Do emerging market stocks benefit from index inclusion?[*]

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ABSTRACT

In this paper, we study the returns of emerging market stocks that are included in the MSCI Emerging Markets index, a widely used benchmark for investment funds. Our sample consists of 269 stocks from 24 countries that were added to the index and 262 stocks that were deleted. We find convincing evidence of positive (negative) permanent price impacts upon index inclusion (exclusion). We attribute this to the *radar screen effect* (Merton, 1987), which predicts that more visible stocks attract more (distant) investors and hence require lower expected returns. Consistent with this theory, we find that betas with respect to the index increase, while those of the local indices decrease. When we analyse returns over an event window from before announcement to after inclusion, we find evidence of a pronounced short term drift which is partially reversed at the inclusion date. We attribute this short term phenomenon to limited arbitrage on the predictable portfolio rebalancing behaviour of tracker funds.

The topic of 'effects of index inclusion' has attracted a significant amount of attention from researchers in financial economics. Substantial literature exists in this area, and event study methodology has been widely used to analyse these price impacts. However, these studies mainly focus on the mature markets, especially on the US and S&P 500, like Brown and Barry, 1984; Harris and Gurel, 1986; Shleifer, 1986; Jain, 1987; Dhillon and Johnson, 1991; Beneish and Gardner, 1995; Lynch and Mendenhall, 1997. Similarly, Liu (2000) and Haneda and Sarita (2001) study the Japanese stocks and rebalancing in the Nikkei indices, while Masse et al. (2000) analyse this effect for the Canadian market and Toronto Stock Exchange. In general, the abnormal returns (ARs, hereafter) caused by the inclusion are found to be inconsistent with the semi-strong form of market efficiency. Whether the index inclusion is an information free event is another question that has been tackled in the existing literature. There is strong empirical evidence on the significant and short-term positive price impacts of index inclusion, though the effects of the index deletions are ambiguous. This positive price impact of the market index inclusion has been explained previously by downward-sloped demand curve, liquidity and information hypotheses.

Though the literature is broad, there have not been any studies exclusively focusing on the price effects of index inclusion in emerging markets (EMs, hereafter). While EMs

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[*] Please note that the paper is being dramatically rewritten. The main approach and findings are summarized in the introduction. The organization of the remainder of the paper is subject to change. In case the paper is accepted, we will make sure to make a polished version available to the discussant and participants.

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were under-researched in this area, a few of the reasons why the US market has attracted so much attention are the availability of data, size, depth and the liquidity of the stock market. These matters have also been quite influential on researchers preferring to focus more on the US market than other mature markets. EMs are challenging in this respect, since the availability and reliability of data is problematic as well as the existing market microstructure issues.

Research on emerging markets finance has brought out several asset pricing anomalies in financial markets to the attention of the academic world. There are several different strands of research existing in this area; however, they all aim to provide explanations to the puzzles in these markets, which cannot be fully explained by the standard finance theories and models.

The literature on asset pricing in emerging markets provides several interesting evidence and explanations on how these markets work. Particularly, there is strong evidence against the full-integration of these markets with mature markets, resulting in EM stocks to be traded with substantial risk premia. Additionally, the effects of financial liberalization in these markets have been various, but analysed mainly within the context of financial integration. Previous studies show that opening of the financial markets to foreign investors have significant positive impacts on integration with world markets, however, the exact dating of the market liberalization remain ambiguous, as this may be a continuous process not only measured by the official liberalization date. Therefore, several events other than the official liberalization may increase the level of integration for these markets and the traded stocks. Especially, given that there are large information asymmetries between domestic and foreign investors in many emerging markets, it would not be correct to assume that these asymmetries disappear totally by the liberalization. We expect to find evidence supporting our view that inclusion in a benchmark index is an event that results in a price revaluation, increases the integration with the global financial markets, enhances risk sharing among local and foreign investors, and lowers the cost of capital (equivalently the discount rate and required rate of return), whilst decreasing the systematic risk of these stocks.

In this paper, we conduct an event study to analyse the index inclusion effects in EMs. We contribute to the existing index inclusion literature by extending it to emerging market context. To our knowledge, this is the first paper analysing this issue with a dataset of this size.[1] We believe that this topic is quite interesting, as the price effects can be explained by other hypotheses than the conventional ones. For an empirical analysis of these issues, we examine the return behaviour of the stocks that were added to Morgan Stanley Capital International, Inc.'s Emerging Market Index (MSCI EM, hereafter) between 1996 and 2004.[2] MSCI's Quarterly Index Reviews (QIRs) are used to identify these 269 stocks in our sample. We discuss the event of index inclusion within the context of international asset pricing and financial integration. In other words, we claim

[1] 531 stocks in total: 269 additions to and 262 deletions from MSCI EM.
[2] MSCI EMFI was renamed as MSCI Emerging Markets Index in December 2003. "The MSCI Emerging Markets Index is a free float-adjusted market capitalization index that is designed to measure equity market performance in the global emerging markets", (msci.com).

that index inclusions in emerging markets have similar, though may be weaker effects to financial liberalization, i.e. the foreign investors start considering these stocks in their available set of stocks (‘radar effect’). Therefore, these stocks are priced and revalued accordingly following the inclusion, i.e. the significance of global factors in pricing of these assets will increase.

Our focus is on the index inclusions, but we also study the price reactions resulting from index deletions, especially while analysing the short-term price responses. In our analysis, we examine the effects of index inclusion for long and short-term effects, separately. Therefore, there are two groups of suggested hypotheses. In the short-term, the emphasis is on the increased aggregate demand (demand-curve hypotheses) and the changing investor base. In the long-term, we consider the revaluation of these stocks due to higher levels of integration and the radar-effect. The long-term effects of the index inclusion provide a natural experiment for testing the integration and segmentation issues in the emerging markets, as well as the changes in risk-sharing and information asymmetry between domestic and foreign investors. The short-term price responses are used to test for the efficient markets hypothesis, information-free content of the announcement and the demand-based hypotheses, such as downward-sloped demand curve and price pressure hypotheses.

Our results show that the index inclusions in emerging markets have significant permanent price effects, and that the index changes are not information-free events. In addition to the standard event study with only one large event window, we also use multiple event windows to analyse the short-run price effects of the event. In the short run, there is evidence for increased aggregate demand, with a slight price reversal after the inclusion. In the long run, there is evidence for revaluation of the stock price following the index inclusion. The results show that there is a 2-3% price increase in the case of inclusions, which persists after the actual inclusion in the index.

The short-run effects in emerging markets are similar to those in mature markets, but the long-run price implications of the event are different and informative within the context of asset pricing in emerging markets. The significant permanent price impacts provide us with an opportunity to test further for the changes in the level of stock liquidity, level of integration and in risk sharing between domestic and foreign investors. The liquidity analysis results do not support the liquidity hypothesis for explaining the permanent price impact. As for the changes in the level of integration with world markets, we find that there is an increase in the world-market betas after the inclusion. For the deleted stocks, there is a change in the opposite direction. The change in world-market betas is much higher than the change in local-market betas. Overall, our results indeed support the arguments of increased foreign investor awareness and the shift from technical to perceived eligibility. Following the index inclusions, there is an increase in price and decrease in the super risk premium for the emerging market stocks. These permanent price impacts cannot only be explained by the changes in aggregate demand.

The rest of this paper is organized as follows; in Section I, we discuss the relevant literature, followed by Section II on theoretical predictions, where the long-term and short-term hypotheses are explained. Section III is on institutional background, which describes the MSCI index methodology and calculation. Data and methodology are discussed in the following section. The empirical results are presented and discussed in Section V, and Section VI concludes.

I. Existing Literature

Multiple strands of finance literature are relevant to our paper, since we try to explain the effects of index inclusions within the context of asset pricing in emerging markets.

The event studies have a relatively long history in finance. In the late 1960s, two influential papers on event study methodology have been written by Ball and Brown (1968) and Fama, Jensen, Ross and Roll (1969). In the 1980s, the practical implications, problems and daily data issues in event studies were discussed in Brown and Warner (1980, 1985). Since then, the event studies have been widely used for direct test of market efficiency, and analyse the impact of firm-specific events (like stock splits, earnings announcements, index inclusion) on the value of the firm. (see MacKinlay, 1997; Kothari and Warner (2004) for a detailed review of event studies).

Event-study literature consists of both methodological studies focusing on the statistical aspects and tests of event induced abnormal returns, and empirical studies that test the existing finance theories and models. The first group includes papers that focus on increasing the accuracy of the abnormal return measures. The index inclusion studies are a part of the second group. Examples of earlier studies on index changes include Harris and Gurel (1986), Jain (1987), Shleifer (1986), Goetzmann and Garry (1986). As we have previously mentioned, most of these cover the mature markets. The studies on the US market report the positive price impact of the additions in the short term, but there are different results for the deletions, as some find that there is a negative price impact while others find this effect to be statistically insignificant. The common finding is that there is a positive effect following announcement, and these abnormal returns accumulate until the inclusion, followed by a slight price reversal. Masse et al. (2000) find similar results in the Canadian market for the additions and insignificant results for the deletions. For the Japanese market, Liu (2000) and Haneda & Sarita (2001) report similar results with the US and Canadian markets. Chakrabarti et al. (2005) examine the changes in 29 MSCI standard country indices between 1998 and 2001. They report that the effects of index changes on the stock returns and volumes are similar to the findings of US focused studies.[3]

There are two types of hypotheses suggested by earlier literature to explain the significant abnormal returns induced by the index changes. The first group consists of demand curve hypotheses, and earlier works on index changes can be listed in this group. These hypotheses assume that the index changes are information free events, and the abnormal returns are caused by the changes in the aggregate demand. The price effect can be permanent or temporary.

[3] This was the only paper that also covered the emerging markets as part of the international portfolio.

Harris and Gurel (1986) find that though there are significant abnormal returns in the run-up window (i.e. between the announcement and index change), there is a full price reversal afterwards. This is called the 'price pressure' hypothesis (PPH), and is partly consistent with DSDC. They conclude that demand curves are downward-sloped in the short run and are horizontal in the long run. Similar to DSDC, PPH also predicts that there will be symmetric price reactions to inclusions and deletions.

The 'downward sloped demand curve' (DSDC) hypothesis, suggested by Shleifer (1986), assumes that the demand curves are less than perfectly elastic in short and long run, so there is a permanent shift in the stock prices, following the index changes. However, if the index phenomenon can be fully explained by DSDC, the price impacts of index additions and deletions should be symmetric. Shleifer (1986) analyses the effects of additions to S&P500 on the daily stock prices. To the extent that there are close substitutes for the stocks, the underlying value is not significantly dependent on the supply. In this paper, Shleifer provides evidence against horizontal demand curve, and argues that there is an increase in the aggregate demand for the stock because of the announcement. Empirical analysis shows that a substantial part of the demand increase comes from the index funds, which try to mimic the indices for institutional clients. The price increase may persist for more than one day since the index funds try to rebalance their portfolios over a period of time. The results show that the demand curve is sloped down and the announcement of the index inclusion shifts the curve outwards resulting in a stock price increase that persists in the long run. Shleifer also states that DSDC hypothesis may not be the only explanation of the observed price effect, i.e. there may be information (certification), liquidity or market segmentation hypotheses based explanations.[4]

Additionally, even if there is no information content to the index change, the liquidity of the stock can improve without information production if there is an increase in the trading volume, which lowers the inventory costs of market makers (Hedge and McDermott, 2003). More liquid stocks have lower expected rates of return compared to the illiquid stocks. Several studies in asset pricing literature report this negative relationship between liquidity and stock returns (see Amihud and Mendelson, 1986; Datar et al, 1988; Brennan, Chordia and Subrahmanyam, 1998)[5]. Therefore, when the stock becomes more liquid as a result of index inclusion, the expected rates of return decrease, which may result in a price revaluation.

The second set of hypotheses assumes that index changes, indeed, have information content, though they do not completely rule out the demand curve hypotheses. As an information event, the index change transmits new information about the firms to the

[4] Other explanations for this event associated price increase are suggested. According to the information hypothesis, price increases may be the result of the inclusion certifying the quality of the company since S&P is assumed to have access to non-public information about the companies. Liquidity hypothesis says that the index inclusion results in an increased liquidity, and thus increased demand for the stock. The price change may also come from the increase in demand from investors who are only interested in investing into stocks included in particular benchmark indices.

[5] This is also a demand-based hypothesis as increased turnover rate means higher level of trading, thus increased demand for the particular stock.

market, which results in a revaluation of the stock price. These information-content explanations to the significant ARs are also valid within the standard valuation model (Gordon, 1962) that shows that the present stock price of a firm is equal to the discounted future cash flows. The revaluation of the stock price then stems either on the change in expected cash flows or a change in the required rate of return (i.e. the discount rate). As explained in Chen et al (2004), increases in expected future cashflow can occur because of at least 3 reasons: certification, enhanced investor awareness resulting in higher expected future cash flows, and enhanced investor awareness resulting in better monitoring and more successful investment decisions. Similarly, decrease in required return can accompany an index addition for several reasons: 1) higher liquidity due to higher trading volume, 2) greater interest in the added stocks results in reduced info asymmetry, and thus higher liquidity (superior liquidity), 3) increased investors awareness model of market segmentation (Merton, 1987), i.e. decrease in the shadow cost.

Certification hypothesis, suggested by Dhillon and Johnson (1991) and Jain (1987), claims that index inclusions convey positive information about the stocks, so inclusion or deletion by a global benchmark index like MSCI signals to the market that it has some private information about the specific stock. This hypothesis also requires the price reactions to be symmetric for additions and deletions.[6] Certification also results in increase in expected future cash flows, thus affecting the pricing of a stock.

There is also an alternative liquidity hypothesis, which assumes that the index change has information content, and index inclusion results in superior liquidity. Since index change transmits information about the stock, there is more information available, which in return decreases the information cost of the stock. In this case, there is reduced information asymmetry and increased liquidity, which means lower expected returns, thus a price jump associated with the increase in liquidity.

Investor recognition hypothesis (IRH), suggested by Merton (1987), says that the index inclusions are associated with 'increase investor awareness' and decrease in shadow cost.[7] In the context of index inclusion, IRH can be interpreted as following; when a stock is added to the index, more investors become aware and hold it for its diversification benefits. As a result, the shadow cost falls and there is a permanent increase in the stock price. This hypothesis does not require the price effects to be symmetric, since the index deletions would not necessarily mean investors becoming unaware of the stock. Therefore, observed asymmetric price reactions are consistent with the IRH. In the previous empirical studies, number of shareholders, number of institutional investors and institutional stockholdings have been used as proxies to

[6] This is actually similar to the explanations that McConnell, Ovtchinnikov and Yu (2003) discuss in their paper, i.e. MSCI can be embedding some analysis of the future prospects of the candidate companies; can have access to private information, or may have superior analytical abilities (and investors might have realized this attribute over time)

[7] The model in this paper is discussed in more detail later in this section, since it is also relevant to the asset pricing literature.

measure investor awareness (see Kadlec and McConell, 1994). Additionally, Shapiro (2002) extends Merton's model to a dynamic one.

More recent literature on index inclusion examines these abnormal returns by comparing the explanatory power of these existing theories, which can be defined as a horse–race of theories. Lynch and Mendenhall (1997) examine the effects of additions and deletions on S&P500 on the stock price over the 1976-1995 period. Their results show that there is a permanent stock price increase after the announcement and the inclusion. This finding is inconsistent with the efficient markets hypothesis (EMH, hereafter), particularly with the semi-strong form of efficiency, since the event-induced abnormal returns show that profits can be made based on publicly available information.[8] The authors explain the observed stock return behaviour via four competing hypotheses in the literature: price pressure, DSDC, information and liquidity hypotheses. Their findings support the first two hypotheses while no supporting evidence is found for the last two.

Denis, McConell, Ovtchinnikov and Yu (2003) study the additions to S&P500 between 1987 and 1999, and test whether the index addition is an information free event, since many of the earlier studies use this assumption, especially the demand curve based ones. Their results support the hypothesis that index inclusions are not information free events, and show that they actually have positive information. They do not totally reject the DSDC, but show that this information content must be accounted for in the demand curve based analyses of the index additions.

Chen, Noronha and Singal (2004) study the price effects of S&P500 changes between 1962 and 2000. They find asymmetric price reactions following additions and deletions, which are inconsistent with the demand curve hypotheses. They compare their results with those in earlier studies, and find that the investor awareness is a better explanation of the phenomenon than the explanation based on the demand curve, liquidity and decreased operational costs. In this paper, the authors find a permanent price effect (increase) for the additions while there is a temporary price effect (decrease) for the deletions. Therefore, neither of the demand-curve related hypotheses nor the certification hypothesis can explain all of this price effect of the index changes. Therefore they try to explain the asymmetric excess returns by alternative hypotheses. They suggest the increase in investor awareness as one. This can affect the price in several ways; 1) firm's operating performance may improve because of increased monitoring by investors and/or by enhanced access to capital markets, 2) The firm's liquidity may improve due to lower cost of info asymmetry as a result of greater production of information, 3) the required rate of return for the firm could fall in segmented markets because of a drop in Merton's (1987) shadow cost. The authors are able to partly explain the asymmetric price response by relying on changes in investor awareness and the consequent effect on investor behaviour. Their results suggest that the evidence against almost perfectly elastic demand curves for financial assets is not particularly strong. These are more consistent with an investor awareness story.

[8] see Fama, 1970and 1991 for a detailed discussion of Efficient Markets Hypothesis

In this paper, we suggest an 'international asset pricing' based explanation to the observed price effects of MSCI EM inclusions.

The literature on international asset pricing shows that the traditional perfect capital market and standard asset pricing models cannot fully explain the anomalies of the real world. IAPMs suggested adjustments to these models to come over the observed problems and weaknesses. Emerging markets, all on their own, already represent a challenge to the standard models because of the market-specific and structural issues. They are subject to several risk factors, including economic risk, political risk, currency risk, and liquidity risk. Because of all these risk factors, these markets differ considerably from the developed ones. One of the important issues is that the decision process of the foreign investor is quite different when investing in the emerging markets as s/he faces a quite different investment environment with direct and indirect investment barriers. 'Direct barriers' to international investments are such as capital controls, transactions costs (see Black 1974 and Stulz, 1981 for a detailed discussion). Then, there are the indirect barriers, such information asymmetries (Merton, 1987; Gehrig, 1993).

The international asset pricing models (IAPM) with market imperfections and market segmentation aim to incorporate these barriers into the standard asset pricing models. IAPM suggests that opening of stock markets to foreign investors decreases the domestic equity cost of capital by allowing for risk sharing among domestic and foreign investors (see Stapleton and Subrahmanyam, 1977; Errunza and Losq, 1985; Eun and Janakiramanan, 1986; Alexander, Eun and Janakiramanan, 1987; Stulz, 1999a, 1999b; Chari and Henry, 2004). Since the equity premium in a market is determined based on the level of integration with the world markets and that this premium should fall when a completely or mildly segmented market liberalizes its stock market. If the markets are partially segmented as in the case of EMs, the equity premium is in between the predictions of the complete segmentation and full integration cases (Bekaert and Harvey, 1995)[9]. The general consensus in previous IAPM studies is that the local price of risk is higher than the global price of risk in the EMs. The fall in the equity premium, then, causes, a permanent fall in the aggregate cost of equity capital and a revaluation of the stock market index, given the expected future cash flows are held constant. Henry (2000) examines this prediction for the case of stock market liberalizations in 12 emerging markets, and finds supporting evidence.

It is useful to mention at this point that the dating of integration in the emerging markets is not straightforward. The official stock market liberalization or foreign ownership limit abolishment does not necessarily mean that the foreign investors start considering these stocks in their available global set of assets. Therefore, it may take longer for the foreign investors to expose themselves to EM assets and for the markets to integrate in practice. This argument is a mixture of the financial liberalization studies and asset pricing with mild segmentation. Harvey, Bekaert and Lumsdaine (2000) discuss this issue and suggest a methodology to date the actual integration of world markets. In this paper, we suggest

[9] In the case of complete segmentation from the world markets, the equity premium is proportional to the variance of country's aggregate cash flows: local price of risk. If fully integrated, it is proportional to the covariance of country's aggregate cash flows with those of a world portfolio: the global price of risk.

that inclusion in a global benchmark index may have similar effects to stock market liberalization in emerging markets, especially in regards to higher integration. For the emerging market stocks, we know that most of them become technically eligible with the market liberalizations; however, the international investors may still hesitate to invest in these, until a more reassuring signal of eligibility and investability, such as inclusion in a benchmark index.

Chari and Henry (2004) study the stock price increases following the liberalizations of emerging stock markets, using firm level data. They find that the liberalization reduces the systematic risk for these stocks as a consequence of increased risk sharing, which result in increases in stock price and decreases in expected stock returns. Their analysis shows that there is a reduction in the systematic risk post-liberalization, thus firm-specific revaluations, which are directly proportional to the firm-specific changes in systematic risk.

Errunza and Losq (1985) (E-L, hereafter) suggest an international asset-pricing model with mild segmentation assumption rather than the full integration assumption used in the traditional asset pricing models. They take international investment barriers into consideration and incorporate these imperfections into their model. The model consists of two types of investors, restricted and unrestricted, and two types of securities, eligible and ineligible. In a two-country setting, the model is built upon the idea that the ineligible securities should have an associated super risk premium. The authors also discuss the issue of technically (in)eligible set of stocks and perceived (in)eligible set. A market security is considered technically eligible if no capital controls exist on foreign portfolio investments, and it is considered perceived eligible if it is characterized by no formal capital controls as well as significant foreign portfolio investments (active foreign investment).

Hietala (1985), similarly, discusses asset pricing in an international context where there are imperfections causing the markets to not to be fully integrated. These imperfections result in equity price premium in unrestricted assets. The model is based on the Finnish case where the domestic investors are the restricted ones, in their foreign investments. This equilibrium model explains the premiums: the unrestricted stock is traded at a premium if and only if the price of the stock is determined by foreign investors, i.e. the foreigners require a lower rate of return than the domestic investors demand for that stock.

Though not in an international investment setting, Merton (1987) criticizes the perfect capital market model for not being a true representation of the real capital markets because of its unrealistic assumptions. He suggests a new model, in which the complete information assumption is invalidated and replaced by the incomplete information assumption. Though this model does not cover the international asset pricing issues, it has a similar approach to market imperfections as the E-L's and Hietala's models. The model assumes that investors hold only a subset of the available assets in the market because of the information costs that arise as a result of the incomplete information in the capital markets. Merton introduces a new type of information costs, which is the background-information cost that is the cost of making the investors aware of the stock. The criticized perfect market model ignores the informational costs that are in reality influential on investors' portfolio allocation decisions (investor recognition hypothesis). The suggested model can be a realistic demonstration of the situation in the emerging stock markets, as the foreign investors face substantial background information costs in their EM investments. However, Merton assumes that the quality of information on a particular stock is the same across all informed investors and this does not really represent our case. For that reason, in our analysis, we assume that the quality of stock information depends (increasing function) on the number of analysts following it, as in Arbel, Carvell and Strebel's (1983) theory of neglected stocks.[10] Arbel et al. divide the stocks into two categories, neglected and generic, and predict that *ceteris paribus* the expected rate of return on neglected stocks is higher than the return on generic stocks. This categorization is based on the number of analysts following a stock. They claim that the investors refrain from investing into some stocks because of the low quality of available information and because they are very risk averse, preferring to 'play it safe'. In our opinion, this perfectly summarizes the situation for foreign investors in the emerging stock markets. These investors face asymmetric stock information and are at a disadvantageous position compared to the domestic investors. Because of the information costs, they have high coefficients of risk aversion and are reluctant to invest in these markets. Though the EM stocks are theoretically eligible, for the liberalized stock markets, the foreign investors only invest in a subset of available stocks in the global markets. They tend to avoid holding EM stocks because of their high risk. This high level of risk aversion of the foreign investors causes the EM stocks to have a super risk premium, a higher expected rate of return and be traded at a premium compared to the developed market stocks.

II. Theory Predictions

The event of index inclusion may result in the two types of price impacts. There may be only short-term price effects, which are temporary, and which occur around and between the announcement and the index inclusion. Following the inclusion, this effect does not persist. The short-term effects are consistent with the demand-based hypotheses, i.e. the demand curve is downward sloped in the short run, but horizontal in the long run. In other words, the stock prices are less elastic in the short run. On the other hand, the index inclusion may have permanent (long-term) price effects. In this case, in addition to the price movements in the short run caused by the changes in the aggregate demand, the index inclusion also has information (positive) content about the fundamental value of the stock. Therefore, the price effects persist even after the actual index inclusion, i.e. slight or no price reversal.

If markets are fully integrated, in the sense that all the world's investors consider all the world's stocks for their portfolio decisions, and markets are efficient in the semi-strong sense, then there should be no permanent effect if a stock is included in an benchmarking index such as those compiled by MSCI. This is therefore our benchmark hypothesis:

[10] Merton also says that this assumption also holds in his model when the number of informed investors is small.

LH1: Full integration of world markets / markets are semi strong efficient.
On average, there is no permanent price effect for stocks that are included in indexes that base their portfolio on publicly observable information.

If the full integration argument for the emerging markets is valid, then this means that the emerging markets assets (given that the stock markets are already officially liberalized) are already in the international portfolio of the investors, thus there are no information asymmetries. In this case, since the index inclusion does not contain any new information about the firm, this hypothesis is also consistent with EMH. All the available information about the firm is already incorporated into the stock price, so there are no significant abnormal returns around the event.

There are two alternative hypotheses, both of which would predict a permanent positive increase in value of stocks that are included in a widely followed index. The first conjectures a situation of mild segmentation. With this we mean that not all investors consider all stocks and that therefore the stocks are priced as segmented assets.

LH2: Mild segmentation
The index inclusion has significant permanent price impact on the stocks, as a result of enhanced integration with the world equity markets.

Existing literature shows that the emerging stock markets are mildly segmented from the world markets.[11] The inclusion in a global benchmark index increases the level of integration, which results in price revaluation (increase). Therefore, the index inclusion has positive information content. In the case of complete segmentation, the risk premium is proportional to the local market beta. If fully integrated, this premium is proportional to stock's world market beta. If the markets are partially segmented as in the case of EMs, the equity premium is in between these predictions of the complete segmentation and full integration cases. The increased integration, after the index inclusion, should then be reflected through changes in the local and world market betas. Since these markets are segmented, there are restricted assets and restricted (foreign) investors, as discussed in E-L and Hietala (1986). Therefore, the concept of 'super risk premium', discussed in these papers, becomes relevant to asset pricing following the index change. With the index inclusion, the super risk premium decreases, and so do the expected stock returns. As a result, the stock prices increase.

The EMs may be technically eligible for foreign investment, but even after the stock market liberalizations, the foreign investors may not increase their exposure to most of these markets because of the high risks involved; such as the liquidity and information risks. Therefore, these investors do not include the emerging market stocks in their

[11] Several researchers have examined the integration-segmentation issue in the theoretical and empirical literature: Solnik (1974); Stehle (1977); Stulz (1981); Errunza and Losq (1985); Eun and Janakiramanan (1986); Jorion and Schwartz (1986); Cho, Eun and Senbet (1986); Harvey (1981); Errunza, Losq and Prabhala (1992). Their findings show that the EMs are partially integrated, and this level of integration is time varying (Bekaert and Harvey, 1995; Carrieri, Errunza and Hogan, 2003).

available investment set. Hence, we believe that E-L's definitions of technical and perceived eligibility characterizes the situation. Though opened to foreign investment by stock market liberalizations, there may not be any significant foreign investment present in these markets and stocks. Then, these can be defined as 'technically eligible', but 'perceived ineligible' stocks, and are priced as restricted stocks with super risk premia. In this case, inclusion in a global benchmark index like MSCI EM indicates an upgrading from technical to perceived eligibility and confirms the international investability of these stocks. Following the index inclusion, these stocks are considered as part of a global asset portfolio, so they are subject to price revaluation as they are now priced as integrated stocks instead of segmented ones.

The international investors may refrain from investing into EM stocks before index inclusion because of various reasons. We focus on three of these in the mild segmentation hypothesis. First, there are actual legal restrictions on holdings of the foreign investors. Several EMs were subject to these in late 1990s, like China, Thailand, Philippines (see Edison and Warnock, 2000 for a detailed analysis). This is similar to the type of restrictions that Hietala (1986) discusses in his analysis of the Finnish case.

The second reason for lack of foreign portfolio investment in EMs is the issue of investor awareness, which we call the 'radar effect' and discuss this briefly above. The investors are not aware of these stocks, and do not consider these in their available set of assets.

The third is the high information asymmetry and background costs that the foreign investors face in EMS; e.g. different accounting standards, availability of stock information only in the local language. Especially given the fact that EM stocks are priced more by the local factors, these issues become important for the investors. As long as these stocks are priced as segmented stocks, the domestic investors will be at an advantageous position, as they have better access to local information. As a sub-hypothesis, we can say that the index inclusion has significant permanent price impact on the stocks, as a result of the increased investor awareness and lower background information costs.

Following Merton's IRH, inclusion in a global benchmark index may increase the number of investors/analysts following the stock, thus any background information about the stock becomes less costly and more easily available. Additionally, this also means advancement from 'neglected' stock category to 'generic' stock category, with higher quality of available information and lower information costs. As predicted by IAPMs, when the stocks become eligible to foreign investors, we should observe a decrease in the equity risk premium and cost of capital, increase in the stock price and enlargement of the investor base. All these alterations signal to a permanent change in the fundamental value of the firm, thus of the stock price.

LH3: Liquidity hypothesis

The index inclusion has significant permanent price impact on the stocks, as a result of the increase in stock liquidity.

When the stocks are included in a global benchmark index, they become more liquid, and this results in price increase.

After the index inclusion, assuming that it has information content, there is more information available for these stocks. This decreases the information asymmetry between the domestic and foreign investors as well as resulting in lower transaction costs. If the index inclusion is associated with increased foreign investor holdings, then it becomes easier to invest and unload portfolios, i.e. there is increased liquidity. As a result of the liquidity increase, expected stock returns decrease, so the stock price increases. In this case, the increased liquidity associated with the index change, is the cause of the price increase.

Apart from these long-term effects, there is also evidence of short-term anomalies around the index inclusion. The most widely accepted explanation of these anomalies is that there exist a relatively large group of dedicated index trackers that wants to buy the stock upon actual inclusion in the index, but not before. Simultaneously, a relatively small group of arbitrageurs start buying the stock upon the announcement that it will be included later. The source of the arbitrage lies in the fact that the index trackers make the price impact, or Kyle's lambda dramatically increases upon inclusion date. This makes it attractive for low transaction cost arbitrageurs to buy in between announcement date and inclusion date, and sell around inclusion date.

If the proportion of arbitrageurs is very high, we expect no effect on inclusion date and all the effect (if any), on the announcement date. If the proportion of index tracker funds is very high, we expect the opposite, i.e. all the effect occurs on the inclusion date.

Any pattern in between can be explained by the demand-curve based analyses, so the short-term hypotheses focus on the changes in aggregate demand and investor base. To test for these short-run hypotheses, we also study the abnormal volume behaviour, as the increase in demand will be reflected in the trading-volume data.

SH1: EMH- information or no information content

- **i. The index inclusion is an information free event, so it should not have any price impacts.**
- ii. **The index inclusion has information content, but if the markets are efficient, the new information must be incorporated into the prices rapidly enough, so that there is no profitable trade pattern following the event.**

According to the first of these hypotheses, there should not be any significant abnormal returns neither around the announcement or inclusion dates. In the case that there is new information introduced to the market, then there can be significant abnormal returns around either of these event dates, however these should vanish rapidly.

The following hypotheses assume that the index inclusion has information content.

SH2: Price Pressure Hypothesis 1 –Arbitrageurs are the majority
Following the index inclusion announcement, the arbitrageurs enter the market, as there is a profitable trade pattern in the run up window. The prices increase until the inclusion date because of the price pressure created by these investors.

This hypothesis is not consistent with EMH, since there is a profitable trade pattern following the public announcement; contradicts the semi-strong form of market efficiency. In addition to the significant abnormal returns on the announcement date, there are also significant cumulative abnormal returns in the run-up window, i.e. between the announcement and actual index inclusion. However, there should not be any significant abnormal returns around the inclusion, as the arbitrageurs no longer demand the stocks, but rather they are the sellers to the index s, so the price pattern should be such that the prices stabilize just before the inclusion, i.e. no significant abnormal returns, and right after the inclusion, there is a price reversal.

Chen et al. (2004) suggest that with the pre-announcement of index changes, quasi arbitrageurs enter the market by buying (selling) added (deleted) stocks in the hope of flipping around on the CD at more favourable prices. If there is a systematic trading pattern before the actual index change, mainly due to the expected index fund rebalancing, then arbitrageurs may enter the market right after the announcement, and hold the stocks until the index change. They then unload their portfolios when the index fund demand reaches its maximum, which would be on the actual inclusion date. This hypothesis is comparable to the price pressure hypothesis of Harris and Gurel (1985).

SH3: Price Pressure Hypothesis 2 –Index tracker funds are the majority
There are significant positive abnormal returns and around the inclusion date, because of the portfolio rebalancings of the dedicated EM investors, i.e. index funds.

The index addition presents a natural experiment in which the price reactions result from the rebalancing needs and increased interest of the foreign institutional investors. The index funds try to mimic the index as accurate as possible as their investment strategy is ‘minimum tracking error’. Therefore, these funds rebalance their portfolios accordingly following the index announcement before the actual inclusion to minimize the tracking error, which in return increases the aggregate demand for the included stocks. Assuming that the demand curve is downward sloped, this results in a price increase over the run up window, which is the window between the announcement and inclusion dates.

The price changes associated with the index rebalancings may represent significant costs to portfolio managers who track the index (Madhavan and Ming, 2002). Since the index fund managers are being evaluated on the tracking error, they tend to wait until the actual index change, and buy/sell stocks on or near that date, rather than just after the announcement. Therefore, they prefer paying a price premium (in the midst of a liquidity crunch) rather than facing a tracking error risk. For index funds benchmarked vs. popular indexes, there is a concentration of trading around pre-disclosed index revisions.

If this hypothesis is true, then there should only be significant cumulative abnormal returns around the inclusion date, and none around the announcement. We should expect stability in the prices, after the actual inclusion, i.e. when the index fund demand is met. There may be a slight price reversal after the change date, but the price pressure diminishes once the index funds make their purchases.

SH4: Arbitrageurs vs. Index Funds

Since there is significant number of both arbitrageurs and index funds in the market, we observe abnormal returns on the announcement, in the run-up window and on the inclusion date, because of increased aggregate demand from both investor groups at different times within the event window.

This hypothesis is in between the second and third short-term hypotheses. The arbitrageurs are aware of this index fund rebalancing, so they enter the market earlier in the run-up window, whereas the index funds make their purchases closer to the change date. Therefore, in this case, the abnormal returns start building up with the announcement and accumulate in the run up window until the inclusion date. Following the index inclusion, there is a price reversal.

III. Institutional Background

The emerging equity markets (EEMs) started to attract foreign investment in 1990s, with several emerging economies liberalizing and abandoning the restrictions on foreign access. As a result, markets became more eligible for the international investors, and substantial amount of foreign capital flew into these markets and stocks. The capital inflows increased rapidly in the first half of the decade, peaking in 1997, but started to decrease in the second half as a result of numerous emerging markets crises, which began with the 1994 Mexican crisis. All this time and still, EMs have been associated with high return as well as high risk, providing major diversification opportunities to international investors.

Though these markets were opened to foreign investment in 1990s, these were not all complete openings (for example China). Therefore, because of the high risk, high uncertainty, legal barriers and unavailability of information (costly), foreign investors preferred to invest through intermediaries instead of individual investments. As a result, institutional investors and funds became major players in these markets (IMF GFSR, 2001a). In the search for a reliable and objective benchmark, foreign investors became interested in indices like MSCI EM, S&P500, since these provide consolidated source of information about the investment universe and benchmarks for investing internationally that accurately represent the opportunities available to the institutional investors.[12] The

[12] The international investors face informational obstacles in emerging markets; asymmetry of information between foreign and local investors, information being costly to obtain, etc.

real-world investment opportunity set available to the international investor is filled with subtle obstacles and contradictions like cross ownership, foreign ownership restrictions, and these constructed indices aim to provide a more realistic picture of the investment universe. Therefore, these are of crucial importance to investors for guidance.

In this paper, we analyse the additions to the MSCI EM, which is respected and seen as a performance benchmark index among the international investors. [13] The index covers 26 emerging stock markets. [14] To maintain accurate representation of the markets, MSCI indices are subject to annual and quarterly revisions. We use these revisions to date the inclusion announcements.

i. MSCI Index Methodology

MSCI EM is widely accepted and used among both the international investors and researchers, to measure the performance of emerging markets. The index is constructed and maintained using the MSCI Standard Index Series methodology. In this section, we briefly explain the methodology, for which more detailed explanation can be found in MSCI Methodology Book.

The index belongs to the family of MSCI Standard Indices, and is a capitalization-weighted index that aims to capture 85% of the total free float market capitalization in 26 emerging markets.[15] It covers a subset of all available shares in the EM universe to foreign investors. To serve this purpose, MSCI adjusts the market capitalization of individual companies by the free float, which is the publicly available portion of the shares outstanding. Therefore, while calculating the market cap, it excludes strategic public or private shareholdings (governments, companies, banks, principal officers, board members and employees), and limitations on share ownership for foreign investors set by law, government regulations, company by-laws and other authoritative statements.[16] Taking these limitations into consideration, MSCI uses Foreign Inclusion Factors (FIFs) and Foreign Ownership Limits (FOLs) to adjust the market capitalization by free float. A detailed example is provided in the Appendix.

[INSERT TABLE I HERE]

The history of the MSCI equity indices goes back to 1969. As of 2005, MSCI estimates that it has a market share of more than 75% in the international equity indexing industry and that over USD 3 trillion of equity assets are benchmarked to its indices around the

[13] Started as MSCI Emerging Markets Free Index(MSCI EMFI) in 1989

[14] Argentina, Brazil, Chile, China, Colombia, Czech Republic, Egypt, Hungary, India, Indonesia, Israel, Jordan, Korea, Malaysia, Mexico, Morocco, Pakistan, Peru, Philippines, Poland, Russia, South Africa, Taiwan, Thailand, Turkey and Venezuela.

[15] Before 2001, the target market representation was 60%. On December 10, 2000, MSCI announced a revision of the index methodology, which was implemented in two steps: November 30, 2001 and May 31, 2002.

[16] Non-strategic shareholders include individuals, investment funds, mutual funds, unit trusts, security brokers, pension funds, insurance companies and social security funds.

world.[17] These equity indices are constructed and maintained based on publicly available information.[18] The MSCI Standard Index Methodology utilizes a bottom-up construction approach, which builds up indices starting from sub-industries (132 in total), and then constructs industry (24) and sector (10) groups, followed by the country indices. The industry and sector definitions are based on the GICS (Global Industry Classification Standards) developed by MSCI and Standard&Poor's. In total, there are 10 sector classifications: energy, materials, industrials, consumer discretionary, consumer staples, health care, financials, IT, telecommunication services and utilities. The same classification also applies to MSCI EM. The number of constituents in an index is not prespecified, but depends on the minimum size guidelines for inclusion, breadth and depth of the specific markets. The constituents are selected to represent 85% of the free float adjusted market capitalization in each of the ten sectors. The ultimate aim is to select stocks that will represent 85% of the free float adjusted market capitalization in the country of interest.[19] The same methodology is applied across markets, which makes it possible to construct accurate and comparable regional and composite indices by aggregating the country indices. For example, MSCI EM is constructed by aggregating 26 emerging market country indices. The percentage breakdown of countries in MSCI EM index is based on the market capitalization values.

MSCI applies minimum size guidelines for the inclusion of countries and industry groups in its standard indices. The selection criteria for countries include the overall free float-adjusted market capitalization of the market, distribution of free float-adjusted market capitalization in the country, level of market concentration, and marginal contribution to the market of the largest security at different percentiles of the free float-adjusted market capitalization distribution. Similarly, the selection criteria for stocks for country index inclusion can be grouped under three headings. First one is the 'business activities' of the company and the degree of diversification it will contribute to the index. The second criterion is the size (free float adjusted market capitalization) and liquidity of the stock. The minimum size guidelines for MSCI EM countries are presented in Table II.[20] For a stock to be added to the index in the Quarterly Index Review, it has to meet double these minimum size guidelines. Regarding the liquidity criterion, though there is no definite measure, liquidity is evaluated based on trade volume or traded value, i.e. ATVR (annualized traded value ratio). The third criterion is the estimated free float for the company and its individual share classes. There is a minimum free float requirement of 15%, with certain exceptions to this rule.[21]

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[17] www.msci.com, MSCI estimates, 2003

[18] MSCI Methodology book

[19] This 85% market representation target in each industry and country group may not always be uniformly and exactly achieved because of industry specific differences. Additionally, 85% guideline can be applied to sub industry groups only in deep and advanced markets like the US.

[20] These minimum size guidelines are used by MSCI to minimize the number of additions and to reflect only significant changes in quarterly index reviews.

[21] In some special cases; stocks with less than 15% free float are also included in the index, i.e. when the free float adjusted market capitalization of the stock is large. In this case, the criteria are that the free float-adjusted market capitalization of the security represents at least 10 basis points of the MSCI Standard World Index or 15 basis points of the MSCI Standard EMF Index, or 5% of the country index to which the security would belong

[INSERT TABLE II HERE]

Maintenance of the indices is as important as the construction, especially for the continuity, replicability and low turnover. The standard indices are maintained through three types of reviews: annual full country index reviews, quarterly index reviews (QIR hereafter) and ongoing event-related changes. QIRs announce a number of changes to the standard indices to ensure the accurate representation of the dynamic market place, and to avoid significant under- and over-representation of any industry group in a country index.[22] In this paper, we focus on the additions to the MSCI EM index. The Quarterly Standard Index rebalancing occurs on only four dates throughout the year, which are the close of the last business day of February, May, August and November. MSCI Index additions and deletions are announced at least two weeks in advance (in QIRs), though sometimes this time gap between announcement and actual inclusion dates may be wider. Any addition to or deletion from the MSCI country indices is simultaneously reflected in the MSCI EM index.

Additions to MSCI EM in QIRs occur because of several reasons. These include the change in size of the stock (free float adjusted), under-representation of one or more industry groups following mergers, acquisitions, restructuring and other major market events affecting that industry group and changes in industry classification. MSCI states that the equity indices are maintained based on publicly available information, which would mean that the index addition announcements should be consistent with the semi-strong form of market efficiency. Overall, since these changes are made based on publicly available information, it should not be possible to make profit by trading on these announcements.

ii. Index Calculation

Daily price of an MSCI Country Index (e.g. $MSCI_{Taiwan,t}$) is calculated based on the following formula:

$$MSCI_{Taiwan,t} = \sum_{i=1}^{N} w_i P_{it}$$

where N is the total number of Taiwanese stocks included in the MSCI Taiwan country index to capture 85% of the market capitalization, P_{it} is the USD daily price for each stock in the index, and w_i is the weight of each stock, which is calculated as following.

$$w_i = \frac{\text{free float adjusted MCAP}_i}{\sum_{i=1}^{N} \text{free float adjusted MCAP}_i}$$

[22] The QIR announcements include additions to and deletions from the indices and changes in number of shares and in FIFs

Using different values for P_{it}, MSCI maintains and calculates the daily prices for two types of indices: MSCI Price Indices and MSCI Total Return Indices. The Price Index measures market performance only by calculating the sum of the free float-weighted market capitalization returns of all its constituents on a given day. It only measures the price performance and does not adjust for any dividends payments. The Total Return Indices measure the market performance, including price performance and income from dividend payments. MSCI's Daily Total Return (DTR) methodology reinvests dividends in indices the day the security is quoted ex-dividend.[23] DTR calculates the dividends reinvestments in two different ways and these are reported separately as Total Return Indices with gross dividends and with net dividends. The gross dividends series approximates the maximum possible dividend reinvestment.[24] The Net Dividends series approximates the minimum possible dividend reinvestment. [25]

To sum up, three different index levels are reported each day for MSCI EM index: Price Index, Gross Index and Net Index. MSCI EM index is calculated on a real time basis in USD and disseminated every 60 seconds during market trading hours. These index values are also available in EUR and MSCI Local currency.

IV. Data and Methodology

i. The event and the event window(s)

In this study, the event of interest is the announcements of MSCI EM inclusion during 1996-2004 period. The event day (AD) is actually the day following the announcement since MSCI QIR announcements occur after 8pm GMT, when European and Asian markets are already closed. Therefore, the announcement effects will be reflected on the prices the following day. We adjust the data for the Western Hemisphere stocks in our sample, as the markets are still open during the announcement. On the other hand, the change date (CD) is the day of the announced inclusion date, since the investors are already aware of this before the inclusion takes place. The complete event window runs from the 10th day prior to the announcement day (AD-10) until the 20th day after the actual change (CD+20). For most of the stocks, there is a two-week period between the announcement (AD) and change dates (CD).[26] While analyzing the stock price behavior within the event window, we focus on six sub-windows.[27] Notice that 'number of days', in this analysis, refers to 'number of business days'.

[23] See MSCI DTR Methodology document for further details.
[24] The amount reinvested is the dividend distributed to individuals resident in the country of the company, but does not include tax credits
[25] The dividend is reinvested after deduction of withholding tax, applying the rate to non-resident individuals who do not benefit from double taxation treaties. MSCI uses withholding tax rates applicable to Luxembourg holding companies, as Luxembourg applies the highest rates
[26] For stocks, with longer period between AD and CD, we make the relevant changes to adjust in our empirical analysis
[27] The multi-window framework was initially suggested by Lynch and Mendenhall (1997). L-M use 5 windows in their study, using also the release date to test for their hypothesis. The release-ending day is the day when the demand for the stock turns to its normal post-change level, i.e. when the index fund demand ends (so that the price release starts). Under the price pressure hypothesis, any price release ends with the completion of index fund trades.

As we are testing for two different sets of hypotheses, we use two different sets of event windows. For testing the long-term effects of the index inclusion, we use the large event window between (AD-10) and (CD+20), for which the results are shown under the 'total price effect window'. For the short-term price impact hypothesis, unlike the standard practice in the event-study papers, in this paper we follow Lynch and Mendenhall (1997) and use multiple-event-window framework to examine the stock price movements around the time of EM index inclusion. Figure 1 presents an illustration of the timeline for the event window.

1. *Anticipation (Pre-announcement) window* is used to detect if there is any event anticipation, or leakage of information before the actual announcement. This window covers the abnormal returns between (AD-10) and (AD-2).

2. *Announcement day (AD)* is the first event day, which is the day following the actual announcement because of the reasons discussed above.

3. *Run-up window* covers the time period from the day after the announcement (AD+1) through the day before change date (CD-1).

4. *Inclusion day (CD)* is the second event day, which is the actual index change date.

5. *Price reversal window* covers the period between (CD+1) and (CD+10).

6. *Total price effect window* covers the time period from the AD until CD+10. Alternatively, we also report results for extended total effect windows; between (AD-10) and (CD+10); between (AD-10) and (CD+20) and between AD and (CD+20). The long-run event window is (AD-10) and (CD+20).

ii. The Sample

The data set consists of stocks added to the MSCI EM since January 1996, based on the MSCI Quarterly Standard index rebalancing announcements. [28] These announcements are available on the MSCI website (www.msci.com) from February 2000 onwards. The announcement data prior to February 2000 were found from the Bloomberg announcements. From the announcement data, we found that in total 353 emerging market stocks have been added to MSCI country indices, and these formed our initial sample.

The daily stock price data was obtained from DataStream, and we use return index (RI) series in USD for these stocks. The return indices are preferred over the price data, as

[28] This selection method enables us to have a more random sample, independent of the size factor.

these are adjusted for the dividends and stock splits.[29] The returns are calculated as the first difference log return indices, for each stock.

For each stock, we also obtain the volume data, to analyse the demand fluctuations for the specific stocks, around the event date. This data is available at DataStream as turnover by volume, showing the number of shares traded for a stock on a particular day, expressed in thousands. Since we need the volume data expressed in dollar value (i.e. equity value traded per day), the turnover value is multiplied by the daily closing price each day to generate the volume data series.

Following the data gathering, we form a complete and clean sample. Some of the observations are eliminated because of the availability of useable return data in USD for at least 30 days prior to AD. The complete sample consists of 269 stocks from 24 EMs.[30] Later on in our analysis, we focus on the sub-sample of stocks for which the run-up window is 9 business days. The breakdown of the sample is provided in Table II.

After the stocks are selected, we use daily stock price and index data in USD. The data in dollars is preferred over the local currency since our analysis focuses on the international investors, who have a much wider and more international investment set than local investors and their opportunity costs are in foreign currency terms.

We are aware of the fact that the characteristics of daily data can result in biased parameter estimators and misspecifications due to the low power of the tests in an event study (see Brown and Warner, 1985). These characteristics include the non-normality of daily stock returns, non-synchronous trading issues which put the econometric methods under question, serial and cross sectional correlation of the error terms in the regression.

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[29] Return Index (RI) shows the theoretical growth in value of a share holding over a specified period, assuming that dividends are re-invested to purchase additional units of an equity or unit trust at the closing price applicable on the ex-dividend date. RI is constructed using an annualized dividend yield, as follows (DataStream definition):

$$RI_t = RI_{t-1} * \frac{PI_t}{PI_{t-1}} * \left(1 + \frac{DY_t}{100} * \frac{1}{N}\right)$$

Where:

RI_t = Return index on day t

RI_{t-1} = Return index on previous day

PI_t = Price index on day t

PI_{t-1} = Price index on previous day

DY_t = Dividend yield % on day t

N = Number of working days in the year (taken to be 260)

[30] Additionally, in a similar fashion to Lynch and Mendenhall (1997), we also take the impact of survivorship into consideration, i.e. if the index inclusion is conditional on some corporate action, which may be dependent on the stock price behaviour of the firm. Therefore, if any merger or spin off activity is reported at the time of the index inclusion announcement, these firms are deleted from the sample to obtain the clean sample.

However, these issues can be neglected in short-term event studies (see Brown and Warner, 1985; Kothari and Warner, 2004).

iii. Methodology

Our analysis is based on event-study methodology. The event of interest in this paper is the inclusion in the MSCI EM index, and the event window is defined accordingly as explained earlier. In the literature, major concern of the event studies has been to assess the extent to which security performance around the time of the event has been abnormal. In that sense, event studies are tests of semi strong form of market efficiency, testing whether the publicly available information is quickly and fully incorporated into asset prices. [31] Therefore, EMH is embedded in the event study methodology. If this holds, ARs should have a mean of zero, in which case they should not systematically differ from zero and not have any tendency to build up or down. If the event is unanticipated, the ARs at the event time are assumed to be an appropriate measure of the impact of the event on the wealth of the firms' shareholders (Brown and Warner, 1980).

The standard event study methodology consists of three main steps. The first one is to specify the return generating process for individual stocks, based on the estimation window data, and then to obtain the model parameters. The assumptions of the return-generating model directly affect its efficiency and power (of the test) in detecting the ARs.[32] In an event study if the return-generating model is correct, then the abnormal performance measure for every security should have an unconditional mean of zero, i.e. the ARs are random disturbances. Additionally, the correct model should minimize the variance of the abnormal return component. In the second step, the ARs are calculated for the event window, based on these model parameters. These are the differences between the expected and actual returns. The third and final step is determining the statistical significance of the ARs, thus the event impact. The event dates are synchronized for all the stocks, and ARs are aggregated to test the null hypothesis of no event impact. Earlier event-studies suggest using different assumptions and methods in these steps, for more powerful test results. For example, various measures have been suggested as the abnormal performance measure like the mean adjusted returns, market adjusted returns, and risk adjusted returns. In this paper, we use market-adjusted returns, which assumes that the market beta is equal to one for all stocks.[33, 34]

Parametric Tests

We start analysing the stock returns in our sample by converting the calendar days to event days and synchronizing the event windows across stocks. Following this, we analyse the abnormal returns using the suggested multi-window framework.

[31] Stock prices are not predictable based on all publicly available information, including the past prices

[32] With each method, then, a test statistics should be computed and be compared to the test stats of the assumed distribution under the null hypothesis

[33] Apparently, this imposes a restriction on the coefficient, but it is more reliable than the market model of Sharpe, for our sample. Alternatively, for robustness of our results we also calculate the ARs using a market model and DataStream market betas for the stocks. The results are available upon request.

[34] This model also takes into account any market specific systematic risk.

The event study analysis is constructed using the following methodology. We use the market adjusted ARs, which are calculated as the excess return on stock *i* on day *t* over the local market index.

$$R_{it} = R_{mt} + \varepsilon_{it}, \quad \varepsilon_i \sim N(0, \sigma_i^2)$$
$$AR_{it} = R_{it} - R_{mt}$$

where R_{mt} is the return on the local market index on day *t*.

Using these ARs, we calculate the average abnormal returns (AAR_t) for day *t* (event day being $t=0$) as well as cumulative abnormal returns to test for the significance of ARs in the sub-event windows.

$$AAR_t = \frac{1}{N}\sum_{i=1}^{N} AR_{it}, \qquad AAR_t \sim N(0, \mathrm{var}(AAR_t))$$
$$\mathrm{var}(AAR_t) = \frac{1}{N^2}\sum_{i=1}^{N}\sigma_i^2$$

$$CAR(t_1, t_2) = \sum_{t=t_1}^{t_2} AAR_t, \quad CAR(t_1, t_2) \sim N(0, \mathrm{var}(CAR(t_1, t_2)))$$
$$\mathrm{var}(CAR(t_1, t_2)) = \frac{1}{N^2}\sum_{i=1}^{N}\sigma_i^2(t_1, t_2)$$
$$\text{where } \sigma_i^2(t_1, t_2) = (t_2 - t_1 + 1)\sigma_i^2$$

Therefore, we calculate CARs for the anticipation, run-up, price reversal and total permanent effect windows. The event windows start on t_1 and end on t_2.

We need the variance to conduct the significance tests. The sample estimator of the variance is calculated as following.[35]

$$\hat{\sigma}_i^2 = \frac{1}{L_1 - 2}\sum_{t=-29}^{-1}(R_{it} - R_{mt})^2$$

where L_1 is the number of days in the estimation window.

To calculate the variance of VAR, we use the sample estimator of σ_i^2; $\hat{\sigma}_i^2$. Following these, we test the null hypothesis of no event related AAR_t and $CAR\ (t_1, t_2)$ by using the following test statistics.

[35] We also use the cross sectional variance of Asquith (1983). The test results change very little when variance is estimated with this method. We report the test statistics with both methods in Table III (for AARs). For the following tests, we just report the t-stats with time series variance.

$$\theta_1 = \frac{AAR_t}{\sqrt{\text{var}(AAR)}} \sim N(0,1)$$

$$\theta_2 = \frac{CAR(t_1,t_2)}{\sqrt{\text{var}((CAR(t_1,t_2))}} \sim N(0,1)$$

Non-parametric Tests

We also conduct non-parametric sign and rank tests for testing the robustness of our results.[36] The test results both for the whole sample and 9-day sub-sample are presented in Tables V and VI. For both the sign and rank tests, the test statistics have standard normal distributions.

For the sign tests, we look at the number of positive and negative returns of sample stocks on a given day, and the test statistics is calculated as following.

$$t_{sign} = \left[\frac{N^+}{N} - 0.5\right]\frac{\sqrt{N}}{0.5} \sim N(0,1)$$

Since the sign test may not be well specified in the case of skewed distribution of AARs, which is generally the case with the daily returns, we also use the rank test suggested by Corrado (1989), which is supposed to overcome this problem. First, the abnormal returns between (AD-10) and (AD+11) are ranked from 1 to L_2, where L_2 is the length of the event window (L_2=T_2-T_1).[37] The test statistics for 'H_0: no AR on event day zero' is calculated as following.

$$t_{Rank} = \frac{1}{N}\sum_{i=1}^{N}\left(K_{i0} - \frac{L_2+1}{2}\right) / s(L_2) \sim N(0,1)$$

where $s(L_2) = \sqrt{\frac{1}{L_2}\sum_{\tau=T_1+1}^{T_2}\left(\frac{1}{N}\sum_{i=1}^{N}\left(K_{i\tau} - \frac{L_2+1}{2}\right)\right)^2}$

$K_{i\tau}$ is the rank of AR of stock i for the event period τ, which ranges between T_1+1 and T_2 with event day $\tau=0$. The term $\left(\frac{L_2+1}{2}\right)$ is the expected rank under the null hypothesis.

[36] see Campbell, Lo and MacKinlay (1997) for a more detailed discussion of the non-parametric tests.

[37] T_1=(AD-10) and T_2= (AD+11)

V. Empirical Results and Discussion

i. *Index Inclusions Price Results*

Our test results show positive and significant ARs on (AD) and (AD+1), though not on (AD-1), which the actual announcement day. We analyse the test results using the multi-window framework, using the test statistics explained above. The results are shown in Tables III and IV.

[INSERT TABLE III AND TABLE IV HERE]

1. *(Pre-announcement) Anticipation window:* There is no significant evidence of anticipation of the event prior to the announcement. The CARs for the pre-AD period are 0.4% with t-statistics of 1.09. There are no significant abnormal returns prior to the announcement, which enables us to conclude that the announcements are not anticipated, i.e. no leakage of news about the stocks to be added.[38]

   However, there are some interesting findings in the anticipation window. On (AD-9), there are significant average ARs (AARs) for the sample stocks. We test these further by using non-parametric tests, as this result may be just due to some outliers on this day. In the rank tests, we do not find AARs on this day to be significant, while the sign tests find this AAR to be significant, but not as strong as the parametric test results.

2. *Announcement Day (AD)*: The tests show positive and significant abnormal returns of 0.48 with t-statistics of 5.08. We also observe positive and significant but slightly lower ARs on (AD+1), 0.32% with 3.41 t-statistics. Following (AD+1), the returns become negative in the next two trading days.

3. *Run-up window:* For the run up and windows following, we narrow down our sample to the stocks, which have 9-day run-up windows. These stocks constitute the largest sub-sample with 192 stocks. We find the CARs in the run-up window to be positive and significant.

   For the run up window, the tests show that CARs are significant with t-stats of 2.98. We see that the ARs cumulate to 1.07% in the run up window. When we exclude the event day AD, the CARs in the run up window are still positive though slightly less significant. The daily AARs are mostly positive in the run-up window, with negative AARs occurring only on three days.

[38] MSCI declares that this is a sensitive issue as transparency is one of the most important guidelines in index construction and development (see MSCI Methodology Book, May 2005).

4. *Inclusion day (CD):* On the inclusion date, we find AARs to be positive, but insignificant. One interesting observation is that there are significant positive returns on (CD-1).

5. *Price reversal window*: We observe significant negative AARs only on two days in the price reversal window: (CD+3) and (CD+6). There is a CAR of -0.16% in the price reversal window, but it is not significant. Actually, this shows us that the price impact is permanent rather than temporary. Though the ARs accumulate in the run up window, the price reversal after the inclusion is not large enough to cancel this increase.

6. *Total price effect window:* The results show significant and positive permanent price impact for the stocks added to MSCI EM. CARs reach maximum of 2.1% from (AD-11) until (CD+18).

   The positive CARs remain even ten days after the actual inclusion. Though we observe negative returns after the inclusion, these are not large enough to cancel out all the positive price impact of the announcement. CARs remain positive and significant also after the release end day, which is assumed to be CD+10 in this exercise.[39] CARs peak on CD+28 up to 1.3% and they are significant wit test statistics of 2.21, i.e. significant at 5% level.

In addition to these six windows, we also look at CARs around both the announcement and inclusion dates. As the announcement window CARs, we use two windows (AD-2)-(AD+2) and (AD-3)-(AD+1). Both CARs are positive and significant at 5% level. We find CARs in the announcement window to be significant and positive: 0.43 with t-statistics of 1.95. When we analyse the sub-event window between (CD–2) and (CD+2), we find significant and positive CARs (0.7% with 2.72 t-stats). Panels A and C in Figure 2 illustrates CAR behaviour for the inclusions between (AD-12) and (AD+60).

We also check the robustness of these results and event impact by non-parametric tests. However, we only check for daily AARs using these tests, not for the sub-event windows. The sign tests show that there is a positive and very significant price impact on the announcement date (AD) with a test statistics of 3.89. Though the ARs are not significant on (CD+1), they are positive and significant on (CD). Both of these results are consistent with the findings of the parametric tests, and support our argument about an increase in demand right before the actual MSCI inclusion. To conduct the rank tests (Corrado, 1989), we rank the ARs between (AD-11) and (AD+9). Similar to the sign test results, we again find the ARs to be significant on the announcement date (AD) as well as on (AD+9), which is right before the actual inclusion.

[INSERT TABLE V AND TABLE VI HERE]

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[39] CD+10 is what L-M use as the release end day when the abnormal volume from the index funds disappears.

Overall, the results show significant positive event impact on the day following the inclusion announcement. There is no significant price reversal following the actual index change, thus the event has positive effect on the stock prices. The price increases observed after the announcement and in the run-up window, seem to be permanent, rather than temporary.

ii. *Index Inclusions Volume Results*

In addition to our analysis of stock price reaction around the event date, we also study the event-induced abnormal volume behaviour of the EM stocks. For the volume analysis, our sample size is smaller with 254 stocks, since we delete 15 stocks for which the volume data is not available for the event window. As in our AR analysis, we discuss the results for the total sample as well as the 9-day sub-sample (182 stocks).

After obtaining the daily price and volume data, we calculate the daily traded value for each stock in USD: equity trade value (ETV). The daily ETV data is scaled by the average ETV over (AD-30) and (AD+30) in order to obtain comparable volume measures across stocks. In addition to this, we check our results by scale the ETV by market capitalization, as in LM (1997). The volume results from both methods are consistent, but we only report the results of the first methodology.[40] Figure 3 illustrates the daily average volume for the sample, between (AD-30) and (AD+30).

[INSERT TABLE IX HERE]

For the total sample, the volume increases on the actual announcement day (AD-1), and continues to increase on AD and (AD+1). Subsequently there is a slight decrease in the volume, but it does not go back to the pre-announcement levels. On day 10 (AD+9), the volume reaches its maximum, but this is probably due to the '9-day subsample' stocks, as (AD+9) is the actual inclusion day (CD) for these. The sub-sample results show that in fact this is the case, and that this jump in volume is more significant for these stocks. After CD, the volume starts to decrease, and it reverts to the pre-announcement level four days after the actual inclusion (CD+4). This is probably the release end day, when the index fund demand ends.[41] For the 9-day sample, the volume also gradually increases between (AD-1 and AD+1), followed by a slight decrease, but then it peaks on CD.

iii. *Index Deletions*

To test for our empirical hypotheses, we also analyse the stocks that were deleted from MSCI EM during 1996-2004. Mainly, we aim to test for the short-term hypotheses, i.e. the demand from different investor groups following the QIR announcements. Some of the suggested hypotheses predict that if they can fully explain the observed price

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[40] Volume results with L-M and Harris&Gurel methodologies are available from the author upon request.

[41] L-M defines the release end day as the day when the trading volume has returned to its normal post change level: *" …The volume is estimated to have returned to its normal post change level on the earliest day after the change day with an MAV that is lower than the average MAV for all later days thru (CD+10)"*. Then CD+4 fits this definition.

behaviour, there should be symmetric price reactions to inclusions and deletions: DSDC, PPH, certification hypotheses.

The data is again collected from the QIRs. In total, there were deletion announcements for 396 EM stocks, however, the daily prices were available for 262 stocks, and the volume data was available for 217 stocks.[42] As in the inclusion analysis, for the price reaction around and following the actual index change, we focus on the 247 stocks with 9-day run-up windows. We conduct analyses of abnormal return and volume; similar to the ones we did for the stocks included in the index.

We also analyse the AARs around and after the index deletions in a multi event window framework. There is a large downward movement in CARs following the announcement and this negative trend persists until the actual index change. From CD onwards, we see a reversal in the CARs. The CARs become more stable around day (CD+40) at a level of –1%, which is lower than the pre-announcement level. Panels B and D in Figure 2 displays the CAR behaviour for the local market adjusted returns.

[INSERT TABLE VII AND TABLE VIII HERE]

1. *Anticipation window:* There is no significant evidence of anticipation of the event prior to the announcement. The CARs for the pre-AD period are -0.4% with t-statistics of 0.57. There are no significant abnormal returns prior to the announcement, which enables us to conclude that the announcements are not anticipated, i.e. no leakage of news about the stocks to be added.

2. *Announcement Day (AD*): The tests show negative, but insignificant and significant abnormal returns of –0.1% on the announcement date of the deletion. The negative AARs start increasing after the announcement, becoming significant on (AD+2).

3. *Run-up window:* For the run up and windows following, we narrow down our sample to the stocks, which have 9-day run-up window. Therefore, our sample size becomes slightly smaller with 247 stocks. We find the CARs in the run-up window to be positive and highly significant.

   For the run up window, the tests show that CARs are significant with t-stats of 5.3. We see that the ARs cumulate to 3.03% in the run up window. AARs induced by the index deletions are much larger and more significant than our results in index inclusions. The results do not change when we exclude AD from the run-up window. The daily AARs are all negative in the run-up window except on (AD+7), with five of these being significant.

4. *Deletion day (CD):* Unlike the AARs of index inclusions, we find AARs to be negative and significant on the actual day of index change, -1.1 with

[42] Stocks for which RI data in USD was not available, we calculated the series from RI in local returns.

t-stats of 5.26. Immediately the day after the index change, the AARs become positive and significant, 0.6% with 3.03 significance.

5. *Price reversal window*: CARS in this window are positive (0.6%), but not significant. The results show that AARS become positive after the index deletion, and they keep on increasing. There is an almost full price reversal by (CD+20), with CAR of 1.7% and 1.87 significance.

   We observe significant positive AARs on three days in the price reversal window: (CD+1), (CD+3) and (CD+9). Actually, this shows us that the price impact is permanent rather than temporary.

6. *Total price effect window:* Our results show that there is a significant negative price reaction following the announcement, and negative AARs build up until the actual index deletion date, up to –3.4%. After the index change, the AARs become positive, and CARs start increasing, but there appears to be a permanent price impact in the total permanent effect window. However, even the price reactions to inclusions and deletions may be similar, they are asymmetric, which still contradicts with what DSDC and PPH predict. In the 50 days following the index deletion, there seems to be a significant price reversal, but CARs do not completely go back to the pre-announcement levels. We use two different event windows to test for the permanent price impact. If we take AD and (CD+10), CARs are –2.8% and significant with t-stats of 3.12. If we expand the window to CD+20, then CARs are smaller (-1.72%), but insignificant.

In the second part of the deletion analysis, we examine the volume behaviour in the event window. Our sample is slightly smaller with 217 stocks (208 stocks with 9-day run-up windows) for the volume analysis. The daily volume series are calculated with the same methodology that we used for the index inclusions. Table IX and Figure 3 (Panels B and D) present a summary of the volume data. There is an increase in volume following the index deletion announcement, starting on (AD), which persists in the run-up window and the maximum trade volume is observed on CD. After the actual index change, volume goes back to its pre-announcement level.

[INSERT TABLE IX HERE]

Overall, for the deleted stocks, AARs are negative, larger and more significant than they are for the included stocks. This has also been reported to be the case in mature markets. Another difference between the deleted and included stocks is that, there is significant price reversal after the index change for the deleted stocks where as this is not the case for the included stocks. Inclusion induced CARs that occur in the run-up window persist even after the actual inclusion, though there is a slight price reversal. Our findings show that there is an asymmetric price reaction to inclusions and deletions, which contradicts with the predictions of the demand-based hypotheses.

iv. *Liquidity Test Results*

In our empirical analysis, we also examine the permanent price effects of the index change on the stock liquidity. In the index inclusion literature, liquidity hypothesis has been suggested to explain the observed abnormal returns. If the liquidity hypothesis is valid, then we should observe positive and significant ARs following the inclusion announcement since increased liquidity means lower expected returns, thus a higher price. The permanent price effects of index inclusion can then be explained by the increase in stock liquidity. However, this would also mean symmetric price effects in the case of deletions. Therefore, we analyse the event induced liquidity effects both for inclusions and deletions.
Stock liquidity can be measured using various proxies, which can be transaction cost based or volume based. We use three different proxies, which measure different dimensions of liquidity (see Kyle, 1985 for a detailed discussion). These are the bid-ask spread, illiquidity measure (Amihud, 2002) and turnover rate.

In the literature, the bid-ask spread (BAS) has been widely used to capture the transaction cost aspect of liquidity. BAS captures the changes in stock liquidity due to information production whereas the volume-based measures capture the changes in liquidity without information (see Chen et al., 2004 for a detailed discussion). The proportional **bid-ask spread** ($BAS_{i,t}$) is calculated as follows:

$$BAS_{i,t} = \frac{\left(P_{i,t}^{A} - P_{i,t}^{B}\right)}{\left(P_{i,t}^{A} + P_{i,t}^{B}\right)/2}$$

where $P_{i,t}^{A}$ and $P_{i,t}^{B}$ are the ask and bid prices for stock i on day t. BAS is a direct measure of transaction costs that are incurred by the buyer/seller on every share they trade; however, this data is very hard to obtain for the EM stocks at higher frequencies. The bid and ask prices are not available for a large number of stocks, and when available, these are the last stamp prices, so do not capture the intraday or trade-by trade reactions of the spreads. Additionally, another problem with spread in EMs is that in some markets, they are subject to limitations, and this may avoid the new information to be incorporated into the stock prices rapidly. In this part of analysis, the sample size for inclusions is much smaller; the bid-ask data was only available for 126 stocks, of which 87 have 9-day run-up windows. The BAS series are scaled by the average BAS over (AD-30) and (AD-1).

[INSERT TABLE X HERE]

In the case of inclusions, BAS results do not show any significant or persistent increase in stock liquidity associated with the event. The results seem to be mean reverting, with a few random peaks.[43] If liquidity were the appropriate explanation to the permanent price

[43] Maximum BAS is on (AD+14), but this is due to an outlier.

impact, we would have observed the spreads to be lower following the announcement or inclusion than before.

We also analyse the bid and ask spreads around the deletions. Again, we use the proportional bid-ask spread as BAS, and we scale the spread by the average over (AD-30) and (AD-2), for each stock. We can calculate BAS for 126 deleted stocks, because of limited availability of the spread data. In the case of deletions, there seems to be a slight decline in the average spreads after the event, though we do not find this for inclusions. There are a few peaks in the run-up window, but these disappear after the actual deletion from the index, as in the case of inclusions.

Our second liquidity proxy is the **illiquidity measure** of Amihud (2002). This is based on the absolute return per dollar of trading volume, and the daily price impact of the order flow following Kyle's (1985) concept of illiquidity. It is computed as:

$$ILLIQ_{i,t} = \frac{|r_{i,t}|}{V_{i,t}}$$

where $r_{i,t}$ is the daily return on security i on day t. $V_{i,t}$ stands for the dollar value of company i's shares traded on a given day t (the trading value). Earlier studies report a positive relationship between illiquidity and stock returns (see Amihud, 2002; Brennan and Subrahmanyam, 1996). In our sample, this measure is available 235 stocks, for inclusions.

[INSERT XI HERE]

Similar to BAS results, the illiquidity measure does not show any evidence of increased liquidity following the announcement or actual inclusion. Instead, what we observe is increased illiquidity at some dates (seems to be random), but when checked for outliers and cleaned, there is no obvious trend in liquidity around the event date. Had the liquidity been the appropriate explanation to the permanent price impact, the index inclusion would have a positive effect on liquidity; we would have observed a decrease in the illiquidity measure after the inclusion.

In the same way, we examine the changes in illiquidity measure around the event window, for deleted stocks. Though we do not find any significant change in illiquidity around the event window for included stocks, there seems to be an increase in average stock illiquidity after the deletions.

Our third liquidity proxy is the **turnover ratio** ($T_{i,t}$), which is calculated as

$$T_{i,t} = \frac{Q_{i,t}}{N_{i,t}}$$

where $N_{i,t}$ denotes the daily number of shares outstanding for stock i and $Q_{i,t}$ is the number of shares of company i traded on day t (trading volume). Turnover ratio is a more refined measure of liquidity compared with the trading volume, because it takes into account the total number of shares of a particular company that are available for trading on a given day ('free-float'). The turnover rates are scaled by the average turnover during (AD-40) and (AD-10) for comparison. We study the changes in the turnover rate for both inclusions and deletions. Additionally, we also check the correlation between the liquidity proxies: BAS and turnover ratio. The average coefficient of correlation is found to be 0.12. Figure 4 displays the average turnover behaviour for both the inclusions and deletions around the event window between (AD-50) and (AD+70).

[INSERT TABLE XII HERE]

First, the results for the index inclusions are reported. In this group, the turnover rate is available for 195 stocks, of which 178 have 9-day run-up windows. The results show that in the long run, there is a considerable difference between the pre-announcement and post-inclusion turnover rates. The maximum rate is observed on AD (2.7), which is the day following the inclusion announcement.[44] Following AD, the turnover decreases and stays at a lower level until CD. On CD, the turnover is 2.2, which is another peak value. After the index inclusion, turnover is lower at around 1.5 but still higher than the pre-announcement levels, which is around 1.[45] The peaks in the run-up window may also be interpreted as demand increases from different investors; arbitrageurs vs. dedicated EM funds. Figure 5i.1 presents the changes in the turnover rate around the inclusion.

For the index deletions, the sample size is 219 (with 208 of these in the 9-day subsample) after cleaning the stocks that did not have either the daily trading volume or the number of shares outstanding data available. In the case of deletions, there is a significant turnover increase, which again starts building up following the announcement. However, unlike the inclusions, the turnover rate starts to increase gradually in the run-up window. There is a significant increase on (AD+1) with a turnover of 2.2, and the turnover increases until CD, with a maximum on the actual deletion date (3.2). When compared with the turnover rates around the inclusion, there is larger increase in turnover rates around deletions.

For deletions, one explanation to the permanent liquidity increases may the slow price reversal (until (CD+40)), as we see in the previous section. Additionally, index funds may be exiting the deleted stock much faster and at a point much earlier in the run-up window, since being caught with deleted stocks in the portfolio may have worse consequences than being caught without the included stock on the actual index change date. The rest of the liquidity increases for deletions may be coming from the noise traders. Additionally, this counter intuitive result may be explained based on the fact that the index deletions do not have the same information content (maybe not as important for the international investors) as the index inclusions. The inclusions may be causing

[44] We observe its affects on AD since the announcement is after the European and Asian markets are closed

[45] Since we scale the turnover rates by the average during this period, we expect the values to be around 1.

revaluation of stock prices as they move from the segmented to integrated world-stock category, however, index deletions would not have the opposite effect, i.e. stocks are repriced as segmented stocks.

Over all, the long-term turnover impacts of the index inclusions and deletions seem to be similar in some respects, i.e. there is a substantial increase in liquidity after both. However, this finding is counterintuitive, since we expect the inclusions and deletions to have the opposite liquidity impacts, if the liquidity hypothesis holds. Therefore, our liquidity analysis show that changes in liquidity is not the reason why we observe permanent price increases following the index inclusions. Thus, we reject the liquidity hypothesis for the permanent price impact.

v. *Impacts of Inclusions on Market Integration*

We have suggested two hypotheses for the significant permanent price impact of the index inclusion. The first one is the liquidity hypothesis, which we test for in the previous section. The second hypothesis is the mild segmentation/enhanced integration. If the mild segmentation hypothesis holds, then following the inclusion, there will be an increase in the global beta, since the stocks are then priced as integrated 'global' assets. However, the validity of mild segmentation/enhanced integration hypothesis does not necessarily mean a large change in the local betas in the opposite direction.

In this section, we test for the mild segmentation hypothesis by looking at the changes in the level of integration associated with the index inclusion. Since this paper examines the index changes within the context of emerging markets, the specific characteristics of these markets are incorporated in our hypotheses and analyses. As mentioned earlier, there is an existing strand of literature showing that the emerging markets are not fully integrated with the global stock markets. Hence, our hypothesis is that inclusion in a global benchmark EM index enhances the level of integration, thus results in permanent price increases.

In our analysis, we use the market betas to measure the level of market integration. Briefly, we examine the changes in local market betas and global market betas, before and after the index inclusion. The betas are calculated using a multi-index international APT framework; the daily stock returns are regressed on the daily world market returns and local market returns.[46] The global market portfolio is proxied by MSCI All World index, and the local market portfolios are proxied by DataStream Country indices.

For the multifactor tests, we use the following empirical model for stock i at time t, *where* r_t is the daily return on stock i on day t, r_{Wt} is the excess return on the world market portfolio, and r_{Lt} is the excess return on the local stock index. The error term is assumed to follow a normal distribution with mean zero and constant variance.

[46] We also conduct the empirical tests using the empirical CAPM of Black, Jensen and Scholes (1972), and these results are also reported in Table XIV.

$$r_t = \alpha + \beta_1 r_{Wt} + \beta_2 r_{Lt} + \varepsilon_t$$
$$\varepsilon_t \sim N(0, \sigma^2)$$
$$E[r_{Wt} r_{Lt}] = 0$$
$$E[r_{Wt} \varepsilon_t] = 0$$
$$E[r_{Lt} \varepsilon_t] = 0$$

Prior to the tests, we expect to find increases in the global betas and decreases in the local betas following the index inclusion, if the mild segmentation hypothesis holds. The rationale is that when the stocks are included in a benchmark index, they are included in the global set of assets available to international investors. This can be explained using IAPMs and as a shift from technical eligibility to perceived eligibility as in E-L (1985) or from neglected to generic stock category as in Arbel et al. (1983). Therefore, whilst these stocks are first priced as segmented assets by the local factors, after the inclusion they are priced as integrated assets, by the global factors. Since we know that the emerging stocks are neither fully integrated nor completely segmented, they are priced by both local and global factors.[47]

We calculate two sets of one-year local market betas and global market betas for each stock.[48] While calculating the betas, the two-month window around the announcement date, i.e. the period between (AD-30) and (AD+40), is excluded in order to eliminate the short-term price impacts of the index inclusion. The pre-inclusion betas are calculated using the stock return data between (AD-290) and (AD-31). Similarly, the post-inclusion market betas are calculated using the data between (AD+40) and (AD+300).

Standard tests assume that the stock returns are normally distributed. However, an important issue with the daily stock data is the existence of serial dependence and autoregressive conditional heteroskedasticity (ARCH) in the return series. In this case, the ordinary least squares (OLS), which is based on normally distributed error terms with zero-mean and constant variance, results in biased parameters. `The non-linear intertemporal dependence in the residual series is observed especially in the high frequency return series and reported in several empirical studies: Akgiray (1989), Corhay and Tourani Rad (1994). These studies show that the empirical characteristics of stock return series can best be described by Generalized Autoregressive Conditional Heteroskedastic (GARCH) models (Bollerslev, 1986; 1987). To correct for this and to test for the robustness, we also run multifactor tests with GARCH (1,1) to calculate local and global betas.[49] When we test our data for serial correlation and suitability of GARCH (1,1), we find the coefficients to be significant.

For GARCH (1,1), we use the following empirical model to test our data for stock *i* at time *t*, where error term has mean zero and conditional variance of h_t.

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[47] See the Literature Review section for references.
[48] Assuming that 1 year is approximately equal to 260 business days.
[49] It has often been proved that GARCH (1,1) fits better stock returns than do GARCH (p, q) models with p + q $\geq$ 3 (Corhay and Tourani Rad, 1996)

$$
\begin{aligned}
r_t &= \alpha + \beta_1 r_{Wt} + \beta_2 r_{Lt} + \varepsilon_t \\
\varepsilon_t &\sim (0, h_t) \\
\mathrm{var}(\varepsilon_t) &= h_t = \varphi_0 + \varphi_1 \varepsilon_{t-1}^2 + \varphi_2 h_{t-1}
\end{aligned}
$$

The results from both tests are consistent. In the remainder of the market-integration analysis, we refer to the results from standard (OLS) tests. There is an increase in the average global market beta and decrease in the average local beta following the index inclusion. These findings are consistent with our expectations, though they are not very strong.

Looking at the equal-weighted averages for the sample, the global market betas increase for 58% of the stocks, by 0.10, while the local market betas decrease for 44% of the stocks by 0.02 after the index inclusion.[50] The magnitude of the event impact on global and local betas seems to be considerably different. In the case of global betas, there is an increase of 257% post AD (114% from GARCH analysis), and this figure is 4% for the local betas (4% from GARCH analysis). Overall, the signs of beta changes are as predicted by the mild segmentation hypothesis. Table XIII presents a summary of our market beta analysis.

[INSERT TABLE XIII HERE]

To test for the robustness of the results, we correct the multi index model for multicollinearity, by calculating the betas by single index CAPM tests using the local and global market portfolios. Since there is a high probability of returns on global market portfolio and local market portfolios being correlated, the standard OLS tests may result in biased parameters. Therefore, we also test the returns using single-index CAPM tests, as in Black, Jensen and Scholes (1972). We run two different CAPM regressions. The first one is the full-integration CAPM, where the market portfolio is proxied by the global portfolio (proxied by MSCI All World Index). The second regression is a complete-segmentation CAPM, where the market portfolio is the local stock index.

The global market beta for stock i on day t, is calculated using the following regression:

$$r_{it} = \alpha_i + \beta_{i1} r_{Wt} + \varepsilon_{it}$$

ε_t is assumed to follow a normal distribution with mean zero and constant variance. r_{it} is the daily return on stock i on day t, and r_{wt} is the return on the world portfolio, proxied by MSCI All World Index. Similarly the local market betas are obtained from the complete-segmentation CAPM:

$$r_{it} = \alpha_i + \beta_{i2} r_{L_i t} + \varepsilon_{it}$$

where all terms are as in full-integration CAPM except r_{Lt}, which is the return on the local market portfolio, proxied by the country stock index of stock i.[51]

[50] Note that the average betas are calculated using equal weights.

[51] We also analyse the changes in market integration for deleted stocks. For this, we use the global and market betas obtained from the single index CAPM regressions. The results show that on average the

[INSERT TABLE XIV HERE]

We also analyse the changes in market integration for deleted stocks. For this, we use the global and market betas obtained from the single index CAPM regressions. The results show that on average the global beta decreases by 0.15, for 59% of the deleted stocks. The local betas increase fro 51% of the stocks, after the deletions. The average increase in local betas is 0.01. As in the case of inclusions, the change in global beta is larger than the change in local beta.

[INSERT TABLE XV HERE]

Overall, the results show changes in the local and global betas consistent with the mild segmentation hypothesis. The strongest support comes from the results of the standard multi-index APT model.

vi. ***Discussion***

So far we have presented the price, volume, liquidity and beta results from the empirical tests. However, we have not yet evaluated these within the context of the suggested empirical hypotheses. In this section, we discuss the results and hypotheses in two separate groups: short and long term.

A substantial part of the existing literature assume that index changes are information free events (in mature markets), thus the abnormal price reactions following these can be explained by the demand curve analysis (i.e. slope of the demand curve), which is also consistent with EMH. All the hypotheses based on the 'information-free event' assumption predict that the price reactions to deletions and inclusions will be symmetric. However, the observed asymmetries between inclusion and deletion induced price reactions provide contradicting evidence.

In the context of emerging markets, we expect index inclusions to have information content larger than in mature markets because of the different nature of these markets. Our results support the 'information content' side of the debate, however, these do not invalidate the demand-curve based hypotheses. Instead, they show that the slope of the demand curve is not the sole explanation to the abnormal price reaction observed around the event.

Our short-term hypotheses are tested based on the abnormal return and volume results. This analysis requires a comparison of the inclusion and deletion results. The main finding of the short-term price response analysis is evidence against the information free content of index changes. Especially, the asymmetric price reactions in the cases of

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global beta decreases by 0.15, for 59% of the deleted stocks. The local betas increase fro 51% of the stocks, after the deletions. The average increase in local betas is 0.01. As in the case of inclusions, the change in global beta is larger than the change in local beta.

deletions and inclusions illustrate this fact, which is what we also observe in mature markets.

The inclusion price results show that there are significant AARs on the announcement date, though there is no evidence for anticipation of the index inclusion. The abnormal returns accumulate after the announcement, over the run-up window until the inclusion date. Though on the actual index change date, AARs are positive, they are not significant. Following the inclusion, there is a slight price reversal, but even 50 days after the inclusion, CARs do not go back to the pre–announcement levels. Thus, we observe a significant positive price impact of MSCI EM inclusion. The inclusion CAR graphs show a mean shift in the returns after the inclusion. Overall, we see that index inclusion results in a higher price level for the emerging market stocks. The findings are also supported by the non-parametric test results.

When we examine at the volume behaviour around the event window, the trade volume starts increasing right after the announcement for the next two days, followed by a slight decrease. Overall, we see that the volume reaches its maximum levels on (AD+1) and (CD). The event induced volume behaviour is also supported by AAR results. When the results are combined, we see that CARs increase significantly on the days when volume increases significantly. This also shows that the price increase is volume related for the included stocks.

This finding is actually consistent with our assumption of existence of two types of investors in the market; arbitrageurs and index funds. Within this context, it can be said that the arbitrageurs enter the markets right after the announcement and start buying these stocks before the actual inclusion takes place. At this point, the index funds are not yet in the market, since they prefer waiting up until actual index inclusion because of the performance benchmark issues. The substantial demand increase from the index funds occurs on the announced day of inclusion.[52]

The index deletions provide us with a natural experiment to test for the price pressure and DSDC hypotheses, as well as for the symmetry of inclusion and deletion results. If the demand-based theories are the only correct explanations for the event-induced abnormal returns, then the price reactions must be symmetric to both types of index changes. However, this is not what we observe in our data. In the case of deletions, there is a much larger/sharper price reaction (decrease) in the run-up window with CARs above 3% (negative), and the price reversal starts right after the index change (deletion). Even though there is a significant price reversal after the deletions, there is still a slight permanent (negative) price effect. When compared with the inclusion-induced CARs over the same window, the permanent price effect is considerably smaller and insignificant.

[52] The actual inclusion takes place on the announced date after 5pm GMT, when most European and Asian markets are closed. However, we do not make the correction by 1 day as we did for the announcement dates, since the investors are fully aware of the inclusion at this point. Therefore, the index funds make their substantial purchases on the last day, so that they minimize the tracking error.

As in inclusions, there is no supporting evidence for anticipation of the event prior to the deletion announcements. AARs on the announcement date are not significant either, however they become significant on (AD+2). CARs are highly significant over the run-up window, and unlike the inclusions case, they remain significant also on the actual index deletion date. AARs right after the deletion are positive and very significant.[53]

The deletion-induced volume reactions are also stronger than the inclusion case. The trade volumes start to increase after the announcement and stay at a higher level than pre-announcement levels in the run-up window, with a maximum on the actual index deletion date (CD). On the whole, the average volume in the run-up window is larger for deletions than inclusions. Following the deletions, the volume levels go back to their pre-announcement levels.

To sum up, the short-term results around the index inclusions support our hypothesis number 4:

> *SH4: Arbitrageurs vs. Index Funds*
> *Since there is significant number of both arbitrageurs and index funds in the market, we observe abnormal returns on the announcement, in the run-up window and on the inclusion date, because of increased aggregate demand from both investor groups at different times within the event window.*

The price and volume reactions are consistent with the existence of two different types of investors in these markets and they affect the aggregate demand at different points in the run-up window. The standard predictions of PPH and DSDC are not valid in our case, as there is evidence for alternative explanations of the abnormal returns. There seems to be evidence for profitable trading patterns in the markets after the index changes, due to the behaviour of the index funds. This is not consistent with the semi-strong form of market efficiency, as it means that in the market, there are profitable trading strategies based on publicly available information. In the case of inclusions, funds prefer buying the stocks at a higher price closer to the actual inclusion rather than risking 'the minimum tracking error' strategy. Arbitrageurs are aware of this so they purchase the stocks after the announcement, with the intention of selling it to the index funds at a later point in the run-up window.

The short-run price reactions in the case of emerging markets stocks seem to be similar to the price reactions in mature markets in some respects. The index inclusion also results in significant AARs around the announcement dates and CARs in the run-up window. However, there is a much larger price reversal after the index inclusion in mature markets, whereas this is not what we observe in emerging markets.

To examine the permanent price impacts of the index inclusion, we suggest three long-term hypotheses: full segmentation, mild segmentation and changes in liquidity. We reject the first one, i.e. the full segmentation, based on the AR results, which show that

[53] This is also why the CARs are not significant in the CD window for the deletions.

there is a significant permanent price increase induced by the index inclusion.[54] We suggest that this permanent price impact can be explained by the remaining two hypotheses, based on the differences between asset pricing in emerging and mature markets.

First we test for the validity of the liquidity hypothesis for the permanent price impact. We focus on the results from the turnover analysis, as this data is available for a larger number of stocks for both inclusions and deletions. The results show that there is an increase in stock liquidity after the index inclusions. In the run-up window, the average liquidity peaks on the announcement and inclusion dates. We also analyse the case of deletions, since if the liquidity hypothesis holds, we expect to see symmetric, but reverse liquidity reaction to the event. However, the deletions results are somewhat surprising and counterintuitive, and they contradict the predictions of the liquidity hypothesis. There is an increase in the liquidity levels after the deletions, and this is much larger than the liquidity change following the inclusions. The same is true for the liquidity behaviour in the deletion run-up window.

Though the results do not support the liquidity hypothesis for permanent price effects of index changes, they are nevertheless interesting. The only study that we came across that analyses the changes in turnover rates is Chen et al. (2004), on S&P500 changes. However, they use a different turnover ratio than ours, and use it to analyse the volume behaviour not the liquidity around the event window. Therefore, we cannot compare the mature market and emerging market results in this case. This issue is beyond the scope of this paper, but may be a feasible topic for future research.

Once the liquidity hypothesis is rejected, then we proceed with the mild segmentation hypothesis. The analysis is based on the changes in local and global market betas before and after the inclusion to measure the changes in market integration. The results are consistent with the predictions of the mild segmentation hypothesis, showing increases in global betas and decreases in local betas following the inclusions. Thus, these illustrate increased level of integration with the world markets as a result of inclusion in a global benchmark index. The changes in global betas are larger than in local betas, and this is not counterintuitive, since the fact that global factors are priced does not necessarily require or mean that the local factors are no longer priced for these stocks. The results are interesting within the context of emerging markets and IAPMs. Particularly, they provide evidence for the gradual, but continuous process of integration in EMs that does not only depend on the official stock market liberalization, but also on the availability, asymmetry and cost of information. In this case, ‘pull’ factors are more powerful tools in attracting foreign portfolio flows into these markets.[55] Even after the official liberalizations, the international investors are still to be convinced about and made aware of the investability of these markets. The perceived, not the technical, inclusion of EM stocks in the global set of available/investable assets is a gradual process, which depends on several other factors than the official openings. The international investors do not only face legal

[54] There does not seem to be any significant impact on the trade volume
[55] The benefits of increasing portfolio flows on the economy and development/growth are well known. However, it may be useful to discuss these briefly at some point in this section.

restrictions, but also practical restrictions that keep these market players away from investing in EMs.

Based on these arguments, we assume that the index inclusions are followed by increased investor awareness and decreased shadow cost as in Merton (1987). Though the shadow cost has been previously measured and tested empirically following Kadlec and McConnell (1994), this analysis requires data on the number of shareholders before and after the index change, which is not publicly available for the emerging market stocks.[56] Therefore, though we cannot directly test for the hypothesis of increased investor awareness, we suggest testing for integration of the emerging markets, which targets a similar issue. IAPM literature suggests that following the official stock market liberalizations in EMs, the cost of capital decreases, which then results in a revaluation of the present value of the stock price. This is consistent with what we observe around the index inclusions. Additionally, the increased number of investors may result in better monitoring of the operating performance, thus higher future cash flows, as shown by Denis et al (2002). All these when analysed in the context of standard valuation model (Gordon, 1962), affect the present stock price.

This study shows that the short-run effects of index inclusion in the emerging markets are similar to the mature markets, but the long-run price implications of the event are different and informative within the context of asset pricing in emerging markets. The significant permanent price impacts provide us with an opportunity to test further for the changes in the level of integration and in risk sharing between domestic and foreign investors. Our results indeed support the arguments of increased foreign investor awareness and the shift from technical to perceived eligibility. Following the index inclusions, there is an increase in price and decrease in the super risk premium for the emerging market stocks. From the short-term results, we already know that these permanent price impacts are not only due to the change in aggregate demand for these stocks, and that the index changes are not information-free events in emerging markets.

In fact, these all point out to the fact that availability/cost of information and increased investor awareness are important factors for pulling foreign portfolio investments into these markets, which, as a result, has magnified effects on the growth and development of an emerging market economy.

VI. Conclusion

We have analysed the impacts of index inclusions in emerging markets, by studying a sample of stocks that were added to MSCI EM index over the period 1996-2004. Our motivation was to show that index inclusions have a permanent impact on the stock prices, which can be explained by the characteristics of these markets. In our analysis, we examine the short term and long term price effects separately, as well as studying the index deletions from MSCI EM during the same time period.

[56] If this data can be obtained, we expect to find the inclusion effects to be stronger in the EM case.

Our findings provide evidence against the hypothesis that index changes are information free events. Thus, the observed price reactions cannot be justified solely on the grounds of downward-sloped demand curve and changes in aggregate demand following the index inclusion announcement. In the short run, the price response to inclusions and deletions are asymmetric and much higher in the latter case. This is somehow similar to the index inclusion effects in the mature markets, though the magnitude of abnormal returns around the inclusions and deletions are different. In the long-term, we find that there is a permanent price impact with a slight reversal following the actual index inclusion, which is different from the mature market case. We suggest two alternative hypotheses to explain this; mild-segmentation of the emerging markets with the world markets, and the changes in stock liquidity, which in return results in changes in expected returns and in stock price revaluations. While we cannot find any supporting evidence for the change of liquidity across stocks, results of our empirical analysis provide evidence for increased integration of these stocks with the world markets, which can also be interpreted as an increased risk sharing between local and foreign investors. Therefore, we suggest that inclusion in a global benchmark index in the emerging market context is a step further in the integration of these markets with the world markets. Though these stock markets are officially liberalized, the actual integration may be a gradual and continuous process until these stocks are considered as part of the global available set of assets by the international investors. Therefore, the shift from technical eligibility to perceived eligibility in the eyes of the international investor community is dependent also on other events and factors than the official liberalization, such as the inclusion in a widely followed global index. These results stress the importance of international investor awareness, thus of the information asymmetries and costs, in increasing the international demand for these stocks.

At the end of it, increasing the foreign portfolio investments into emerging markets is important for economic development and growth. Whereas, attracting foreign investment into the stock markets is not an issue in mature markets, this is a major concern in emerging markets. Because of this, being included in the global set of investable assets of the international investors has much larger implications in the latter case. The inclusion in a global benchmark index like MSCI EM provides us with a case to test for these issues.

Additionally, our paper brings out some issues regarding index changes in emerging markets, which may provide future research opportunities. The stock liquidity response to index inclusions and changes is counterintuitive and the underlying reason may be due to asset pricing in EMs. A similar liquidity analysis can be conducted for mature markets, to extend the topic to a comparative study. Another possible research area is the changes in fund holdings around the index changes in EMs, however, this requires individual fund holdings data. We are currently engaged with this aspect of index changes. One other issue, which we could not analyse because of data unavailability, is testing for investor recognition hypothesis using shareholder data. This may have interesting implications for the emerging markets.

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Table I
Illustration of the Calculation of Free-Float Adjusted Market Capitalization

This table and the information given are based on the Morgan Stanley Capital International, Inc. (MSCI) Standard Index Methodology Book issued in May 2005. It illustrates how MSCI calculates the free-float adjusted market capitalization for securities that are subject to foreign ownership limitations (FOLs). This methodology is used to calculate free float adjusted market capitalization for all the stocks included in the MSCI Standard Indices, including MSCI Emerging Markets Index, which is used in this paper. The Estimated free float in row five is calculated by subtracting the total non-free float shareholding from 100. The foreign ownership limits are set by the local authorities, thus exogenous. For securities subject to FOLs, the estimated free float available to foreign investors is equal to the lesser of estimate of free float and FOL adjusted for non-free float stakes held by foreign investors. If free float is larger than 15 %, then Foreign Inclusion Factor (FIF) is equal to the Estimated Free Float, rounded up to closest 5%. If free float is less than 15%, then FIF is rounded up to closest 1%. The free float adjusted market capitalization is calculated by multiplying FIF and Full market capitalization.

Calculating Free Float-Adjusted Market Capitalization:	Company C	Company D	Company E
Total number of shares outstanding	10,000,000	10,000,000	10,000,000
All shares classified as non-free float	8,760,000	4,000,000	4,000,000
'- those held by foreign investors as strategic	1,000,000	1,000,000	-
Total non-free float shareholdings (%)	87.6	40.0	40.0
Estimated free float (%)	12.4	60.0	60.0
Foreign ownership limit (%)	33.3	33.3	33.3
Foreign strategic shareholding (%)	10.0	10.0	0.0
Foreign ownership limit less the foreign strategic shareholding (%)	23.3	23.3	33.3
Foreign Inclusion Factor (FIF)	0.12	0.25	0.33
Market price ($)	500	500	500
Full market capitalization ($ mm)	5,000	5,000	5,000
Free float-adjusted market capitalization ($ mm)	600	1,250	1,650

Table II
Sample and MSCI EM Index Description

This table presents country breakdown of Morgan Stanley International, Inc's Emerging Markets Index (MSCI EM) and of the inclusion and deletion samples, used in this paper. The table is divided into three main groups: MSCI EM (based on the information as of August, 2005), the sample of stocks added to the index, and the sample of stocks deleted from the index. The first column presents the countries that constitute MSCI EM, and the weights of each country group in the index (with respect to the total market capitalization of the index) are shown in the second column. Similarly, columns six and nine show the weights of each country group in the samples. In column three, the total market capitalization (MCAP) for each country in MSCI EM is shown, in millions of USD. Columns seven and ten show the MCAP for each country, using free float market value as of 2005. Numbers of stocks from each country are presented in columns four, eight and eleven. Eligible minimum size thresholds for inclusions of new securities in MSCI country indices are presented in column five, as free-float adjusted MCAP in millions of USD, as of May 2005.

	MSCI EM Index (as of August,2005)				**Inclusion sample**			**Deletion sample**		
Country	**index weights**	**MCAP**	**no of stocks**	**minimum size guidelines**	**sample weights**	**MCAP**	**no of stocks**	**sample weights**	**MCAP**	**no of stocks**
Argentina	0.3%	4,523	9	75	0.30%	1,020	2	0.09%	148	2
Brazil	10.8%	149,732	47	200	4.04%	13,670	13	10.49%	16,678	14
Chile	1.9%	26,775	22	100	2.17%	7,359	5	1.36%	2,158	7
China	4.0%	55,881	45	200	8.58%	29,053	29	1.99%	3,161	15
Colombia	0.3%	3,690	6	75	0.00%		0	0.00%		0
Czech Republic	0.8%	11,390	6	100	0.53%	1,799	2	0.00%		1
Egypt	0.8%	11,057	15	75	5.19%	17,550	2	2.65%	4,218	5
Hong Kong	3.4%	47,654	28	200	5.44%	18,425	8	13.08%	20,799	13
Hungary	1.4%	20,005	6	100	0.07%	235	3	0.00%		0
India	5.7%	78,716	62	200	6.03%	20,396	23	12.22%	19,423	19
Indonesia	1.4%	19,922	26	150	1.80%	6,086	20	1.38%	2,187	21
Israel	3.6%	49,263	39	150	2.01%	6,789	8	0.03%	43	5
Jordan	0.3%	4,259	13	75	0.00%		0	0.00%		0
Korea	17.8%	246,621	73	450	15.44%	52,266	37	9.47%	15,061	33
Malaysia	3.4%	46,835	75	150	1.16%	3,914	12	0.83%	1,313	6
Mexico	6.3%	87,844	22	200	0.00%		0	2.41%	3,823	4
Morocco	0.2%	3,399	11	75	1.03%	3,480	3	0.58%	921	3
Pakistan	0.3%	3,995	14	75	0.36%	1,204	1	0.20%	325	10
Peru	0.3%	4,259	6	75	0.16%	550	10	0.07%	104	4
Philippines	0.5%	6,520	18	75	0.20%	686	5	0.48%	763	12
Poland	1.8%	25,346	22	100	0.38%	1,287	4	1.65%	2,629	5
Russia	5.2%	72,487	19	200	9.70%	32,829	12	13.66%	21,720	5
South Africa	9.7%	134,832	49	450	5.52%	18,691	7	1.91%	3,030	7
Taiwan	14.2%	196,845	103	450	19.59%	66,314	21	2.56%	4,070	26
Thailand	1.9%	26,872	43	150	10.10%	34,182	40	22.48%	35,732	31
Turkey	2.0%	27,926	35	100	0.18%	618	1	0.38%	611	7
Venezuela	0.1%	1,415	5	75	0.02%	60	1	0.03%	54	7
Total		**1,387,304**	**823**			**338,464**	**269**		**158,970**	**262**

Table III
Daily Average Abnormal Returns (AARs) for Stocks Added to MSCI EM

This table presents the daily AARs in the event window for the included stocks in our sample. AAR is the cross sectional average of local-market adjusted stock returns. The abnormal return for stock *i* on day *t* (AR_{it}) is calculated as following:

$$AR_{it} = R_{it} - R_{Mt}$$

where R_{it} is the return on stock *i* at day *t*, calculated as first log differences of closing prices. R_{Mt} is the daily return on the local market index. The table is divided into two main sections, the whole sample of 269 stocks and the subsample of 192 stocks with 9-day run-up windows. The announcement date (AD) is taken to be on day 1 since the announcements are made on (AD-1) after 5pm GMT, when European and Asian markets are closed. The actual index change date (CD) is on day 10 for the '9-day run-up window' stocks in our sample, 192 in total. The first column specifies the days in the event window, where day 0 is when the actual announcement takes place. The second and sixth columns show the daily AARs for the sample and the subsample respectively. The third and seventh columns are the t-statistics values calculated using cross-sectional variance for the significance of the AARs. The fourth column shows the t-statistics for daily AARs, calculated using time-series variance. Note that this is only reported for the whole sample, for showing that both t-statistics give similar results. In the fifth and eighth columns, the cumulative abnormal returns (CARs) for each day are shown. The CARs begin on (AD-30). *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	Whole Sample				9-day sample		
days	AAR	tc(AAR)	t_T(AAR)	CAR	AAR	tc(AAR)	CAR
-10	-0.00024	*-0.25*	*-0.25*	-0.00867	-0.00113	*-0.99*	-0.00924
-9	0.00075	*0.80*	*0.78*	-0.00793	0.00009	*0.08*	-0.00915
-8	0.00368	*3.93****	*3.86****	-0.00425	0.00523	*4.58****	-0.00392
-7	0.00232	*2.48***	*2.44***	-0.00192	0.00126	*1.10*	-0.00266
-6	-0.00019	*-0.21*	*-0.20*	-0.00212	0.00116	*1.01*	-0.00150
-5	0.00066	*0.71*	*0.70*	-0.00145	0.00244	*2.14***	0.00094
-4	0.00095	*1.01*	*1.00*	-0.00050	0.00139	*1.21*	0.00233
-3	-0.00216	*-2.31***	*-2.27***	-0.00266	-0.00271	*-2.38***	-0.00039
-2	-0.00037	*-0.40*	*-0.39*	-0.00304	0.00104	*0.91*	0.00065
-1	-0.00103	*-1.09*	*-1.08*	-0.00406	0.00000	*0.00*	0.00065
0	-0.00121	*-1.29*	*-1.27*	-0.00527	-0.00204	*-1.79**	-0.00139
AD=1	0.00476	*5.08****	*5.00****	-0.00050	0.00429	*3.77****	0.00290
2	0.00319	*3.41****	*3.35****	0.00269	0.00316	*2.78****	0.00607
3	-0.00179	*-1.90**	*-1.87**	0.00090	-0.00146	*-1.28*	0.00461
4	-0.00117	*-1.25*	*-1.23*	-0.00027	-0.00086	*-0.76*	0.00375
5	0.00050	*0.53*	*0.52*	0.00023	0.00141	*1.24*	0.00515
6	0.00043	*0.46*	*0.46*	0.00066	-0.00043	*-0.38*	0.00472
7	0.00154	*1.64*	*1.62*	0.00220	0.00004	*0.03*	0.00476
8	0.00034	*0.36*	*0.35*	0.00254	0.00095	*0.83*	0.00571
9	0.00125	*1.34*	*1.31*	0.00379	0.00216	*1.90**	0.00787
CD=10	0.00088	*0.94*	*0.92*	0.00467	0.00133	*1.17*	0.00920
11	0.00147	*1.57*	*1.55*	0.00614	0.00117	*1.03*	0.01037
12	0.00110	*1.18*	*1.16*	0.00725	0.00112	*0.98*	0.01149
13	-0.00234	*-2.50*	*-2.46*	0.00490	-0.00245	*-2.15***	0.00904
14	-0.00118	*-1.26*	*-1.24*	0.00372	-0.00132	*-1.16*	0.00772
15	0.00136	*1.45*	*1.42*	0.00508	0.00155	*1.36*	0.00927
16	-0.00355	*-3.79****	*-3.72****	0.00153	-0.00273	*-2.40***	0.00654
17	0.00049	*0.52*	*0.52*	0.00202	-0.00076	*-0.66*	0.00578
18	0.00116	*1.23*	*1.21*	0.00318	0.00126	*1.11*	0.00704
19	-0.00086	*-0.91*	*-0.90*	0.00232	0.00077	*0.68*	0.00781
20	0.00110	*1.18*	*1.16*	0.00343	0.00008	*0.07*	0.00789

Table IV

Cumulative Abnormal Returns in Smaller Event Windows for Stocks Added to MSCI EM

This table illustrates the CARs over eight smaller event windows, within the large event window. The first column specifies the event window of interest. The actual start and end dates of these windows are shown in the second column. CARs are cumulated separately within these windows. The third column shows the number of stocks in the sample for each event window, since the whole sample is only used in the first three event windows. Cumulative abnormal returns for each window are presented in the fourth column. The significance of the CARs is calculated using t-statistics using cross-sectional variance, and these are reported in column six. *, ** and *** denote significance at the 10%, 5%, and 1% level, respectively.

Specific Event Window	Event Days	N	CAR	t-stats
Anticipation	AD-11, AD-2	269	0.0043	*1.38*
Announcement day	AD	269	0.0476	*5.08****
AD window	AD-1, AD+1	269	0.0071	*4.19****
	AD-2, AD+2	269	0.0043	*1.95**
	AD-3, AD+3	269	0.0025	*0.97*
	AD-3, AD+1	269	0.0054	*2.48***
Run up	AD, CD	192	0.0107	*2.98****
(9-day sample)	AD+1, CD	192	0.0069	*2.00***
Inclusion Day	CD	192	0.0009	*0.76*
	CD+1	192	0.0012	*1.03*
CD window	CD-1, CD+3	192	0.0029	*1.16*
	CD-2, CD+2	192	0.0073	*2.87****
Price Reversal	CD+1, CD+10	192	-0.0017	*0.47*
	CD+2, CD+10	192	-0.0022	*0.59*
Total Effect	AD, CD+10	192	0.0091	*1.78**
	AD, CD+18	192	0.0133	*2.21***
	AD, CD+20	192	0.0087	*1.39*
Permanent Price Effect	AD-10, CD+10	192	0.0163	*2.56****
	AD-10, CD+20	192	0.0159	*2.17***

Table V

Non-parametric Rank Test Results for Daily AARs for Stocks Added to MSCI EM

This table presents the test results of the rank test, following Corrado (1989). The average abnormal returns (AARs) between (AD-10) and (AD+11) are ranked from 1 to L2, where L2 is the length of the event window (L2=T2-T1).1 The test statistics for ‘H_0: no abnormal return on AD’ is calculated as

$$t_{Rank} = \frac{1}{N}\sum_{i=1}^{N}\left(K_{i0} - \frac{L_2+1}{2}\right) / s(L_2) \sim N(0,1)$$

$$s(L_2) = \sqrt{\frac{1}{L_2}\sum_{\tau=T_1+1}^{T_2}\left(\frac{1}{N}\sum_{i=1}^{N}\left(K_{i\tau} - \frac{L_2+1}{2}\right)\right)^2}$$

where $K_{i\tau}$ is the rank of AR of stock i for the event period τ, which ranges between T_1+1 and T_2 with event day τ=0. The first column shows the days, where the announcement date (AD) is day 1, which is the business day following the actual inclusion announcement on day 0. The results are reported in two separate groups of stocks: the whole sample and the group of stocks with a 9-day run-up window (9-day subsample). The second and fourth columns show the number of stocks in each of these groups. The third and fifth columns report the t-stats of the rank tests for each AAR on the specified date. The AARs are local market adjusted average abnormal returns for the sample. *, ** and *** denote significance at the 10%, 5%, and 1% level, respectively.

	Whole Sample		9-day subsample	
days	N	t-stats	N	t-stats
-10	269	*0.36*	192	*-0.06*
-9	269	*0.42*	192	*0.82*
-8	269	*-1.20*	192	*-1.22*
-7	269	*-0.94*	192	*-1.00*
-6	269	*0.56*	192	*0.51*
-5	269	*-0.03*	192	*-0.26*
-4	269	*-0.36*	192	*-0.13*
-3	269	*1.20*	192	*0.68*
-2	269	*0.92*	192	*0.32*
-1	269	*0.80*	192	*0.88*
0	269	*0.76*	192	*-0.07*
AD=1	269	*-2.31***	192	*-2.43***
2	269	*-1.22*	192	*-0.33*
3	269	*1.38*	192	*1.49*
4	269	*0.91*	192	*1.37*
5	269	*-0.04*	192	*-0.90*
6	269	*0.84*	192	*1.35*
7	269	*-1.35*	192	*-1.59*
8	269	*0.10*	192	*0.24*
9	269	*-0.08*	192	*0.22*
10	269	*-1.83**	192	*-1.26*
11	269	*0.19*	192	*0.45*

[1] T_1=(AD-10) and T_2= (AD+11)

Table VI
Non-parametric Sign Test Results for Daily AARs for Stocks Added to MSCI EM

This table presents the test results of the non-parametric sign test. The sign tests are performed by looking at the number of positive and negative returns of sample stocks on a given day. The AARs are local market adjusted average abnormal returns for the sample. The test statistics is calculated:

$$t_{sign} = \left[\frac{N^{+}}{N} - 0.5\right]\frac{\sqrt{N}}{0.5} \sim N(0,1)$$

The first column shows the days, where the announcement date (AD) is day 1, which is the business day following the actual inclusion announcement on day 0. CD is the actual index change date for the 9-day subsample. The results are reported in two separate groups of stocks: the whole sample and the group of stocks with a 9-day run-up window (9-day subsample). The second and sixth columns show the number of stocks with positive returns on the specific date, in each of these groups. Similarly, the third and seventh columns show the number of stocks with negative returns on each day. The ratios of stocks with positive returns to the total number of stocks in each group are reported in columns four and eight. Test statistics are reported in columns five and nine.

	Whole Sample				9-day subsample			
days	Positive	Negative	ratio	test-stats	Positive	Negative	ratio	test-stats
-10	119	121	0.50	*-0.14*	93	94	0.50	*-0.07*
-9	126	139	0.48	*-0.80*	85	104	0.45	*-1.39*
-8	131	100	0.57	*2.20*	105	74	0.59	*2.40*
-7	157	110	0.59	*2.89*	108	83	0.57	*1.81*
-6	134	122	0.52	*0.77*	98	81	0.55	*1.32*
-5	132	124	0.52	*0.51*	100	83	0.55	*1.29*
-4	123	144	0.46	*-1.29*	79	112	0.41	*-2.39*
-3	122	136	0.47	*-0.89*	79	102	0.44	*-1.76*
-2	133	131	0.50	*0.12*	94	95	0.50	*-0.07*
-1	113	153	0.42	*-2.47*	90	100	0.47	*-0.73*
0	126	142	0.47	*-0.98*	93	98	0.49	*-0.36*
AD=1	169	98	0.63	*4.36*	123	69	0.64	*3.90*
2	134	128	0.51	*0.38*	99	93	0.52	*0.43*
3	121	147	0.45	*-1.59*	97	95	0.51	*0.14*
4	134	135	0.50	*-0.06*	99	93	0.52	*0.43*
5	144	125	0.54	*1.16*	112	80	0.58	*2.31*
6	129	135	0.49	*-0.37*	91	96	0.49	*-0.37*
7	140	127	0.52	*0.80*	95	97	0.49	*-0.14*
8	137	129	0.52	*0.49*	100	91	0.52	*0.65*
9	130	134	0.49	*-0.25*	94	94	0.50	*0.00*
CD=10	155	112	0.58	*2.64*	112	79	0.59	*2.39*
11	132	129	0.51	*0.19*	94	91	0.51	*0.22*
12	138	128	0.52	*0.62*	98	91	0.52	*0.51*
13	118	146	0.45	*-1.74*	88	104	0.46	*-1.15*
14	118	119	0.50	*-0.07*	100	84	0.54	*1.20*
15	124	124	0.50	*0.00*	89	96	0.48	*-0.52*
16	104	165	0.39	*-3.72*	78	114	0.41	*-2.60*
17	136	120	0.53	*1.03*	88	92	0.49	*-0.31*
18	137	128	0.52	*0.56*	96	92	0.51	*0.29*
19	130	133	0.49	*-0.19*	96	91	0.51	*0.37*
20	124	143	0.46	*-1.17*	85	106	0.45	*-1.52*
21	115	144	0.44	*-1.84*	84	100	0.46	*-1.20*
22	136	127	0.52	*0.56*	101	85	0.54	*1.19*

Table VII
Daily Average Abnormal Returns (AARs) for Stocks Deleted from MSCI EM

This table presents the daily AARs in the event window for the deleted stocks in our sample. . AAR is the cross sectional average of local-market adjusted stock returns. The abnormal return for stock *i* on day *t* (AR_{it}) is calculated as following:

$$AR_{it} = R_{it} - R_{Mt}$$

where R_{it} is the return on stock *i* at day *t*, calculated as first log differences of closing prices. R_{Mt} is the daily return on the local market index. The table is divided into two main sections, the whole sample of 262 stocks and the subsample of 247 stocks with 9-day run-up windows. The announcement date (AD) is taken to be on day 1 since the announcements are made on (AD-1) after 5pm GMT, when European and Asian markets are closed. The actual index change date (CD) is on day 10 for the '9-day run-up window' stocks in our sample. The first column specifies the days in the event window, where day 0 is when the actual announcement takes place. The second and fifth columns show the daily AARs for the sample and the subsample respectively. The third and sixth columns are the t-statistics values calculated using time-series variance for the significance of the AARs. In the fourth and seventh columns, the cumulative abnormal returns (CARs) for each day are shown. The CARs begin on (AD-30). *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	Whole Sample			**9-day sample**		
days	AARs	t-stats	CARs	AARs	t-stats	CARs
-10	-0.0016	*-0.82*	-0.0034	-0.0019	*-0.94*	-0.0040
-9	-0.0008	*-0.39*	-0.0042	-0.0008	*-0.41*	-0.0048
-8	-0.0006	*-0.30*	-0.0048	-0.0007	*-0.38*	-0.0056
-7	0.0013	*0.68*	-0.0034	0.0013	*0.63*	-0.0043
-6	-0.0020	*-1.03*	-0.0055	-0.0023	*-1.14*	-0.0066
-5	0.0007	*0.34*	-0.0048	0.0009	*0.43*	-0.0057
-4	0.0012	*0.58*	-0.0036	0.0012	*0.62*	-0.0045
-3	-0.0043	*-2.18***	-0.0080	-0.0046	*-2.31***	-0.0091
-2	0.0045	*2.26***	-0.0035	0.0046	*2.34***	-0.0044
-1	-0.0014	*-0.70*	-0.0049	-0.0013	*-0.67*	-0.0057
0	-0.0031	*-1.57*	-0.0080	-0.0030	*-1.52*	-0.0087
AD= 1	-0.0019	*-0.97*	-0.0099	-0.0019	*-0.98*	-0.0107
2	-0.0032	*-1.61**	-0.0131	-0.0032	*-1.62*	-0.0139
3	-0.0056	*-2.82****	-0.0187	-0.0059	*-2.96****	-0.0198
4	-0.0042	*-2.11***	-0.0229	-0.0045	*-2.28***	-0.0243
5	-0.0020	*-1.00*	-0.0249	-0.0022	*-1.09*	-0.0265
6	0.0005	*0.26*	-0.0244	0.0008	*0.40*	-0.0257
7	-0.0053	*-2.66****	-0.0297	-0.0058	*-2.90*	-0.0315
8	0.0041	*2.05***	-0.0256	0.0039	*1.98*	-0.0275
9	-0.0043	*-2.16***	-0.0299	-0.0046	*-2.34***	-0.0322
CD= 10	-0.0096	*-4.82****	-0.0395	-0.0105	*-5.26****	-0.0426
11	0.0056	*2.82****	-0.0339	0.0060	*3.03****	-0.0366
12	-0.0023	*-1.17*	-0.0362	-0.0019	*-0.96*	-0.0385
13	0.0036	*1.83**	-0.0326	0.0041	*2.07***	-0.0344
14	0.0000	*-0.02*	-0.0326	0.0000	*0.00*	-0.0344
15	-0.0011	*-0.53*	-0.0336	-0.0011	*-0.56*	-0.0355
16	-0.0022	*-1.12*	-0.0359	-0.0018	*-0.88*	-0.0373
17	-0.0024	*-1.23*	-0.0383	-0.0024	*-1.21*	-0.0397
18	0.0008	*0.39*	-0.0375	0.0010	*0.48*	-0.0387
19	0.0040	*2.00*	-0.0336	0.0045	*2.26*	-0.0342
20	-0.0027	*-1.34*	-0.0362	-0.0023	*-1.14*	-0.0365

Table VIII

Cumulative Abnormal Returns in Smaller Event Windows for Stocks Deleted from MSCI EM

This table illustrates the CARs over eight smaller event windows, within the large event window. The first column specifies the event window of interest. The actual start and end dates of these windows are shown in the second column. CARs are cumulated within these windows. The third column shows the number of stocks in the sample for each event window, since the whole sample is only used in the first three event windows. Cumulative abnormal returns for each window are presented in the fourth column. The significance of the CARs is calculated using t-statistics using time-series variance, and these are reported in column six. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Specific Event Window	Event Days	N	CAR	t-stats
Anticipation	AD-11, AD-2	262	-0.0036	*0.57*
Announcement day	AD	262	-0.0019	*0.97*
AD window	AD-2, AD+2	262	-0.0016	*0.41*
	AD-1, AD+1	262	-0.0082	*2.38***
	AD-3, AD+3	262	-0.0153	*3.14****
Run up	AD, CD	247	-0.0339	*5.39****
(9-day sample)	AD+1, CD	247	-0.0319	*5.35****
Inclusion Day	CD	247	-0.0105	*5.26****
	CD+1	247	0.0060	*3.03****
CD window	CD-1, CD+3	247	-0.0069	*1.55*
	CD-2, CD+2	247	-0.0071	*1.59*
Price Reversal	CD+1, CD+10	247	0.0061	*0.97*
	CD+1, CD+20	247	0.0167	*1.87**
Total Effect	AD, CD+10	247	-0.0278	*3.12****
	AD, CD+20	247	-0.0172	*1.58*
Permanent Price Effect	AD-11, CD+10	247	-0.0344	*3.16****
	AD-11, CD+20	247	-0.0239	*1.90**
	AD-11, CD+34	247	-0.0205	*1.56*

Table IX
Daily Average Volume for Stocks Added to and Deleted from MSCI EM

This table summarizes the average volume behaviour around both the inclusions and deletions. The volume is measured by the daily trade value in USD and calculated by multiplying the daily price and number of shares traded: equity trade value (ETV). The daily ETV data is scaled by the average ETV over (AD-30) and (AD+30) in order to obtain comparable volume measures across stocks. The first column shows the days with the actual announcement taking place on day 0, however, since the inclusion announcements occur after 5pm GMT, the event date is assumed to be 'day 1' (AD). Day 10, i.e. CD, is the actual index change date for the group of stocks with 9-day run-up windows. The second and fourth columns report the cross-sectional average ETV on the specified date, for inclusions and deletions respectively. The whole sample for the inclusions consists of 254 stocks, with 182 of these having 9-day run-up windows. The deleted stocks are 217 in total, with 208 of these in the 9-day subsample. The third and fourth columns are the daily average ETV for the group of stocks in the 9-day subsample.

	Index Additions		**Index Deletions**	
days	whole sample	9-day sample	whole sample	9-day sample
-10	0.742	0.732	0.881	0.911
-9	0.924	0.943	0.887	0.914
-8	0.921	0.875	0.934	0.967
-7	0.981	0.941	0.831	0.825
-6	0.940	0.868	1.024	0.993
-5	0.913	0.885	0.887	0.862
-4	0.971	1.072	0.974	0.939
-3	0.951	1.023	0.832	0.849
-2	0.907	0.913	0.842	0.852
-1	0.983	0.962	0.886	0.885
0	1.159	1.001	0.790	0.773
AD=1	1.226	1.191	0.899	0.905
2	1.263	1.322	1.355	1.366
3	0.976	0.921	1.015	1.023
4	1.069	1.100	1.290	1.316
5	0.905	0.916	1.030	1.051
6	0.999	1.047	1.264	1.281
7	0.957	0.985	0.921	0.921
8	0.960	0.938	1.037	0.988
9	1.098	1.064	1.173	1.170
CD=10	1.542	1.591	1.913	1.953
11	1.181	1.178	1.245	1.274
12	1.119	1.118	1.384	1.403
13	1.091	1.104	1.180	1.190
14	0.891	0.807	1.021	1.025
15	1.140	1.145	1.131	1.150
16	1.090	1.062	1.195	1.219
17	0.904	1.004	1.068	1.093
18	0.924	0.931	1.031	1.050
19	0.965	1.011	0.964	0.959
20	0.998	0.985	1.028	0.969

Table X

Liquidity Analysis I: Bid-Ask Spreads for Stocks Added to and Deleted from MSCI EM

This table summarizes the daily average bid and ask spread behaviour around both the inclusions and deletions. The proportional bid-ask spread (BASi,t) is calculated as follows:

$$BAS_{i,t} = \frac{\left(P_{i,t}^{A} - P_{i,t}^{B}\right)}{\left(P_{i,t}^{A} + P_{i,t}^{B}\right)/2}$$

where $P_{i,t}^{A}$ and $P_{i,t}^{B}$ are the last stamp ask and bid prices for stock i on day t. The BAS series are scaled by the average BAS over (AD-30) and (AD-1) in order to obtain comparable volume measures across stocks. The first column shows the days with the actual announcement taking place on day 0, however, since the inclusion announcements occur after 5pm GMT, the event date is assumed to be 'day 1' (AD). Day 10, i.e. CD, is the actual index change date for the group of stocks with 9-day run-up windows. The second and fourth columns report the cross-sectional average BAS on the specified date, for inclusions and deletions respectively. The whole sample for the inclusions, with BAS data available, consists of 126 stocks, with 87 of these having 9-day run-up windows. The deleted stocks with BAS data are 126 in total, with 119 of these in the 9-day subsample. The third and fourth columns are the daily average BAS for the group of stocks in the 9-day subsample.

	Index Additions		**Index Deletions**	
days	whole sample	9-day sample	whole sample	9-day sample
-10	1.19	1.010	0.93	0.900
-9	0.84	0.900	0.92	0.884
-8	0.81	0.999	0.76	0.769
-7	0.97	0.977	0.87	0.882
-6	0.92	0.912	0.94	0.954
-5	0.99	1.042	0.98	1.003
-4	0.94	0.911	0.87	0.792
-3	1.24	1.181	0.80	0.743
-2	0.64	0.868	1.04	1.000
-1	0.68	0.889	1.07	1.067
0	1.13	1.148	1.12	1.185
AD=1	1.39	1.191	1.06	1.064
2	1.08	1.035	1.25	1.253
3	1.10	1.192	0.90	0.917
4	0.88	0.740	0.92	0.918
5	1.01	1.005	0.94	0.950
6	1.19	1.045	0.72	0.711
7	1.25	1.187	1.35	1.387
8	1.04	0.980	1.20	1.225
9	1.27	1.321	1.07	1.087
CD=10	1.13	1.085	1.52	1.580
11	1.20	1.104	0.94	0.965
12	1.14	1.180	0.80	0.813
13	1.09	1.189	0.80	0.777
14	1.54	1.687	1.10	1.074
15	1.13	1.037	0.73	0.730
16	0.90	0.853	0.93	0.942
17	1.12	1.129	0.85	0.847
18	1.02	1.037	0.76	0.754
19	1.13	1.063	0.94	0.913
20	0.97	0.865	0.76	0.758

Table XI

Liquidity Analysis II: Illiquidity Measures for Stocks Added to and Deleted from MSCI EM

This table summarizes the daily average illiquidity behaviour around both the inclusions and deletions. The illiquidity ($ILLIQ_{i,t}$) for stock i at day t is calculated following Amihud (2002) as:

$$ILLIQ_{i,t} = \frac{|r_{i,t}|}{V_{i,t}}$$

where $r_{i,t}$ is the daily return on security i on day t. $V_{i,t}$ stands for the dollar value of company i's shares traded on a given day t (the trading value).The ILLIQ series are scaled by the average ILLIQ over (AD-30) and (AD-1) in order to obtain comparable volume measures across stocks. The first column shows the days with the actual announcement taking place on day 0, however, since the inclusion announcements occur after 5pm GMT, the event date is assumed to be 'day 1' (AD). Day 10, i.e. CD, is the actual index change date for the group of stocks with 9-day run-up windows. The second and fourth columns report the cross-sectional average illiquidity measure on the specified date, for inclusions and deletions respectively. The whole sample for the inclusions, for which illiquidity measure is available, consists of 235 stocks, with 166 of these having 9-day run-up windows. The deleted stocks, with illiquidity measures, are 262 in total, with 247 of these in the 9-day subsample. The third and fourth columns are the daily average illiquidity for the group of stocks in the 9-day subsample.

	Index Additions		**Index Deletions**	
days	whole sample	9-day sample	whole sample	9-day sample
-10	1.20	1.30	1.27	1.266
-9	1.17	0.97	0.99	0.972
-8	0.91	0.94	1.11	1.103
-7	0.90	0.85	0.56	0.543
-6	0.94	0.93	1.07	0.890
-5	0.81	0.75	0.75	0.750
-4	1.19	1.00	0.85	0.882
-3	1.11	0.95	1.21	1.192
-2	0.97	0.95	1.21	1.247
-1	0.76	0.76	1.27	1.308
0	1.25	1.12	1.38	1.426
AD=1	1.14	0.90	1.50	1.544
2	0.84	0.80	1.32	1.365
3	1.33	1.27	0.92	0.939
4	1.06	0.88	0.57	0.589
5	1.01	1.05	1.23	1.247
6	1.16	1.07	1.45	1.505
7	1.14	1.03	1.54	1.606
8	1.06	1.17	1.47	1.514
9	1.12	0.97	1.46	1.468
CD=10	1.00	0.90	1.66	1.710
11	0.92	0.81	1.98	2.023
12	1.15	0.74	0.84	0.881
13	0.85	0.62	1.28	1.325
14	1.73	1.84	1.14	1.190
15	0.83	0.81	1.19	1.212
16	0.71	0.79	0.85	0.873
17	1.16	0.91	1.17	1.206
18	0.84	0.68	1.44	1.473
19	1.24	1.22	1.23	1.242
20	1.10	0.95	1.18	1.221

Table XII
Liquidity Analysis III: Turnover for Stocks Added to and Deleted from MSCI EM

This table summarizes the daily average liquidity behaviour around both the inclusions and deletions. The liquidity is proxied by the turnover ratio (T_{it}) for stock i on day t, which calculated as following:

$$T_{it} = \frac{Q_{it}}{N_{it}}$$

where N_{it} denotes the daily number of shares outstanding for stock i and Q_{it} is the number of shares of company i traded on day t (trade volume). The turnover rates are scaled by the average turnover during (AD-40) and (AD-10) in order to obtain comparable volume measures across stocks. The first column shows the days with the actual announcement taking place on day 0, however, since the inclusion announcements occur after 5pm GMT, the event date is assumed to be 'day 1' (AD). Day 10, i.e. CD, is the actual index change date for the group of stocks with 9-day run-up windows. The second and fourth columns report the cross-sectional average turnover on the specified date, for inclusions and deletions respectively. The whole sample for the inclusions, for which the turnover data is available, consists of 243 stocks, with 174 of these having 9-day run-up windows. The deleted stocks with the turnover data are 219 in total, with 208 of these in the 9-day subsample. The third and fourth columns are the daily average turnover for the group of stocks in the 9-day subsample.

	Index Additions		**Index Deletions**	
days	whole sample	9-day sample	whole sample	9-day sample
-10	0.83	0.83	1.13	1.16
-9	0.96	1.00	1.38	1.42
-8	1.02	0.99	1.20	1.24
-7	1.07	1.07	1.11	1.10
-6	1.00	0.94	1.57	1.54
-5	1.01	1.00	1.31	1.19
-4	1.12	1.28	1.70	1.57
-3	1.07	1.13	1.27	1.29
-2	1.07	1.08	1.38	1.40
-1	1.19	1.12	1.49	1.51
0	1.52	1.31	1.41	1.40
AD=1	1.54	1.46	1.29	1.31
2	1.68	1.77	2.15	2.17
3	1.30	1.15	2.12	2.16
4	1.38	1.34	2.59	2.67
5	1.25	1.22	1.99	2.04
6	1.43	1.46	3.03	3.13
7	1.34	1.37	2.07	2.11
8	1.39	1.25	2.54	2.56
9	1.57	1.41	3.00	3.08
CD=10	2.17	2.09	3.13	3.20
11	1.73	1.58	2.41	2.49
12	1.54	1.48	2.41	2.47
13	1.43	1.40	2.03	2.07
14	1.14	0.94	1.65	1.66
15	1.51	1.48	1.93	1.96
16	1.57	1.46	1.87	1.89
17	1.22	1.30	1.79	1.84
18	1.24	1.15	1.79	1.83
19	1.25	1.27	1.81	1.81
20	1.33	1.20	1.87	1.77

Table XIII
Market Integration I: Multifactor Model Results for Stocks Added to MSCI EM

This table presents the changes in global and local market betas, before and after the index inclusion. There are two sections in this table; Part A shows the results from OLS regressions, and Part B shows the results from GARCH (1,1) regressions. The market betas for stock i on day t, are calculated using the following regression:

$$r_{it} = \alpha_i + \beta_{i1} r_{Wt} + \beta_{i2} r_{L_i t} + \varepsilon_{it}$$

For Part A results, ε_t is assumed to follow a normal distribution with mean zero and constant variance. For Part B, error term has mean zero and conditional variance of h_t:

$$\varepsilon_t \sim (0, h_t), \text{var}(\varepsilon_t) = h_t = \varphi_0 + \varphi_1 \varepsilon_{t-1}^2 + \varphi_2 h_{t-1}.$$

r_{it} is the daily return on stock i on day t, r_{wt} is the return on the world portfolio, proxied by MSCI All World Index and r_{Lt} is the return on the local market portfolio, proxied by the country stock index. All the returns are calculated as the first log differences of the closing prices on days t and t-1.β_{i1} is the global beta and β_{i2} is the local beta for stock i. Two sets of one-year local market betas and global market betas for each stock are calculated. While calculating the betas, the two-month window around the announcement date (AD), i.e. the period between (AD-30) and (AD+40), is excluded in order to eliminate the short-term price impacts of the index inclusion. The pre-inclusion betas (b1) are calculated using the stock return data between (AD-290) and (AD-31). Similarly, the post-inclusion market betas (b2) are calculated using the data between (AD+40) and (AD+300). In Part A, the first row shows the average global and local one-year betas before (b1), and the second row shows the average global and local betas one-year after the inclusion (b2). The third row is the sample averages of the differences between pre-inclusion and post-inclusion betas (b1-b2): for both global and local betas. The fourth row shows the number of stocks with a negative difference between pre- inclusion and post- inclusion betas. Total numbers of stocks for which the betas are available are given in row five. In row six, the percentage of stocks with increases in their global and local betas following the announcement are specified. In Part B, the rows have the same content, but the market betas are obtained from the same two-index model with GARCH (1,1) specification.

Part A		
OLS	**global**	**local**
Average pre-AD beta (b1)	0.04	0.84
Average post-AD beta (b2)	0.13	0.80
Average difference (b1-b2)	-0.10	0.02
Number of stocks with negative (b1-b2)	153	115
Total number of stocks	264	264
% of stocks with increased betas	58%	44%
Part B		
GARCH (1,1)		
Average pre-AD beta (b1)	0.05	0.80
Average post-AD beta (b2)	0.10	0.77
Average difference (b1-b2)	-0.06	0.02
Number of stocks with negative (b1-b2)	145	120
Total number of stocks	259	260
% of stocks with increased betas	56%	46%

Table XIV

Market Integration II: CAPM Results for Stocks Added to MSCI EM

This table presents the changes in global and local market betas, before and after the index inclusion, obtained from CAPM regressions. There are two sections in this table: the results from full-integration CAPM with the world market portfolio and the results from complete-segmentation CAPM with the local market portfolio. The global market beta for stock i on day t, is calculated using the following regression:

$$r_{it} = \alpha_i + \beta_{i1} r_{Wt} + \varepsilon_{it}$$

ε_t is assumed to follow a normal distribution with mean zero and constant variance. r_{it} is the daily return on stock i on day t, and r_{wt} is the return on the world portfolio, proxied by MSCI All World Index. Similarly the local market betas are obtained from the complete-segmentation CAPM:

$$r_{it} = \alpha_i + \beta_{i2} r_{L_i t} + \varepsilon_{it}$$

where all terms are as in full-integration CAPM except r_{Lt}, which is the return on the local market portfolio, proxied by the country stock index of stock *i*. All the returns are calculated as the first log differences of the closing prices on days *t* and *t*-1. β_{i1} is the global beta and β_{i2} is the local beta for stock *i*. The second column presents the results for the global betas, while the third column illustrates the local betas. The average global and local market betas are also calculated excluding the stocks from the most-invested emerging markets; Brazil, Hong Kong, Republic of Korea, Malaysia, Mexico and Taiwan. The results are shown in columns four and five for global and local betas respectively. Two sets of market betas are calculated from each empirical model; pre-inclusion and post-inclusion. While calculating the betas, the two-month window around the announcement date (AD), i.e. the period between (AD-30) and (AD+40), is excluded in order to eliminate the short-term price impacts of the index inclusion. The pre-inclusion betas (b1) are calculated using the stock return data between (AD-290) and (AD-31). Similarly, the post-inclusion market betas (b2) are calculated using the data between (AD+40) and (AD+300). The first row shows the global and local one-year betas before (b1), and the second row shows the average global and local betas one-year after the inclusion (b2). The third row is the sample averages of the differences between pre-inclusion and post-inclusion betas (b1-b2): for both global and local betas. The fourth row shows the number of stocks with a negative difference between pre- inclusion and post-inclusion betas. Total numbers of stocks for which the betas are available are given in row five. In row six, the percentage of stocks with increases in their global and local betas following the announcement are stated.

single-index CAPM	global	local	cleanglobal	cleanlocal
Average pre-AD beta (b1)	0.58	0.85		
Average post-AD beta (b2)	0.69	0.83		
Average difference (b1-b2)	-0.12	0.01	-0.19	0.03
Number of stocks with negative (b1-b2)	137	127	88	73
Total number of stocks	263	263	152	152
% of stocks with increased betas	52%	48%	58%	48%

Table XV
CAPM Results for Stocks Deleted from MSCI EM

This table presents the changes in global and local market betas, before and after the index deletions, obtained from CAPM regressions. In Part A, the results from the multi-index APT model are presented. The market betas for stock i on day t, are calculated using the following regression:

$$r_{it} = \alpha_i + \beta_{i1} r_{Wt} + \beta_{i2} r_{L_i t} + \varepsilon_{it}$$

where ε_t is assumed to follow a normal distribution with mean zero and constant variance. r_{it} is the daily return on stock i on day t, r_{wt} is the return on the world portfolio, proxied by MSCI All World Index and r_{Lt} is the return on the local market portfolio, proxied by the country stock index. All the returns are calculated as the first log differences of the closing prices on days t and t-1.β_{i1} is the global beta and β_{i2} is the local beta for stock i. Two sets of one-year local market betas and global market betas for each stock are calculated. While calculating the betas, the two-month window around the announcement date (AD), i.e. the period between (AD-30) and (AD+40), is excluded in order to eliminate the short-term price impacts of the index deletion. The pre-deletion betas (b1) are calculated using the stock return data between (AD-290) and (AD-31). Similarly, the post-deletion market betas (b2) are calculated using the data between (AD+40) and (AD+300). In Part A, the first row shows the average global and local one-year betas before (b1), and the second row shows the average global and local betas one-year after the deletion (b2). The third row is the sample averages of the differences between pre-deletion and post-deletion betas (b1-b2): for both global and local betas. The fourth row shows the number of stocks with a negative difference between pre-deletion and post- deletion betas. Total numbers of stocks for which the betas are available are given in row five. In row six, the percentage of stocks with increases in their global and local betas following the announcement are shown.

In Part B, the results from full-integration CAPM with the world market portfolio and the results from complete-segmentation CAPM with the local market portfolio. The global market beta for stock i on day t, is calculated using the following regression:

$$r_{it} = \alpha_i + \beta_{i1} r_{Wt} + \varepsilon_{it}$$

The explanatory and dependent variables are defined as in the multifactor model, with the same specification of the error term. Similarly the local market betas are obtained from the complete-segmentation CAPM:

$$r_{it} = \alpha_i + \beta_{i2} r_{L_i t} + \varepsilon_{it}$$

where all terms are as in full-integration CAPM except the explanatory variable r_{Lt}, which is the return on the local market portfolio, proxied by the country stock index of stock i. The ordering and contents of the rows in Part B are same with Part A.

Part A		
Multi-index APT	**global**	**local**
Average pre-AD beta (b1)	0.16	0.47
Average post-AD beta (b2)	0.06	0.47
Average difference (b1-b2)	0.10	-0.01
Number of stocks with negative (b1-b2)	88	99
Total number of stocks	205	203
% of stocks with increased betas	43%	49%
Part B		
single-index CAPM	**global**	**local**
Average pre-AD beta (b1)	0.42	0.47
Average post-AD beta (b2)	0.27	0.48
Average difference (b1-b2)	0.15	-0.01
Number of stocks with negative (b1-b2)	83	103
Total number of stocks	202	201
% of stocks with increased betas	41%	51%

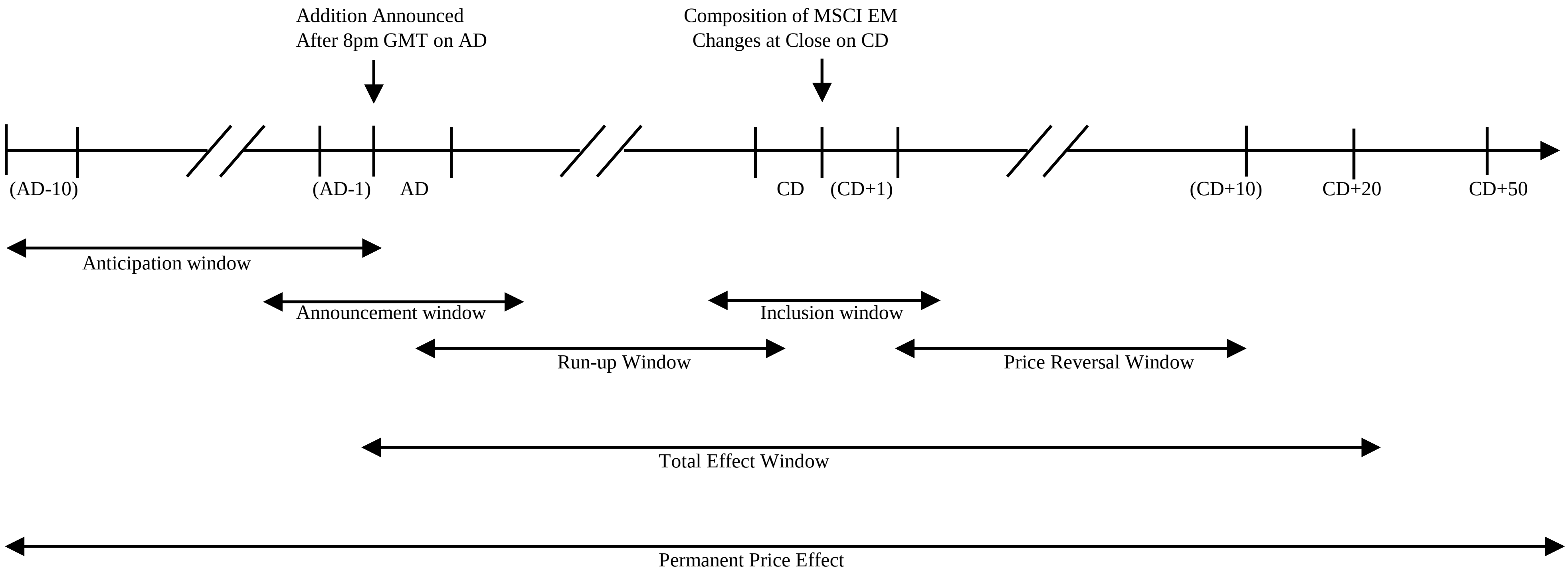

Figure 1. Timeline and Multiple Event Windows for Additions to and Deletions from MSCI EM. This timeline illustrates the large and smaller event windows used in this paper. AD stands for the announcement date, which is the day following the actual announcement of index inclusion or deletion, because the announcements are made after 5pm GMT, when the European and Asian stock markets are closed. CD stands for the actual index change (inclusion and deletion) date. There is one large event window, which covers the days between (AD-10) and (CD+20). In order to analyse, the price changes within the event window, the large window is divided into six smaller event windows: Anticipation window (between (AD-10) and (AD-1)), announcement day (AD), run-up window (between (AD+1) and (CD-1)), inclusion/change day (CD), price reversal window (between ((CD+1) and (CD+10)) and the total price effect window (between AD and (CD+10)). Additionally, announcement window (between (AD-2) and (AD+2)) and inclusion window (between (CD-2) and (CD+2)) are not major windows, but also included in the analysis.

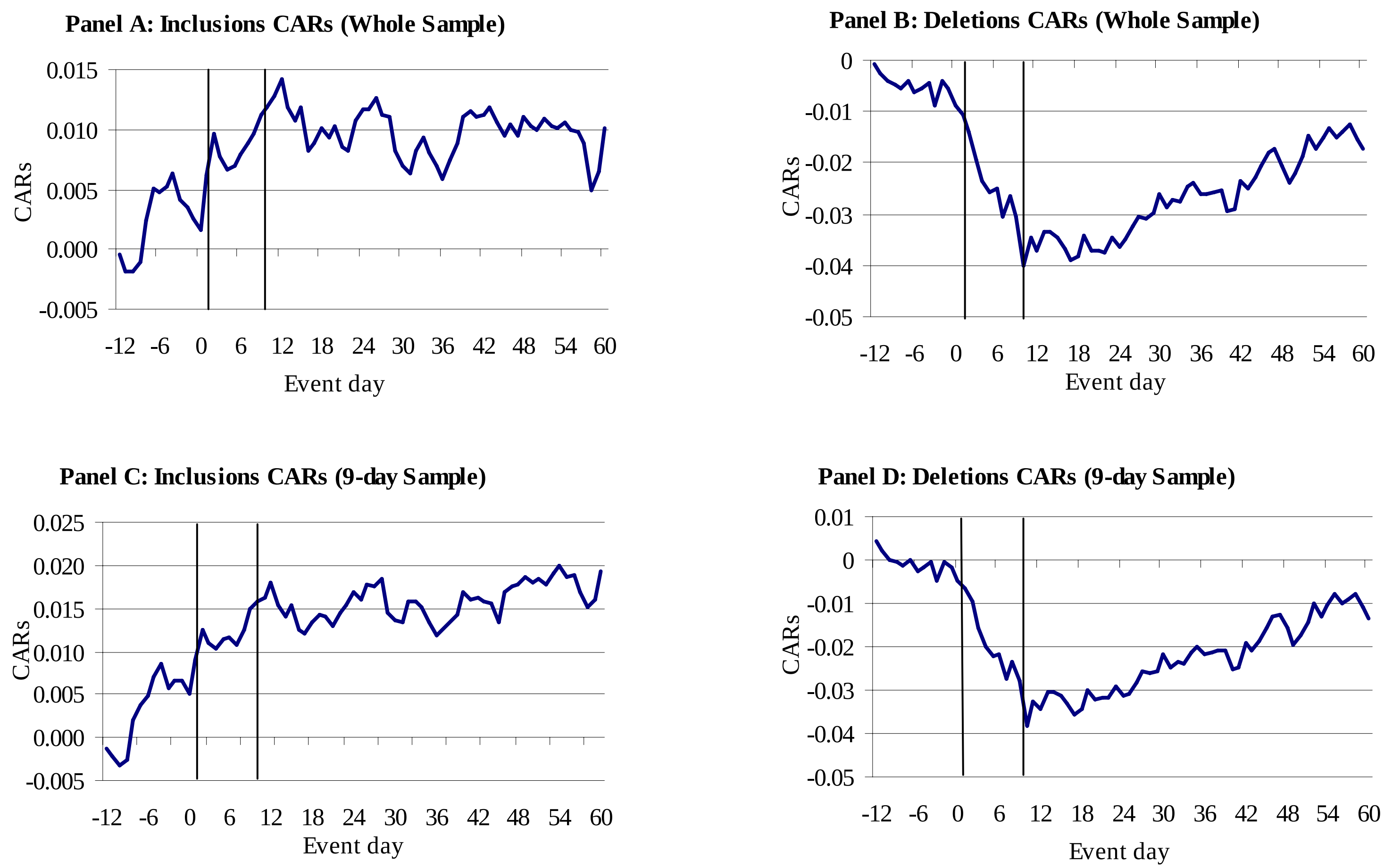

Figure 2. Cumulative Abnormal Returns (CARs) for Additions to and Deletions from MSCI EM. The figure presents CARs for both inclusions and deletions. Daily sample averages of local-market adjusted abnormal returns (AARs) are used to calculate the CARs; AARs are accumulated from day (-12) onwards, until day 60. The two vertical lines in each panel specify the announcement (AD) and actual index change date (CD) respectively. Panels A and B show the results for the complete samples, which include stocks with different number of days between AD and CD (i.e. run-up window). Similarly, Panels C and D show CARs for the group of stocks with 9-day run-up windows. The complete sample for inclusions consists of 269 stocks, of which 192 have 9-day run-up windows. The complete sample for deletions consists of 262 stocks, of which 247 have 9-day run-up windows.

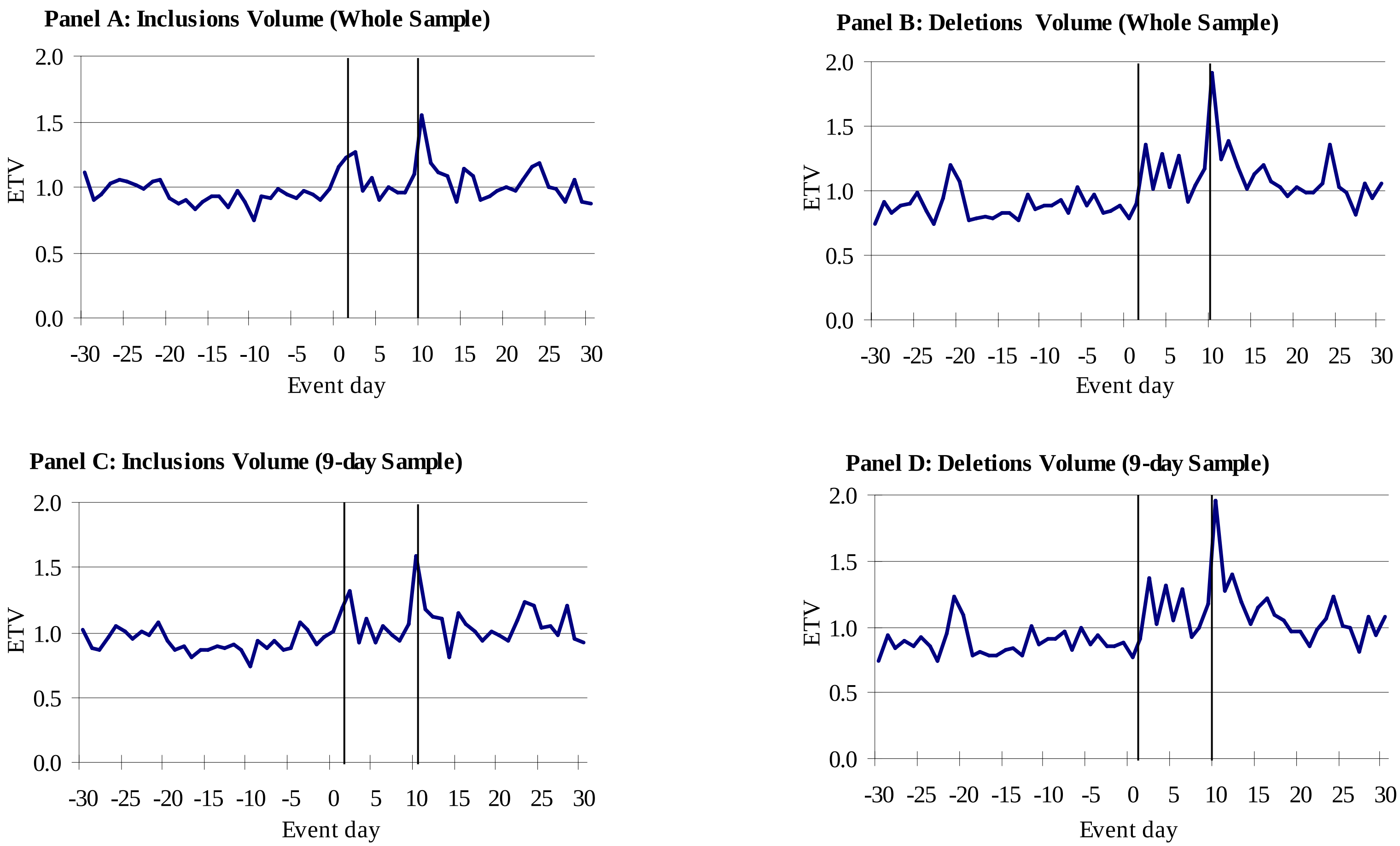

Figure 3. Average Standardized Volume (Equity Trade Value, ETV) for Additions to and Deletions from MSCI EM. The figure presents average volume around the event window, for both inclusions and deletions. The daily equity trade value (in USD) is used as the volume data (ETV). ETV for each stock is scaled by the average volume between (AD-30) and (AD-1), and the cross-sectional average is used as ETV. The two vertical lines in each panel specify the announcement (AD) and actual index change date (CD) respectively. Panels A and B show the stdVOL for the complete samples, which include stocks with different number of days between AD and CD (i.e. run-up window). Similarly, Panels C and D show stdVOL for the group of stocks with 9-day run-up windows. The complete sample for inclusions consists of 254 stocks, of which 182 have 9-day run-up windows. The complete sample for deletions consists of 217 stocks, of which 208 have 9-day run-up windows.

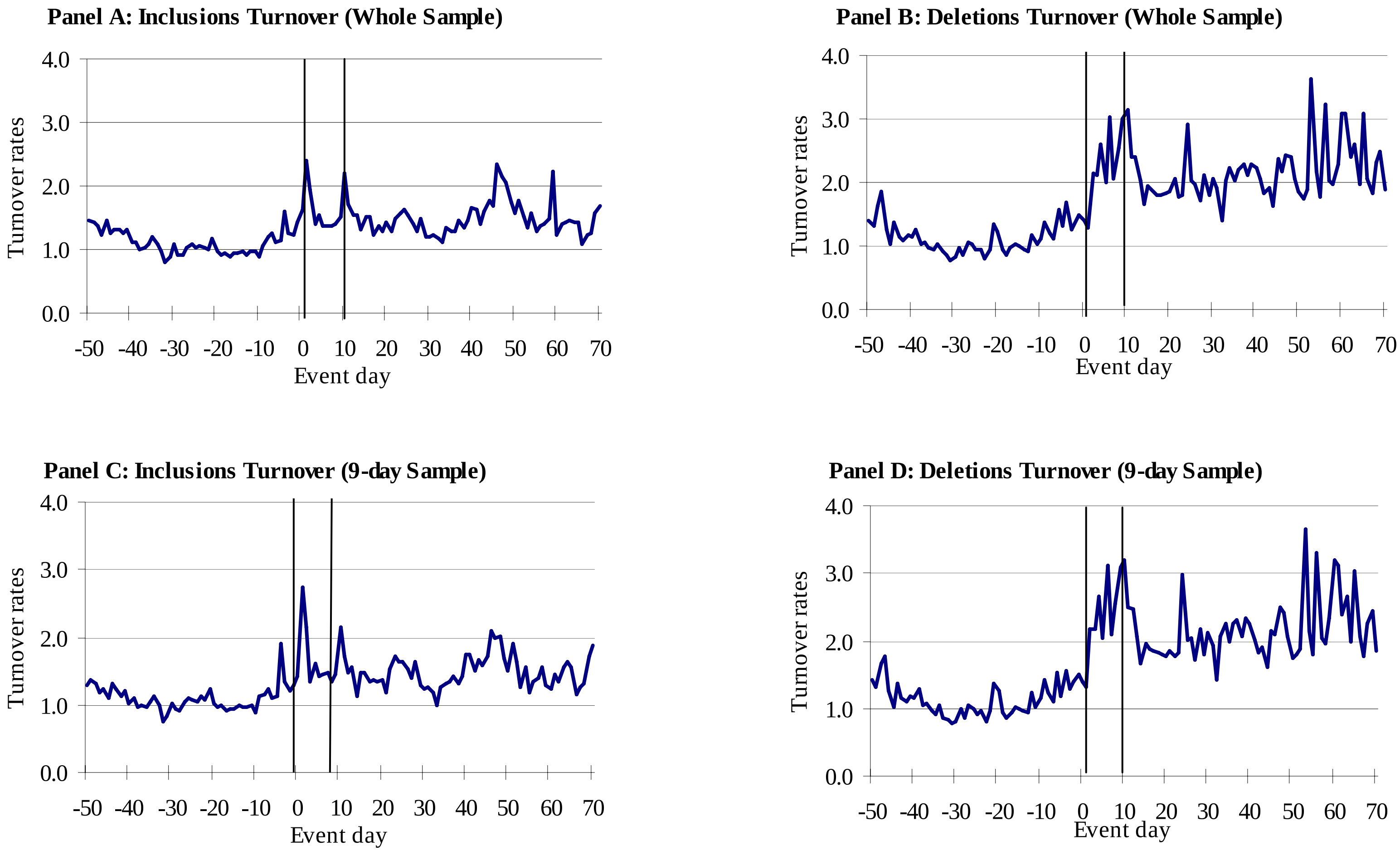

Figure 4. Average Standardized Turnover Rates for Additions to and Deletions from MSCI EM. The figure presents average turnover rates around the event window, for both inclusions and deletions. Turnover of each stock is calculated as the ratio of daily number of shares traded to the number of total shares outstanding. Turnover rates are scaled by the average illiquidity over (AD-30) and (AD-1) in order to obtain comparable volume measures across stocks. The two vertical lines in each panel specify the announcement (AD) and actual index change date (CD) respectively. Panels A and B show the turnover for the complete samples, which include stocks with different number of days between AD and CD (i.e. run-up window). Similarly, Panels C and D show turnover for the group of stocks with 9-day run-up windows. The complete sample for inclusions consists of 243 stocks, of which 174 have 9-day run-up windows. The complete sample for deletions consists of 219 stocks, of which 208 have 9-day run-up windows.