firms	All Firms
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post	0.02	0.13	0.04	0.02	0.02	0.04	0.02	0.02
	[0.17]	[0.17]	[0.16]	[0.17]	[0.03]	[0.02]	[0.03]	[0.03]
Post x ΔWeight	1.05 **	1.18 ***	1.20 ***	1.05 **	0.22 ***	0.25 ***	0.24 ***	0.21 ***
	[0.46]	[0.44]	[0.43]	[0.46]	[0.07]	[0.07]	[0.07]	[0.07]
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-Time Control	No	No	Yes	No	No	No	Yes	No
Country-Industry-Time Control	No	No	No	Yes	No	No	No	Yes
No. of Observations	2,860	2,331	2,860	2,860	2,860	2,331	2,860	2,860
R-squared	0.60	0.612	0.60	0.60	0.58	0.59	0.59	0.59
No. of Clusters	64	62	64	64	64	62	64	64

B. Corporate Bonds

Dependent Variable:	Log (1 + Bonds Raised)				Dummy=1 if Firm Issued Bonds			
Sample:	All Firms	Excl. U.S.	All Firms	All Firms	All Firms	Excl. U.S.	All Firms	All Firms
Post	0.32 **	0.20	0.29 **	0.32 **	0.02	0.02	0.02	0.02 **
	[0.14]	[0.17]	[0.14]	[0.14]	[0.02]	[0.03]	[0.02]	[0.02]
Post x Δweight	0.07	-0.20	-0.08	0.06	-0.07	-0.07	-0.08	-0.07
	[0.34]	[0.36]	[0.34]	[0.34]	[0.06]	[0.06]	[0.06]	[0.06]
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-Time Control	No	No	Yes	No	No	No	Yes	No
Country-Industry-Time Control	No	No	No	Yes	No	No	No	Yes
No. of Observations	2,860	2,331	2,860	2,860	2,860	2,331	2,860	2,860
R-squared	0.78	0.76	0.78	0.78	0.73	0.71	0.73	0.73
No. of Clusters	64	62	64	64	64	62	64	64

C. Syndicated Loans

Dependent Variable:	Log (1 + Syndicated Loans Raised)				Dummy=1 if Firm Issued Syndicated Loans			
Sample:	All Firms	Excl. U.S.	All Firms	All Firms	All Firms	Excl. U.S.	All Firms	All Firms
Post	1.18 ***	1.05 ***	1.18 ***	1.18 **	0.15 ***	0.15 ***	0.15 ***	0.15 ***
	[0.16]	[0.17]	[0.15]	[0.16]	[0.02]	[0.03]	[0.02]	[0.02]
Post x (ΔWeight)	2.00 ***	1.70 ***	1.99 ***	2.00 **	0.24 ***	0.23 ***	0.25 ***	0.24 ***
	[0.36]	[0.40]	[0.35]	[0.36]	[0.05]	[0.06]	[0.05]	[0.05]
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-Time Control	No	No	Yes	No	No	No	Yes	No
Country-Industry-Time Control	No	No	No	Yes	No	No	No	Yes
No. of Observations	2,860	2,331	2,860	2,860	2,860	2,331	2,860	2,860
R-squared	0.76	0.73	0.76	0.76	0.76	0.70	0.72	0.72
No. of Clusters	64	62	64	64	64	62	64	64

Table 6. Effects on Investment

This table shows the regression results of the change in capital expenditures (CAPEX) between 1997-99 and 2000-02 for MSCI Global Index Constituents around the methodology redefinition of MSCI international equity indices in 2000-02. The annual level of CAPEX is averaged within periods (1997-99 and 2000-02) for each firm and then converted to logs. New and deleted MSCI stocks during its redefintion (entrant and exit firms) are excluded. CAPEX data are winsorized at the 95%. Standard errors are clustered at the industry (two-digit SIC) level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. High risk firms are those above the median standard deviation of cash flows per country and industry. Cash flows are measured as income over average assets (1991-99).

A. Upweighted vs. Downweighted Firms

Sample:	All Firms	High Risk	Low Risk
Post	-0.14 ***	-0.07	-0.15 ***
	[0.04]	[0.07]	[0.05]
Post x Upweighted	0.19 ***	0.24 ***	0.12
	[0.06]	[0.09]	[0.08]
Firm FE	Yes	Yes	Yes
No. of Observations	2,182	718	764
R-squared	0.946	0.937	0.953
No. of Clusters	64	47	48

B. Percent Change in Weight

Sample:	All Firms	High Risk	Low Risk
Post	0.02	0.15 ***	-0.05
	[0.04]	[0.05]	[0.06]
Post x ΔWeight	0.44 ***	0.66 ***	0.25
	[0.11]	[0.15]	[0.18]
Firm FE	Yes	Yes	Yes
No. of Observations	2,182	718	764
R-squared	0.947	0.938	0.953
No. of Clusters	64	47	48

Table 7. Balance Sheet Effects

This table shows the regression results of the change in balance sheet characteristics between 1997-99 and 2000-02 for MSCI Global Index Constituents around the methodology redefinition of MSCI international equity indices in 2000-02. The annual firm-level data are averaged within periods (1997-99 and 2000-02) and then converted to logs. New and deleted MSCI stocks during its redefintion (entrant and exit firms) are excluded. All variables are winsorized at the 95%. Standard errors are clustered at the industry (two-digit SIC) level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

A. Upweighted vs. Downweighted Firms

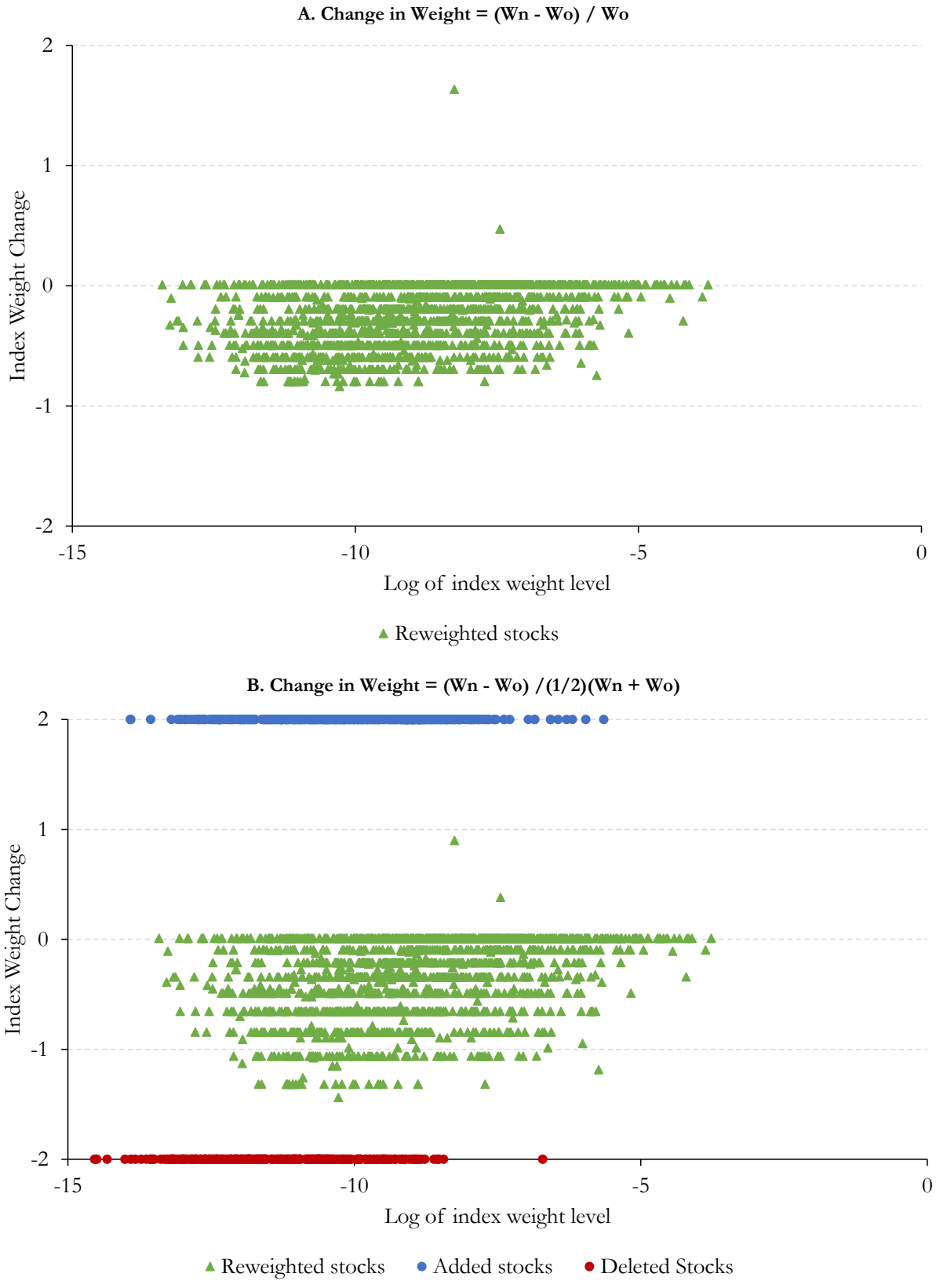
Dependent variable:	Sources of Financing							Size and Capital Structure			
	Total Sources of Funds	External Finance			Internal Finance			Total Assets	Leverage (Debt / Assets)	Leverage (Debt / Book Equity)	Leverage (Debt / Market Equity)
		Book Value of Total Shares	Total Debt	Net Receivables	Dividends	Cash	Net Income				
Post	0.05	0.36 ***	0.09 ***	0.09 ***	0.14	0.16 ***	0.07 **	0.11 ***	0.00	0.03	0.11 ***
	[0.03]	[0.05]	[0.03]	[0.03]	[0.10]	[0.04]	[0.04]	[0.03]	[0.00]	[0.03]	[0.03]
Post x Upweighted	0.14 **	0.10 *	0.17 ***	0.05	0.20	0.10	0.00	0.10 ***	0.01 **	0.04	0.06 *
	[0.06]	[0.05]	[0.04]	[0.04]	[0.19]	[0.06]	[0.05]	[0.03]	[0.01]	[0.05]	[0.03]
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	2,000	2,048	2,252	2,012	2,342	1,760	2,008	2,284	2,226	2,206	2,164
R-squared	0.923	0.926	0.957	0.967	0.882	0.936	0.936	0.98	0.886	0.871	0.853
No. of clusters	62	61	64	64	64	61	64	64	63	62	63

B. Percent Change in Weight

Dependent variable:	Sources of Financing							Size and Capital Structure			
	Total Sources of Funds	External Finance			Internal Finance			Total Assets	Leverage (Debt / Assets)	Leverage (Debt / Book Equity)	Leverage (Debt / Market Equity)
		Book Value of Total Shares	Total Debt	Net Receivables	Dividends	Cash	Net Income				
Post	0.19 ***	0.44 ***	0.22 ***	0.13 ***	0.31 **	0.23 ***	0.10 ***	0.20 ***	0.01 **	0.05	0.14 ***
	[0.03]	[0.05]	[0.04]	[0.03]	[0.12]	[0.04]	[0.03]	[0.02]	[0.01]	[0.04]	[0.03]
Post x ΔWeight	0.38 ***	0.21 **	0.33 ***	0.09	0.45	0.15	0.11	0.21 ***	0.02	0.03	0.01
	[0.08]	[0.09]	[0.09]	[0.06]	[0.40]	[0.11]	[0.09]	[0.05]	[0.01]	[0.10]	[0.09]
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	2,000	2,048	2,252	2,012	2,342	1,760	2,008	2,284	2,226	2,206	2,164
R-squared	0.923	0.926	0.957	0.967	0.882	0.936	0.936	0.98	0.886	0.871	0.852
No. of clusters	62	61	64	64	64	61	64	64	63	62	63

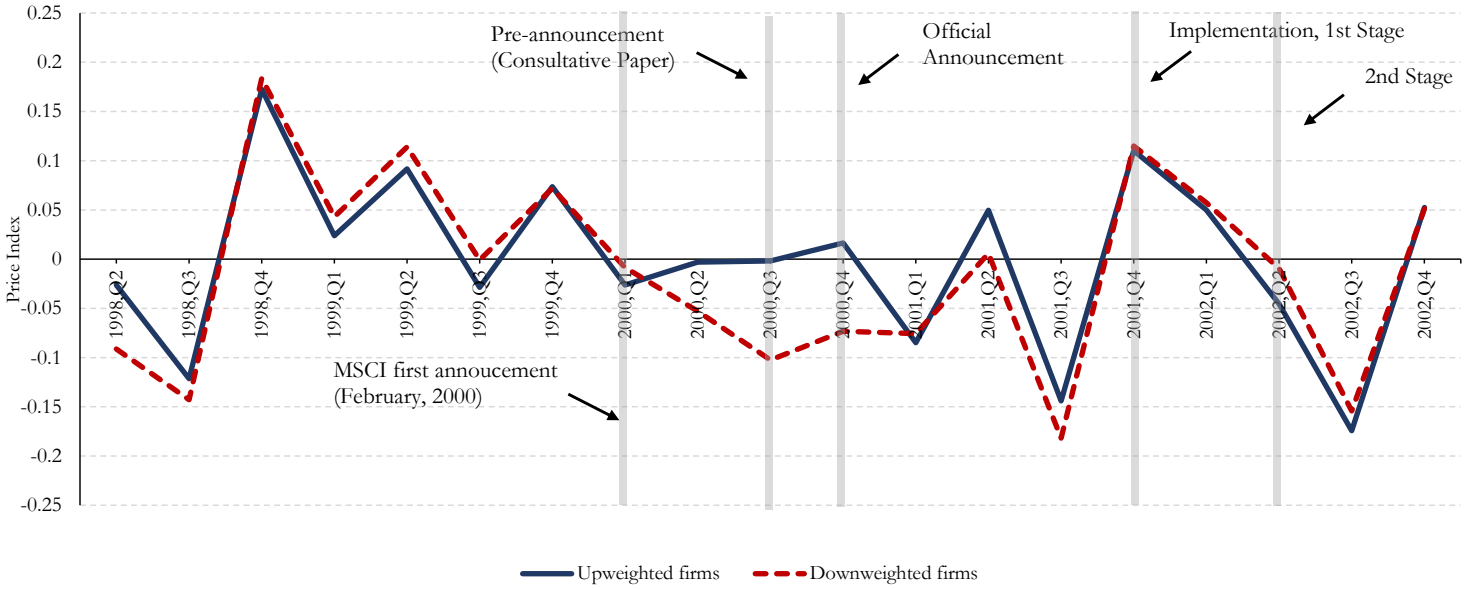
Appendix Figure 1. The Percentage Weight Change of MSCI Stocks

This figure plots the percentage weight change of MSCI index constituents due to the methodology redefinition of MSCI international equity indices in 2000 as a function of the log level of the old weight.



Appendix Figure 2. Quarterly Equity Returns

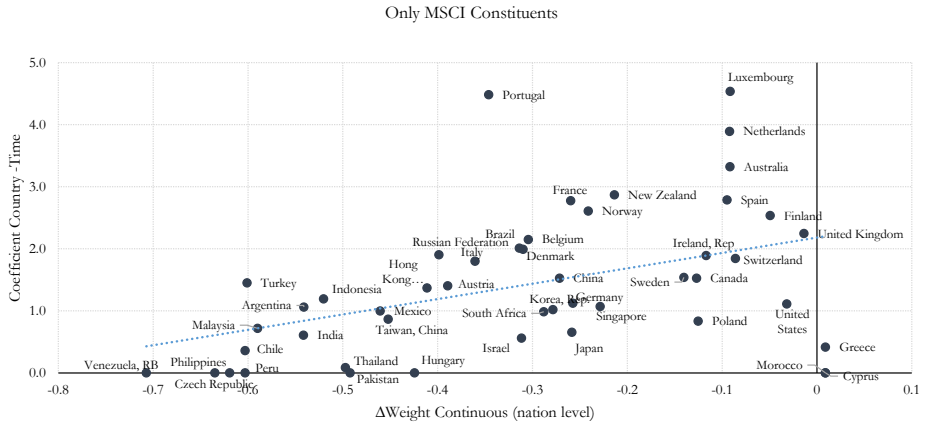
This figure shows equity quarterly returns of MSCI Global Index constituents with positive and negative weight rebalancing around the methodology redefinition of MSCI international equity indices in 2000-02.

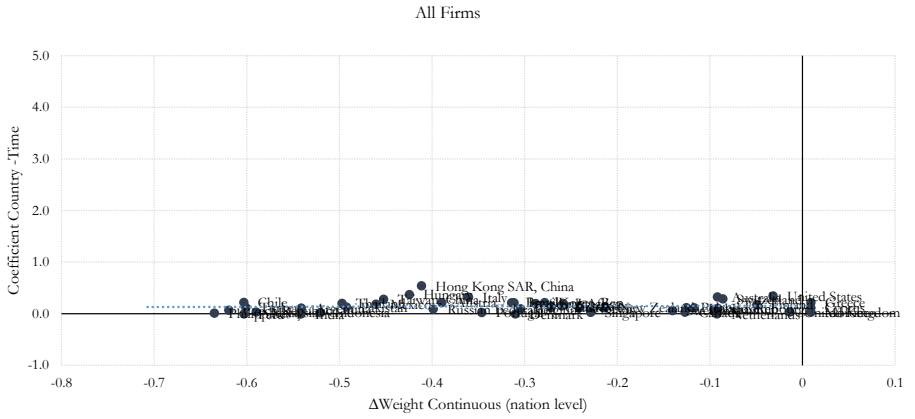


Appendix Figure 3. Changes in Issuance Probabilities and Changes in MSCI Weigths at the Country Level

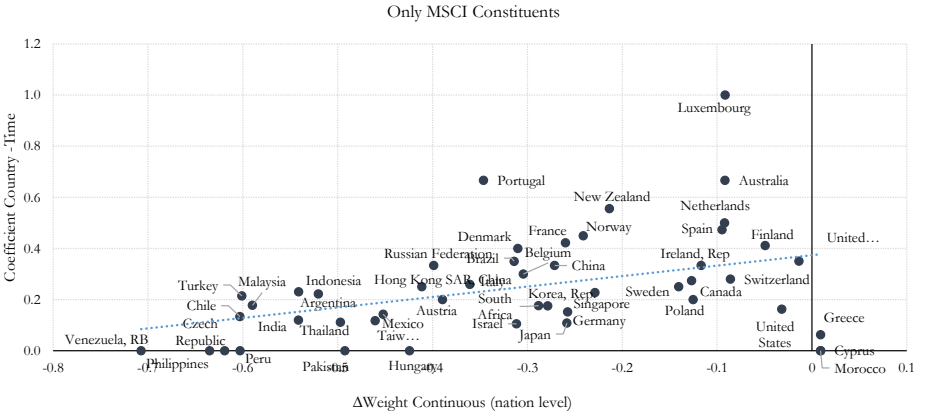
This figure plots the cross-country change in equity issuance probabilities against the changes in benchmark country weights after the MSCI redefinition in 2000-02. To estimate the figure, we run two-period issuance activity regressions on country-period dummies (only). The figure plots each country-time coefficient extracted from the regression results against the aggregate change in country weights after the MSCI redefintion.

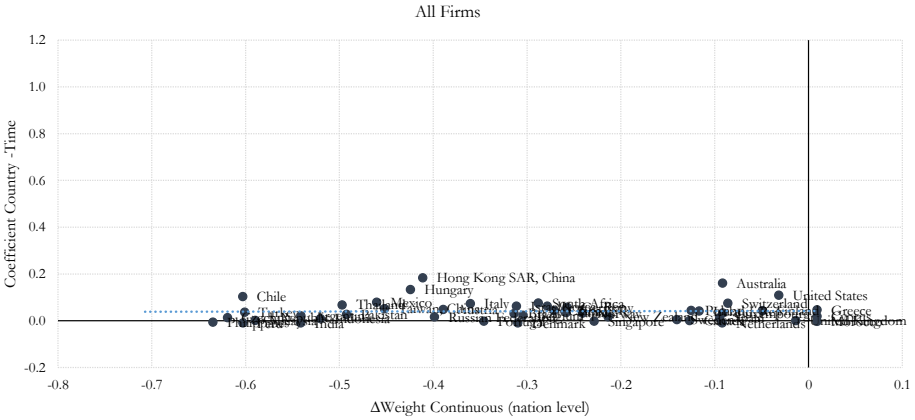
A. Log(1 + Equity Raised)





B. Dummy=1 if Firm Issued Equity

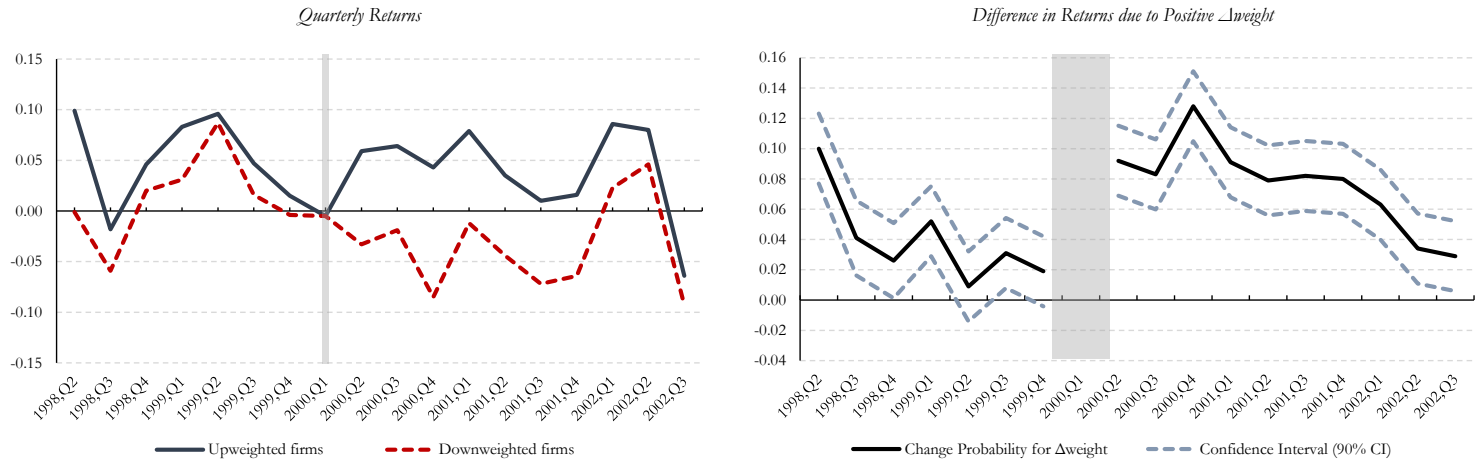




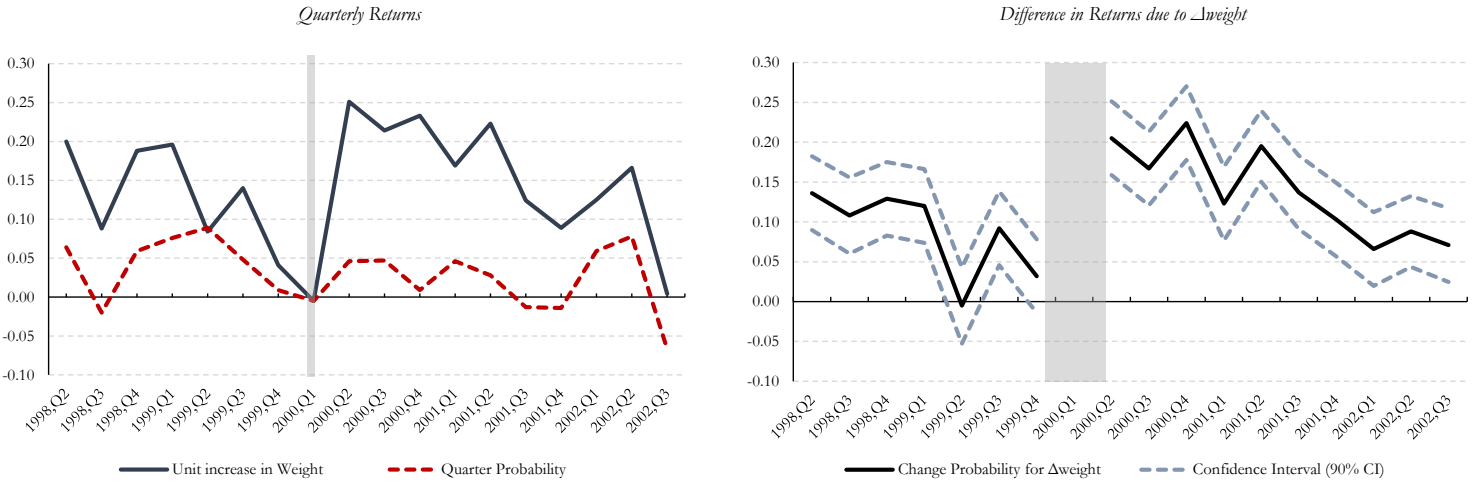
Appendix Figure 4. Equity Returns, Regression Coefficient Plots

This figure shows the quaterly returns of MSCI firms around the methodology redefinition of MSCI international equity indices in 2000-02. The estimates are extracted from regressions of the quaterly returns on the dummies for each quarter and the interaction of each quarter with the change in weight (dummy variable for upweighted firms in Panel A and percentual change in weight in Panel B). Panel A shows the predicted quarterly returns for upweighted and downweighted firms (left-side panel) and the change in issuance probability due to positive change in weight with the 90% confidence interval (right-side panel). Panel B shows the predicted quarterly returns (left-sode panel) and the change associated to one hundred percentual points increase in weight with the 90% conficende interval (right-side panel). The regressions have firm fixed effects. New and deleted MSCI stocks during its redefintion (entrant and exit firms) are excluded.

A. Change in Weight = Upweighted vs. Downweighted Firms



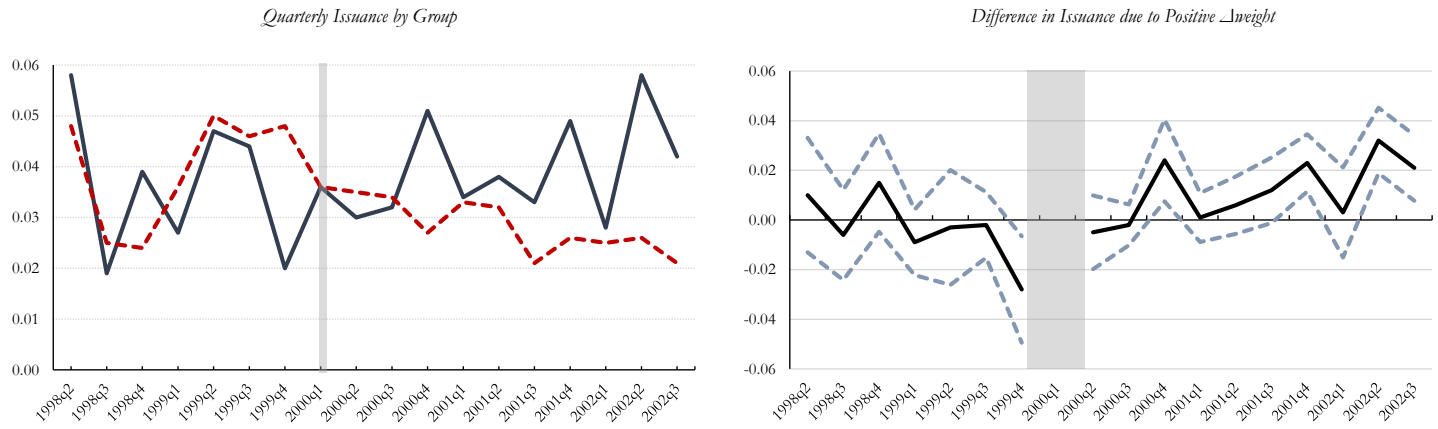
B. Change in Weight = (Wn - Wo) / Wo



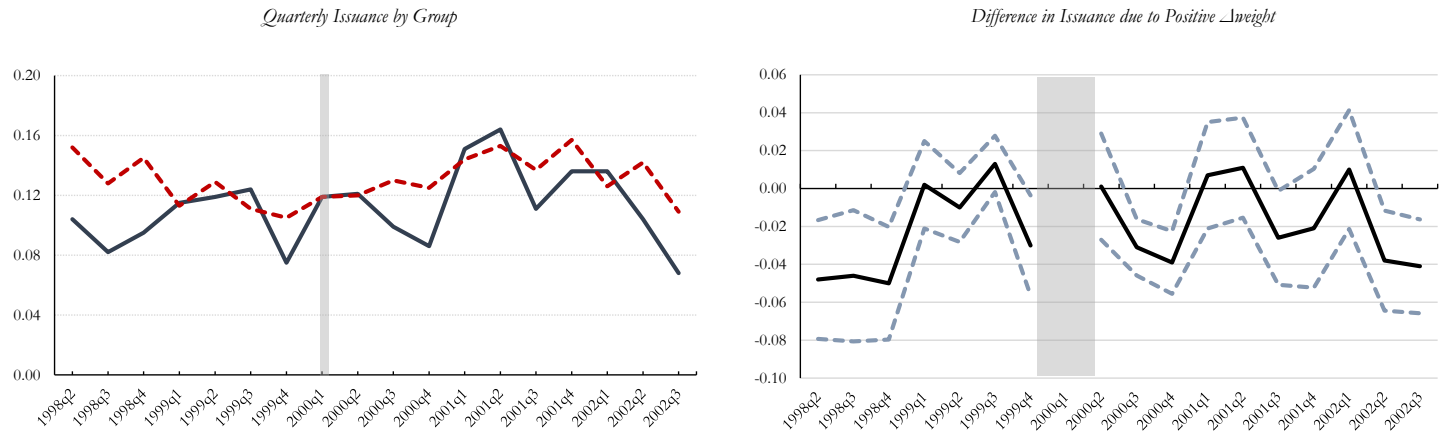
Appendix Figure 5. Probability of Issuance, Regression Coefficient Plots

This figure shows the quarterly probability of issuance of upweighted and downweighted firms around the methodology redefinition of MSCI international equity indices in 2000-02. The estimates are extracted from the regressions of the probability of issuance (dummy that equals one if firms issue securties in a given quarter) on dummies for each quarter and the interaction of each quarter with the positive change in weight dummy. The left-side panels show the estimated the quarterly probabilities for upweighted and downweighted firms. Right-side panels show the beta coefficient of interest: the change in issuance probability due to positive change in weight and the 90% confidence interval. The regressions have firm fixed effects. New and deleted MSCI stocks during its redefintion (entrant and exit firms) are excluded.

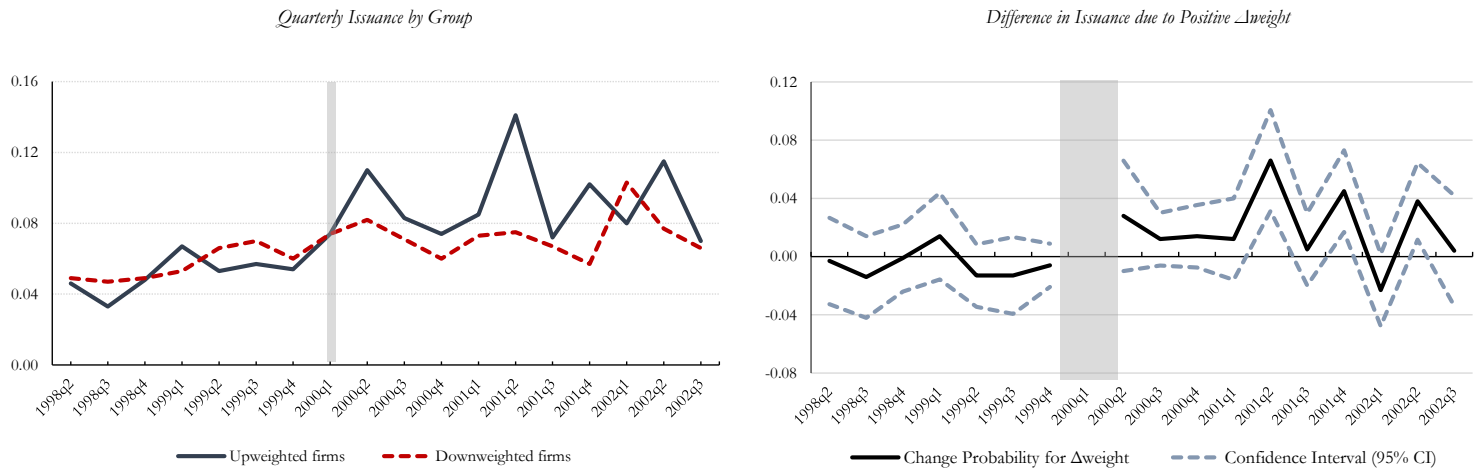
A. Equity Issuers



B. Corporate Bond Issuers



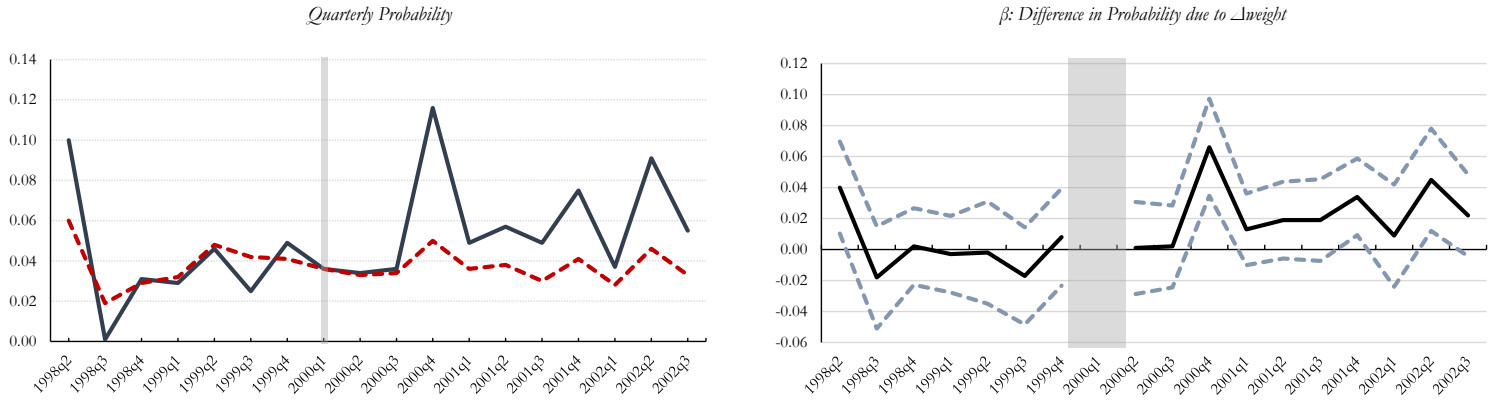
C. Syndicated Loans Issuers



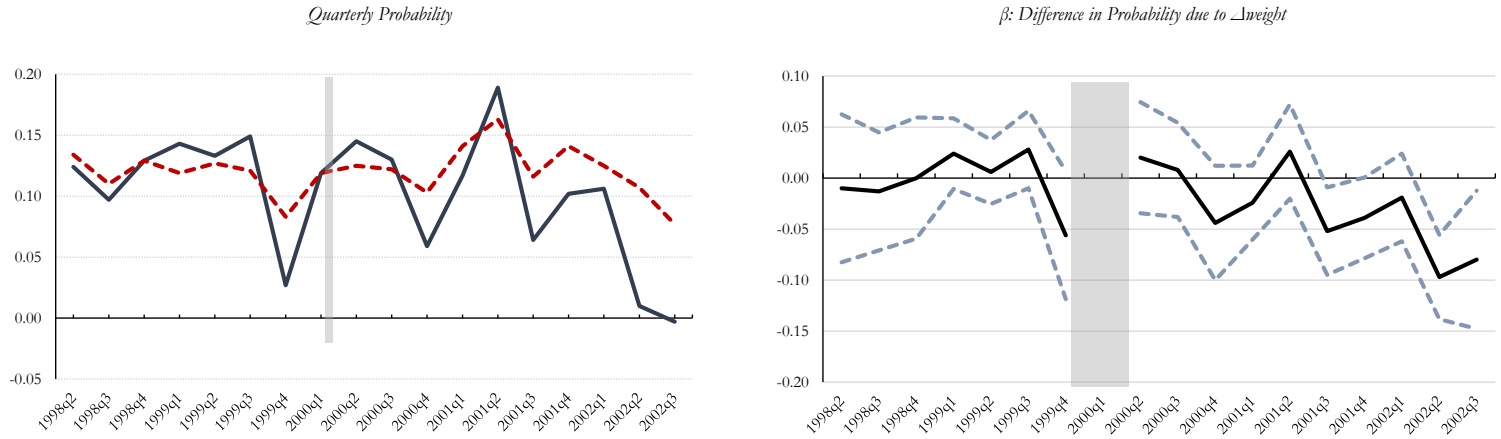
Appendix Figure 6. Probability of Issuance, Regression Coefficient Plots

This figure shows, for MSCI Global Index constituents, the quarterly probability of issuance and the difference in issuance probability due to one hundred percentual points increase in index weight around the methodology redefinition of MSCI international equity indices in 2000-02. The estimates are extracted from the regressions of the issuance probability on dummies for each quarter and the interaction of each quarter with the percent change in weight. The left-side panels show the average quarterly probability of issuance and the quaterly probability of issuance associated to 100 percentual point increase in benchmark weight. Right-side panels show the beta coefficient of interest: the change in issuance probability due to one hundred percentual points change in weight and the 90% confidence interval. The regressions have firm fixed effects. New and deleted MSCI stocks during its redefintion (entrant and exit firms) are excluded.

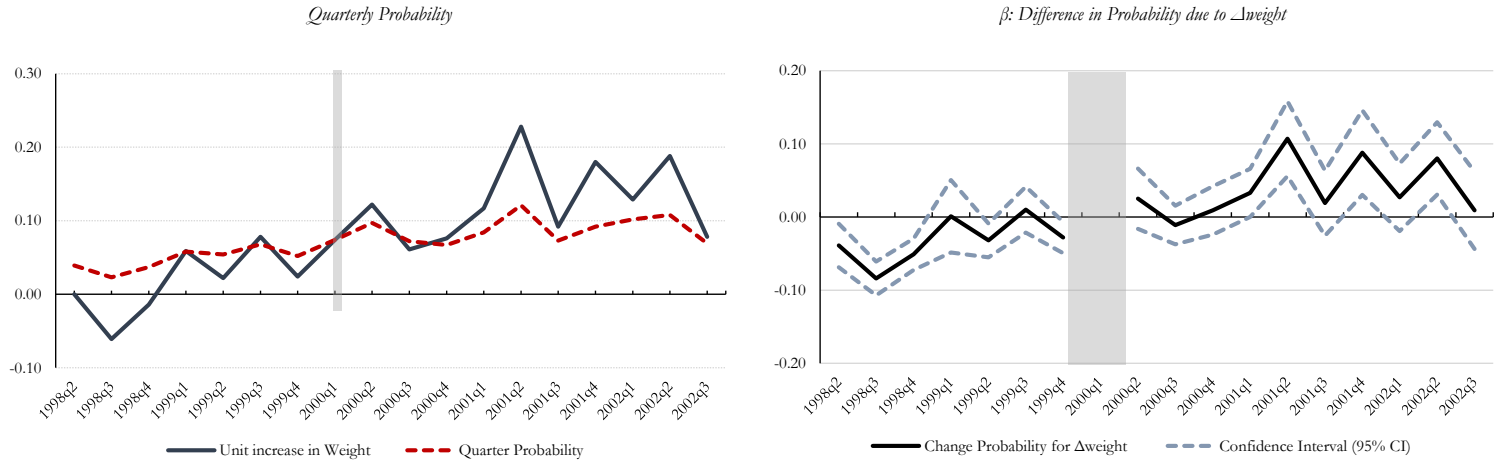
A. Equity Issuers



B. Corporate Bond Issuers



C. Syndicated Loans Issuers



Apppendix Table 1. MSCI Constituents by Country, Summary Statistics

Country	MSCI Firms	Old Country Weight (%)	New Country Weight	Country Δweigh (%)	Mean ΔWeight per Firm (%)	SDC Sample		
						MSCI Firms	Upweighted Firms	Downweighted Firms
Argentina	18	0.04	0.02	-0.55	-0.81	18	1	17
Australia	71	1.43	1.39	-0.02	0.44	65	53	12
Austria	16	0.08	0.04	-0.46	-0.68	13	2	11
Belgium	18	0.43	0.32	-0.24	-0.28	13	4	9
Bermuda	49	0.44	0.29	-0.34	-0.59	4	3	1
Brazil	89	2.05	1.93	-0.06	0.31	30	9	21
Canada	29	0.17	0.06	-0.62	-0.76	87	64	23
Chile	44	0.29	0.23	-0.23	0.23	20	2	18
China	8	0.01	0.00	-0.67	-0.96	11	6	5
Cyprus	6	0.04	0.01	-0.63	-0.90	1	1	0
Czech Republic	26	0.41	0.28	-0.32	0.18	4	0	4
Egypt	13	0.01	0.01	0.01	0.01	0	0	0
Denmark	30	0.87	0.85	-0.02	-0.54	21	10	11
Finland	60	4.67	3.50	-0.25	-0.11	26	8	18
France	55	3.42	2.65	-0.23	-0.09	62	19	43
Germany	23	0.15	0.15	0.01	0.01	45	13	32
Greece	34	0.87	0.56	-0.36	-0.34	16	16	0
Hong Kong SAR, China	11	0.05	0.03	-0.33	-0.90	51	14	37
Hungary	75	0.36	0.15	-0.59	-0.97	3	0	3
India	30	0.04	0.02	-0.49	-1.13	38	4	34
Indonesia	15	0.29	0.31	0.05	0.06	16	2	14
Ireland, Rep	51	0.23	0.15	-0.36	-0.58	16	9	7
Israel	49	1.88	1.33	-0.30	-0.20	34	10	24
Italy	345	9.21	7.50	-0.19	0.07	38	10	28
Japan	9	0.01	0.01	-0.34	-0.61	326	69	257
Korea, Rep.	84	0.77	0.59	-0.24	0.02	76	18	58
Malaysia	85	0.37	0.15	-0.58	-0.62	70	12	58
Mexico	26	0.54	0.28	-0.48	-0.54	22	3	19
Morocco	12	0.01	0.01	0.01	0.01	6	6	0
Netherlands	25	2.33	2.13	-0.09	-0.07	22	10	12
New Zealand	14	0.06	0.05	-0.17	0.13	12	6	6
Norway	25	0.21	0.17	-0.19	0.13	23	7	16
Pakistan	18	0.01	0.01	-0.61	-1.33	14	0	14
Peru	11	0.02	0.01	-0.39	-0.03	7	4	3
Philippines	21	0.04	0.02	-0.54	-0.74	14	3	11
Poland	18	0.06	0.04	-0.29	-0.18	16	3	13
Portugal	11	0.22	0.15	-0.35	-0.45	10	0	10
Russian Federation	11	0.17	0.10	-0.44	-0.62	5	1	4
Singapore	39	0.36	0.28	-0.21	0.09	36	14	22
South Africa	48	0.51	0.41	-0.20	-0.32	23	9	14
Spain	37	1.37	1.24	-0.09	-0.42	30	9	21
Sweden	37	1.01	0.88	-0.13	-0.02	31	11	20
Switzerland	42	2.96	2.83	-0.05	0.01	36	22	14
Taiwan, China	95	0.64	0.39	-0.40	0.25	83	30	53
Thailand	39	0.09	0.04	-0.56	-0.82	19	4	15
Turkey	45	0.10	0.04	-0.58	-0.68	26	7	19
United Kingdom	140	9.60	9.89	0.03	0.33	101	86	15
United States	444	51.08	53.26	0.04	0.37	409	314	95
Venezuela, RB	7	0.02	0.01	-0.65	-0.22	5	1	4

Appendix Table 2. Balance Sheet Effects, Including Entrant and Exit Constituents

This table shows the regression results of the change in balance sheet characteristics between 1997-99 and 2000-02 for MSCI Global Index Constituents during the methodology change introduced in 2000. The firm-level data are averaged within periods and then converted to logs. All variables are winsorized at the 95%. Standard errors are clustered at the industry (two-digit SIC) level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Sources of Financing							Investment, Size, and Capital Stucture		
Dependent variable:	Total Sources of Funds	External Finance			Internal Finance			CAPEX	Total Assets	Leverage
		Book Value of Total Shares	Total Debt	Net Receivables	Dividends	Cash	Net Income			
Post (*Exits*)	-0.11 *	0.02	-0.02	-0.13 ***	-0.80 ***	0.02	0.01	-0.34 ***	-0.03	0.01
	[0.06]	[0.06]	[0.05]	[0.03]	[0.26]	[0.09]	[0.06]	[0.08]	[0.03]	[0.01]
Post x Negative Reweight	0.18 ***	0.34 ***	0.10 *	0.22 ***	0.94 ***	0.14 *	0.06	0.19 **	0.14 ***	-0.01
	[0.07]	[0.07]	[0.05]	[0.04]	[0.25]	[0.08]	[0.07]	[0.08]	[0.03]	[0.01]
Post x Postive Reweight	0.31 ***	0.45 ***	0.27 ***	0.27 ***	1.15 ***	0.24 **	0.07	0.38 ***	0.24 ***	0.01
	[0.07]	[0.08]	[0.06]	[0.05]	[0.28]	[0.10]	[0.06]	[0.09]	[0.03]	[0.01]
Post x Entrants	0.38 ***	0.70 ***	0.35 ***	0.36 ***	1.51 ***	0.33 ***	0.25 ***	0.47 ***	0.35 ***	-0.01
	[0.07]	[0.10]	[0.06]	[0.05]	[0.33]	[0.08]	[0.07]	[0.09]	[0.04]	[0.01]
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of Observations	2,862	2,906	3,254	2,890	3,358	2,562	2,840	3,106	3,280	3,210
R-squared	0.925	0.929	0.955	0.966	0.878	0.929	0.937	0.939	0.979	0.879
No. of Clusters	65	65	67	67	68	64	65	67	66	67