The Impacts of Stock Market Liberalization in Emerging Markets:

Looking Beyond Country Indices

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Abstract

We attempt to answer the following key questions: What are the revaluation effects and the impacts on the cost of capital, volatility, and correlation with world market returns from stock market liberalization in emerging market countries? These questions have been studied extensively at the market-level, i.e. using country indices, but not at the firm level. In the market-level analysis, there is increasing concern whether the country indices are proper means to answer those questions, for example they may not represent the real holdings of foreign portfolio investors after liberalization. Indeed, foreign portfolio investors are known to prefer investment in large and well-known firms. Hence, the opening of capital markets should have a differential impact across securities depending on foreign investors' demand. In order to take into account the potentially different impacts caused by foreign investors' demand, we use individual firm data as well as market-level indices. Our analysis is based on the cross-sectional and time-series panel regression method.

Our test results using country indices show statistically and economically significant revaluation effects, and increases in the cost of capital. While the stock market volatility increases, its correlation with world market return does not change after stock market liberalization. More important than these market-level findings, we report significantly different impacts of stock market liberalization, based on firm size, which is used as a proxy for foreign investors' demand. Large firms tend to exhibit large revaluation effects, insignificant change in the cost of capital, small increases in volatility, and increases in correlation with the world market from liberalization. Small firms show small revaluation effects, increases in the cost of capital, large increases in volatility and decreases in correlation with world market returns after liberalization. Our results have important implications for international investors seeking to manage their global exposure as well as for policy makers considering capital market liberalization.

Résumé

Dans la présente étude, nous essayons d'apporter des réponses aux questions suivantes: Quels sont les effets de réévaluation et les impacts de la libéralisation des marchés des capitaux des pays émergents sur le coût du capital, la volatilité et la corrélation avec le rendement du marché mondial ? Ces questions ont été bien étudiées dans la littérature mais seulement sur le plan des marchés agrégés, en utilisant des indices boursiers. Il est pertinent de se demander si les indices par pays sont appropriés à l'analyse visant à répondre aux questions soulevées. Par exemple, ces indices pourraient ne pas représenter la vraie composition des portefeuilles des investisseurs étrangers après une libéralisation du marché. En effet, les investisseurs étrangers sont connus pour préférer investir dans de grandes firmes bien connues. Par conséquent, l'ouverture des marchés de capitaux peut avoir des impacts différents sur le titre des firmes dépendemment de la demande des investisseurs. Afin de tenir compte de ces différences potentielles causées par la demande des investisseurs étrangers, notre analyse se base aussi bien sur des données individuelles par firme que sur les indices boursiers.

Nos résultats à partir des tests basés sur des indices de pays montrent des effets de réévaluation significatifs tant au niveau statistique qu'économique, ainsi qu'une augmentation du coût du capital. La volatilité des marchés boursiers semble augmenter, mais la corrélation avec le rendement du marché mondial ne semble pas changer suite à la libéralisation. Par ailleurs, en tenant compte de la taille des firmes, nos résultats sont encore plus significatifs et démontrent l'existence d'impacts différents de la libéralisation sur le rendement des firmes. En effet, pour les firmes de grande taille, la libéralisation est suivie par un effet de réévaluation plus important, une variation non significative dans le coût du capital, une faible augmentation de la volatilité ainsi qu'une augmentation de la corrélation avec le marché mondial. Par ailleurs, les entreprises de petite taille montrent un faible effet de la réévaluation, une augmentation du coût du capital, une augmentation importante de la volatilité et une baisse de la corrélation avec le marché mondial. Ces résultats ont des implications importantes sur les investisseurs internationaux cherchant à gérer leur exposition globale ainsi que sur les décideurs politiques qui envisagent la libéralisation des marchés de capitaux.

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Chapter I. Introduction

A. Motivation

The past two to three decades have witnessed a dramatic decrease in barriers to international investment, especially in emerging markets (EMs). In general, these barriers can be classified into explicit and implicit barriers. While the explicit barriers are directly observable and quantifiable, for example foreign ownership restriction and discriminatory taxation, the implicit barriers are not directly observable and may arise from, for example lack of information, political risk, or fear of expropriation.

In recent years, many studies have investigated the impact of market liberalizations – see for example, Bekaert and Harvey (2000), Errunza and Miller (2000), Henry (2000), and Kim and Singal (2000). Since these studies [with the exception of Errunza and Miller (2000)] use market-level indices, the documented results represent an average effect of liberalization on a country's securities. Further, there is increasing concern about the representation of market-level indices. For example, Bekaert and Harvey (2000) point out the potential problems in using International Finance Corporation (IFC) indices to examine the impact of market liberalization in emerging markets by noting that the IFC index may not represent the real portfolio holdings of foreign investors. Indeed, foreign portfolio investors are known to prefer investment in large and well-known firms.[1] Thus, investigating the impact of market

[1] For example, Kang and Stulz (1997) and Choe, Kho and Stulz (1999) show explicitly that foreign investors are more likely to invest in large firm securities. Mondellini (1999) also emphasizes the importance of information in investment decision even with ADRs, which are supposed to resolve information barriers embedded in direct foreign portfolio investment. He cites Rene Vanguestaine, managing director and global head of ADRs at JP Morgan in New York, *"Over the past few years, we have seen a lot of hype about ADRs, but a lot of programs*

liberalization using market indices, the results could be "averaged out" in the sense that the impact could be underestimated for securities with high foreign demand and overestimated for securities with low foreign demand or vice versa.

Finally, although the explicit foreign investment restrictions may be removed by the government, the implicit barriers such as lack of information may still remain. Different firms from a liberalized market may also provide different diversification opportunities to the foreign investors. Thus, the use of market-level indices to investigate the impact of market liberalization may not take into account firm level asymmetries embedded in investment decisions.

There are also other potential problems with using market-level indices. First, since each country has only one observation (market index) the power of any test will be low. Second, firms are included and excluded based on the firm selection criteria in index construction. Hence sometimes some firms are included implicitly to test the impact of market liberalization even though they did not exist before or during the market liberalization period.

All the above concerns motivate this study to investigate the impact of stock market liberalization at a more disaggregated firm level.

B. Objective

Our *objective* of this study is to investigate empirically the impact of stock market liberalization using firm-level data as well as market-level data on the following aspects:

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were set up by companies that don't have either a US presence or a real US penetration strategy. As a result of that, US investors don't know them and these programs remain very illiquid."

revaluation effect, cost of capital, stock market volatility and its correlation with world market return.

Based on the standard International Asset Pricing Models (IAPMs), we would expect a decrease in the cost of capital after market liberalization. If we assume that market A is segmented from the world markets, the expected return (cost of capital) for firms in market A will be priced by the local market risk. If we assume that the market A becomes fully integrated after liberalization, the expected return would depend only on the world market risk. The general consensus is that the local price of risk is higher than the world price of risk and the securities are more correlated within a market than across markets (see Stulz (1999) and Errunza and Miller (2000)). Therefore, we would expect the expected return (cost of capital) to decrease and the stock price to increase subsequently (revaluation effect) after market liberalization. An alternative argument to explain this revaluation effect is that foreign portfolio investors will increase the demand for domestic securities that will subsequently increase the stock price (see Bailey and Jagitiani (1994) and Bailey, Chung and Kang (1999)).

As noted above, there are solid theoretical arguments for the revaluation effect and the cost-of-capital after stock market liberalization. However there is no established theory regarding the impacts on volatility or correlation following liberalization. It has been claimed that foreign portfolio investment makes the local stock market unstable. However, this is not supported by empirical evidence.[2]

Diversifying investment internationally allows investors to reduce their portfolio risks without sacrificing their total returns unless international markets are perfectly correlated. The low correlation with world market return is the source of the gains from international

diversification. It is generally accepted that correlation coefficient of market returns can not be used as a direct measure of market integration which will be discussed in detail in Chapter II. It is, however believed that the gradual removal of barriers to international investment as well as political and economic integration could lead to a progressive increase in the international correlation of financial markets (see Solnik et al. (1996) and Longin and Solnik (1995)). Portfolio managers are of course interested if an important event like stock market liberalization has an impact on volatility and correlation which in turn affects portfolio rebalancing decisions and risk management practices. Hence, we will examine whether market liberalization is associated with an increase in stock market volatility and an increase in correlation with the world market.

C. Contribution

Our *main contributions* to the current studies examining the impact of market liberalization are as follows: First, by applying firm level data, our approach allows a more in-depth study of the impact of market liberalization. For example, we can investigate the cross-sectional differences among individual firms driven by foreign investors' demand using firm size as a proxy. The rationale for using firm size as a proxy for foreign investors' demand is as follows. The importance of information availability in international investment is well documented. For example, in international asset pricing models of Black (1974), Stulz (1981), and Errunza and Losq (1985), the informational barrier can render cross-border investments costly, or prohibit such investments in the limit. The "home bias" literature emphasizes the importance of

[2] See for example, Tesar and Warner (1995), Bekaert (1995), De Santis and Imrohoroglu (1997), Bekaert and

information asymmetry to explain the predominance of home assets in international portfolios.[3] In her survey of market experts and participants, Chuhan (1994) also reports limited information as one of the major impediments to investing in emerging markets. On the other hand, firm size has been used in many studies as a proxy for information richness and found to be a good indicator of information availability.[4] Hence it is reasonable to assume that foreign investors, who generally have limited information, prefer information-rich large firms to information-poor small firms in international investment decisions, especially in emerging markets.[5]

Second, we significantly enhance the power of hypothesis tests by having more observations compared to studies that use market-level observations. Third, since we deal with individual firms directly, we do not face the problem of including firms to test market liberalization impact even though they did not exist before or during market liberalization.

D. Main Findings

Our main test results using *market-level* data show statistically and economically significant revaluation effects and increases in the cost of capital. While the stock market volatility increases, its correlation with world market return does not change after stock market

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Harvey (1997, 2000), Errunza (2000) and Kim and Singal (2000).

[3] See for example, French and Poterba (1991), Cooper and Kaplanis (1994) and Lewis (1999).

[4] See Bailey and Jagtiani (1994), Kang and Stulz (1997) and Bailey, Chung and Kang (1999) among others.

[5] It is plausible that the cost of information on small-size firms is too high for foreign investors in relation to the potential diversification benefit. Hence, foreign investors may not invest in small-size firms at all. These small firms become non-traded in the vein of Stulz (1981) who shows that there could exist non-traded assets that do not provide sufficient diversification benefits to overcome the cost of existing barriers. Along the same line, Merton (1987) also argues that investors invest only in the securities they know about. He emphasizes the importance of information asymmetry in investment by noting that (P.488) *"concern about asymmetric information among investors could be important reason why some institutional and individual investors do not*

liberalization. More important than these market-level findings, we report significantly different impacts of stock market liberalization, based on firm size, which is used as a proxy for firm's foreign investors' demand. Large firms tend to exhibit large revaluation effects, insignificant changes in the cost of capital, small increases in volatility, and increases in correlation from stock market liberalization. On the other hand, small firms show small revaluation effects, increases in the cost of capital, large increases in volatility and decreases in correlation with world market return after liberalization.

E. Organization

The organization of this study is as follows. In Chapter II, we provide a literature review of previous theoretical and empirical studies related to this research. We describe our methodological issues and data in chapter III. In Chapter IV, we investigate our first interest of revaluation effect during market liberalization. The changes in the cost of capital, stock market volatility and correlation with world market returns will be analyzed in Chapter V, VI and VII, respectively. Chapter VIII summarizes our results and proposes future studies.

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invest at all in certain securities, such as shares in relatively small firms with few stockholders." Note that this phenomenon will be much severe in international investment context.

Chapter II. Literature Review

In this chapter, we review the previous studies, which will provide the necessary background for our research. This chapter is organized as follows. In section A, we present International Asset Pricing Models (IAPMs) with barriers and some empirical tests. A time-varying feature of world market integration will follow. In section B, the impact of barriers (stock market liberalization) on differential pricing mechanism, revaluation effect, cost of capital, stock market volatility and correlation with world market return are discussed. We introduce the importance of implicit barriers to international investment in section C. Section D summarizes the results and directs our further study.

A. The Structure of International Capital Market: Mild Segmentation

The international capital market structure has been the focus of a significant body of international portfolio choice and asset pricing literature. Markets are assumed to be completely integrated (segmented) if investors face only common world (local) market risk.[6] It is generally accepted that markets are neither completely segmented nor fully integrated, but rather plot somewhere between the two extreme cases. Hence, investors face both world and local market risks. Market segmentation can arise from explicit and/or implicit barriers to international investment.

[6] Previous studies assuming complete market integration are a world CAPM (Harvey (1991) and De Santis and Gerard (1997)), a world CAPM with currency risk (Solnik (1974), Adler and Dumas (1983), Dumas and Solnik (1995) and De Santis and Gerard (1998)), a consumption-based asset pricing model (Wheatley (1988)), Multiple risk factor models (Ferson and Harvey (1994, 1997)) and a world arbitrage pricing theory (Solnik (1983) and Cho, Eun and Senbet (1986)). Markets are assumed to be completely segmented when one country data is used to test a model like Sharpe-Lintner version of CAPM.

The existence of such barriers may constrain the portfolio choice of foreign investors and hence the resulting equilibrium may be different from what would be without such barriers. To investigate the impact of such barriers, many attempts have been made to model these barriers explicitly and evaluate the impact of such barriers on foreign investment, investors' portfolio choice and asset pricing. For example, Black (1974) and Stulz (1981) impose taxes on international investment flows as a proxy for barriers to international investment, while Errunza and Losq (1985) and Eun and Janakiramanan (1986) focus on capital flow restrictions to derive international asset pricing models.

A.1. Theoretical Models: IAPM with Barriers

Applying a mean-variance framework in a two-country setting, Black (1974) develops an IAPM in which there are barriers to investments across national boundaries. He assumes that the barriers to international investment take the form of taxes on the value of an investor's foreign asset holdings which makes it more expensive for domestic investors to hold foreign assets. The taxes represent various kinds of barriers to international investment. They are not only pecuniary but also non-pecuniary such as the fear of expropriation, direct controls on the capital movement and a foreign ownership ceiling on domestic assets, etc. Black's model is a modified version of Sharp-Lintner Capital Asset Pricing Model (CAPM) in the sense that when all the taxes are zero ($\tau_i = \tau_m = 0$), it becomes the usual form of CAPM:

$$E(r_i) = \beta_i[E(r_m)] + \tau_i - \beta_i \tau_m$$

where $E(r_{i(m)})$ is the expected rate of excess return on asset i *(market portfolio)*, β_i is the beta of asset i ($= Cov(r_i, r_m)/Var(r_m)$), τ_m is the weighted average shadow cost of barrier(tax) ($=\Sigma_i$

$W_i\tau_i/\Sigma_i W_i$, where W_i is the total value of outstanding security i and τ_i is the shadow cost of barrier for a security i).

The model has no short-sale limitations. Since the taxes are imposed on both the long and short position in foreign assets, investors with short position pay a negative tax, which implies that short positions in foreign assets are subsidized. The model shows that the two-fund separation property does not hold any more and the world market portfolio becomes inefficient for any investor in either country under barriers to international investment. The limitation of this model is the unrealistic assumption that the domestic investor is paid a subsidy for short positions in foreign assets.

Stulz (1981) addresses this problem by assuming that domestic investors pay a positive tax whether they are long or short in foreign assets. In his model, an investor pays taxes proportional to the absolute value of his or her holdings of foreign assets, while in Black's model, an investor pays taxes proportional to the net value of his foreign asset holdings. Thus, Stulz's model removes the Black's unrealistic assumption of a subsidy on short position in foreign assets. While Black shows that an increase in the level of barriers to international investment will never segment the national capital market completely from the foreign investors because of a negative tax assumption on short sale in foreign assets, Stulz models barriers which make it difficult for domestic investors to hold --either long or short-- foreign risky securities. Using a similar framework as Black, Stulz shows that two Security Market Lines (SML) exist for foreign risky assets, one for long and the other for short position in foreign assets. The asset pricing equation for foreign risky assets is as follows:

$$\mathrm{E}(r_i) = \beta_i[\mathrm{E}(r_m)] + \tau_i - q_i + \beta_i(q_m - \tau_m)$$

where q_m is the weighted average of nonnegative artificial number q_i, which is not observable but it facilitates the derivation. For domestic assets, since there are no barriers to international investment ($\tau_i=q_i=0$), the relationship becomes, $E(r_i)=\beta_i[E(r_m)]+\beta_i(q_m-\tau_m)$ and if the CAPM holds q_m and τ_m would be equal. When all risky foreign assets are held long (short) by domestic investors, q_i becomes zero ($2\tau_i$) and the SML for long (short) position lies above (below) the SML for domestic risky asset.

Stulz also provides theoretical results that in the presence of barriers, some assets will be non-traded in the sense that they are held only by domestic investors and would not be held by foreign investors. In other words, some domestic assets are held only by domestic investors because they do not provide enough diversification benefits to compensate the costs induced by the barriers in the form of taxes.

While Black (1974) and Stulz (1981) include a broadly defined tax to represent all the international investment barriers which domestic investors may face when they invest in foreign assets, Errunza and Losq (1985) focus on capital inflow restrictions and derive the mild segmentation IAPM. Errunza and Losq assume the presence of infinite barriers of unequal market accessibility in a two-country setting: a subset of the investing population (the unrestricted investors) can invest in all the securities available, whereas the others (the restricted investors) can invest only in a subset of the securities (the eligible securities). Hence, the ineligible securities can only be held by the unrestricted investors. For example, portfolio inflow restrictions imposed by the government of country-2 prevent country-1 investors from holding country-2 securities whereas no such controls are imposed by the government of country-1. They show that the eligible securities are priced as if markets are completely

integrated, but the ineligible securities command a "super" risk premium to compensate for the segmented nature of the market.

Their model states that,

$$E(R_i) = R_f + AMCov(R_i, R_w) + (A_I - A)M_I Cov(R_i, R_I \mid \underline{R_e})$$

where $E(R_i)$ is the expected return on the *ith* security from the *Ith* market that is accessible only to its nationals, R_f is the risk-free rate, $A(A_I)$ is the aggregate risk aversion coefficient for all (*Ith*) market investors, $R_w(R_I)$ is the return on the world (*Ith*) market portfolio, $M(M_I)$ is the market value of world *(Ith)* market portfolio and $\underline{R_e}$ is the vector of returns on all securities that can be bought by all investors irrespective of their nationality. Thus, the expected return on the *ith* security commands a global risk premium and a super risk premium, which is proportional to the conditional market risk. Securities without restriction will be priced as if the markets were completely integrated i.e., they will not command super risk premium.

While Errunza and Losq (1985) assume infinite barriers to international investment for restricted investors, Eun and Janakiramanan (1986) relax that assumption and derive optimal portfolio choices and equilibrium asset pricing model where some investors face finite restrictions on international investment in foreign assets. Specifically, Eun and Janakiramanan analyze the effect of finite legal restrictions imposed by the foreign government on the fraction of foreign firms that can be held by domestic investors. In their two-country model--one domestic and one foreign-- the domestic investors are constrained to own a fraction of the outstanding shares of the foreign firms not greater than fractional constraint $\delta\ (0<\delta<1)$, while the foreign investors do not face such restrictions on their investment in domestic firms. The restriction δ is assumed to be uniform across all the firms in a foreign country.

Eun and Janakiramanan show that when the ownership constraint δ is binding, there exists a two-tier pricing relation for restricted foreign securities: a higher price for domestic investors and a lower price for foreign investors. This differential pricing relationship reflects a premium paid by domestic investors over the equilibrium price with no constraints and a discount demanded by foreign investors. This happens when the market clearing conditions are applied to arrive at equilibrium asset prices. When the δ constraint is binding on domestic investors, which implies that the demand exceeds the supply, the domestic investors will be willing to pay more than they would have paid under no restrictions. Similarly, for the foreign investors, their demand could have been less than the supply. If the demand is less than the supply, the securities will be selling at a discount for the foreign investors.

All the aforementioned models of Black (1974), Stulz (1981), Errunza and Losq (1985) and Eun and Janakiramanan (1986) are developed in a two-country world. On the other hand, Padmanabhan (1992) develops a multi-country model of IAPM. In the model of Padmanabhan, the international capital market is characterized by N security markets and N classes of investors, where the *nth* class of investors (n=1,2, ...N) can invest in security markets up to and including the *nth* security market. Thus, when N=3, the class 1 investors are the most restricted in the sense that they are limited to invest in their own securities, due to outflow controls by their governments. Similarly, the class 3 securities can only be held by the class 3 investors due to inflow controls imposed by local government. When N is set to 1, one obtains the standard Capital Asset Pricing Model and with N=2 one obtains the Errunza and Losq (1985) model. Using the mean-variance framework, Padmanabhan shows that the class 1 securities are priced as if markets are integrated and the other class of securities commands different risk premia.

A.2. Empirical Studies: Unconditional Tests of IAPMs with Barriers

At the empirical level, Errunza and Losq (1985) conduct a cross-sectional test of their mild segmentation hypothesis with data including the U.S. and 9 emerging markets[7] and provide tentative support of their model. Based on Errunza and Losq (1985) model, Errunza, Losq and Padmanabhan (1992) extend the previous empirical test and investigate the structure of world capital markets by testing the competing hypothesis of integration, mild segmentation and segmentation for a group of emerging markets. Their results show that the world market is neither fully integrated nor completely segmented.

Using the consumption-based asset pricing model with data from the U.S. and 17 other countries from Jan. 1960 to Dec. 1985, Wheatly (1988) tests international capital market integration. He cannot reject the joint hypothesis that equity markets are fully integrated and that the consumption-based International Asset Pricing Model holds.

Hietala (1989) tests an equilibrium model similar to those of Errunza and Losq (1985) and Eun and Janakiramanan (1986) using data from the Finnish stock market, in which the Finish law prohibited Finnish investors from investing in foreign securities until 1986 while simultaneously allowing foreign investors to own up to 20 % of the shares of certain Finnish companies. Hietala shows that there exists a foreign investment barrier in the Finnish market in the sense that the price premium for unrestricted stocks is higher or at least equal to the price premium for restricted stocks. In addition to the existence of a differential premium, Hietala also finds that the price premium is positively correlated with the firm size and the liquidity of the securities in the Finnish market.

A.3 Time-Varying World Market Integration

All the aforementioned studies do not test the change in the degree of market integration (segmentation) through time. However, since many types of investment barriers have been gradually removed over the past decades, it's reasonable to expect the degree of world market integration to be time varying.

Bekaert and Harvey (1995) measure the degree of integration using nonlinear regime-switching models. Their model econometrically combines the two polar specifications of full integration and complete segmentation to characterize the time-varying degree of integration for 12 emerging markets.[8] Such a time-varying integration measure is incorporated in their conditional mean return process as follows:

$$E_{t-1}[r_{i,t}] = \Phi_{i,t-1}\lambda_{t-1}Cov_{t-1}(r_{it}, r_{wt}) + (1-\Phi_{i,t-1})\lambda_{i,t-1}Var_{t-1}(r_{i,t})$$

where the parameter $\Phi_{i,t-1}$ $(0 \le \Phi_{i,t-1} \le 1)$ is the time-varying integration measure which measures the conditional level of integration of market i to the world market based on information up to time $t-1$, $E_{t-1}[r_{i,t}]$ is the conditionally expected excess return on securities in country i, and λ_{t-1} $(\lambda_{i,t-1})$ is the conditionally expected world(local) price of risk for time t. They use two different regime switching models to construct the time-varying integration measure $\Phi_{i,t-1}$: the standard Hamilton (1989, 1990) model with constant transition probabilities and its extension by Diebold, Lee and Weinbach (1994) and Gray (1996) to allow for time-varying transition probabilities. The test results show time-varying integration for a number of countries.

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[7] The nine emerging markets are Argentina(22), Brazil(18), chile(21), Greece(9), India(23), Korea(22), Mexico(21), Thailand(7) and Zimbabwe(10). The number of securities in the sample is in parentheses.

[8] The twelve emerging markets are Chile, Colombia, Greece, India, Jordan, Korea, Malaysia, Mexico, Nigeria, Taiwan, Thailand and Zimbabwe.

Interestingly, in contrast to general perceptions that markets are becoming more integrated, their results suggest that some countries are becoming less integrated with the world market.

While Bekaert and Harvey (1995) is assuming a unique risk factor of covariance, Hardouvelis, Malliaropulos and Priestley (1999) modify the framework of Bekaert and Harvey model to allow for multiple sources of risk. They add foreign exchange rate risk to remove the need of purchasing power parity assumption.

$$E_{t-1}[r_{i,t}] = \Phi_{i,t-1}\left(\lambda_{EU,t-1} Cov_{t-1}(r_{it}, r_{EU,t}) + \lambda_{C,t-1} Cov_{t-1}(r_{it}, r_{Ct})\right) + (1 - \Phi_{i,t-1})\lambda_{i,t-1} Var_{t-1}(r_{i,t})$$

where r_{EU} (r_C) is the excess return on the European Union (EU) stock market index (the currency), $\lambda_{EU,t-1}$, $\lambda_{C,t-1}$, and $\lambda_{i,t-1}$ are the price of EU market risk, currency risk, and local market risk respectively. By doing so, they estimate a conditional asset pricing model of European stock markets with a time-varying degree of integration to examine whether the convergence process of European economies toward EMU (Economic and Monetary Union) has led to increased integration of European stock markets. They find that the degree of integration is positively related to the probability of a country joining EMU and that integration increases substantially over time.

Barriers can take many forms and the mere existence of such barriers does not necessarily segment the local markets from the world capital market. Errunza, Hogan and Hung (1999) also show that it is possible to mimic the foreign market index returns with portfolios of domestically traded assets which implies that domestic investors do not necessarily need to invest in foreign markets to get international diversification benefits. In other words, the international diversification benefits can be realized through home-made international diversification with only claims on foreign assets that traded in the home-market.

As we see, the degree of world market integration can be affected not only by barriers to international investment, but also by the availability of substitute assets such as country funds and depository receipts, which enable domestic investors to avoid the existing barriers.

Given the importance of substitute assets in the world market integration, Carrieri, Errunza and Hogan (2000) focus on the availability of substitute assets, that could effectively integrate world markets even though explicit barriers to international investment are existent. The "integration index (II)" based on the Errunza and Losq (1985) asset pricing model is:

$$II = 1 - \frac{Var[R_l \mid \underline{R_e}]}{Var[R_l]}$$

where emerging market index and several diversification portfolios constructed with U.S. traded securities are used for R_l and $\underline{R_e}$ respectively in their paper. The integration index becomes zero when markets are completely segmented ($Var[R_l|\underline{R_e}]=Var[R_l]$) and it becomes 1 when markets are fully integrated ($Var[R_l|\underline{R_e}]=0$). They show that there exists increasing market integration through time and market integration has preceded the removal of explicit barriers in many cases, which is attributed to the market anticipation of country fund issuance and barrier removal. Carrieri, Errunza and Hogan also find that country funds have played a critical role in integrating financial markets in the presence of investment barriers.

In summary, it is well recognized that the structure of the international capital market has important implications in international finance theory and practice. Here we focused on the effect of barriers to international investment on investors' portfolio choice and asset pricing. Empirical studies in general support the theoretical prediction of mild segmentation models that world markets are neither completely segmented nor fully integrated. The degree to which the local market is integrated to the rest of world markets seems to be changing over time. This

time-varying feature can be attributed to two important factors: a progressive market liberalization to remove international investment barriers and a sequential introduction of substitute assets such as country funds and depository receipts, which effectively integrate the local market into the rest of world markets.

B. The Impact of Market Liberalization (Barriers)

In this section, we review studies investigating the impacts of market liberalization (barrier) on differential pricing mechanism, revaluation effect and the cost of capital, stock market volatility and its correlation with world market returns.

B.1. Differential Pricing Mechanism

There are several recent single country studies with a fine data set which investigate the impacts of international investment barriers on the stock price mechanism. Bailey and Jagtiani (1994) study the effects of investment barriers in the Thailand stock market, where domestic investors trade on the Main Board and foreign investors trade on the Alien board. They observe a significant price premium for Alien Board share price relative to that of Main Board share and find that this premium is correlated with the severity of foreign ownership limits, liquidity, and information availability. Bailey and Jagtiani argue that foreign investors prefer to invest in larger companies where there is greater financial disclosure and better information.

Domowitz, Glen and Madhavan (1997) examine the relationship between stock prices and market segmentation induced by foreign ownership restrictions in the Mexican market. Foreign ownership restrictions create market segmentation in the domestic equity market in the

sense that there exists an economically significant stock price premia for unrestricted shares relative to restricted ones. They also find that the price premium for unrestricted shares is positively related to foreign demand and is negatively related to the relative supply of unrestricted shares measured by the ratio of unrestricted to total shares outstanding. By contrast, a proxy for relative liquidity --the ratio of unrestricted to total trading volumes-- cannot explain the observed premia indicating that the premia are not the result of differential market liquidity.

Bailey, Chung and Kang (1999) study the impact of barriers to international capital flows with stock price data from 11 countries[9] including 8 emerging markets and 3 developed markets, where some shares are restricted to only domestic investors and otherwise identical shares are available to both domestic and foreign investors. Similar to Domowitz, Glen and Madhavan (1997) results, Bailey, Chung and Kang also observe large price premiums for unrestricted shares relative to matching restricted shares and find that premiums for unrestricted shares are positively correlated with foreign investor demand and information richness reflected in press coverage, country rating and firm size. Specifically, premiums are strongly positively correlated with market capitalization and the ratio of turnover in the unrestricted market to turnover in the restricted market. Bailey, Chung and Kang interpret the former relation as indicating that larger firms are more information-rich, therefore, more appealing to foreign investors and the latter relation as measuring relative liquidity in the unrestricted versus restricted markets.

[9] The eight emerging markets are China, Indonesia, Korea, Malaysia, Mexico, the Philippines, Taiwan and Thailand. Developed markets are Norway, Singapore and Switzerland.

B.2. Revaluation Effect and Cost of Capital

Based on the standard IAPMs, we would expect a decrease in the cost of capital after market liberalization. If we assume that market A is segmented from the world markets, the expected return (cost of capital) for firms in market A will be priced by the local market risk. If we assume that the market A becomes fully integrated after liberalization, the expected return would depend only on the world market risk. The general consensus is that the local price of risk is higher than the world price of risk and the securities are more correlated within a market than across markets (see, for example Bekaert and Harvey (2000), Stulz (1999) and Errunza and Miller (2000)). Therefore, we would expect the expected return (cost of capital) to decrease and the subsequent stock price to increase (revaluation effect) after market liberalization.[10]

The relationship between the expected return (cost of capital) and the realized return before, during and after market liberalization is well described by Errunza and Miller (2000) as follows:

- High equilibrium expected returns before liberalization indicating the high cost of capital.
- Large positive returns during the liberalization period, reflecting price increases as the cost of capital falls (the *revaluation effect*). An alternative argument to explain this revaluation effect is that foreign portfolio investors will increase the demand for domestic securities which will subsequently increase the stock price (Bailey and Jagitiani (1994) and Bailey, Chung and Kang (1999)).

[10] We can think of this negative relationship using a simple pricing model assuming that the current stock price is the future cash flows discounted by the cost of capital.

- Normal equilibrium expected returns after liberalization, with the difference in the before- versus the after-liberalization period returns (*the change in the cost of capital*) related to the diversification potential of the firm.

Alexander Eun and Janakiramanan (1988) study price reactions for 34 firms from six non-U.S. countries[11] that are listed on U.S. major stock exchanges (NYSE, AMEX or NASDAQ) between 1962 and 1982. They find that the cumulative abnormal returns (CARs) for non-Canadian firms increase by 17 % in the two years before listing and fall by 33 % over the three years following listing. The CARs for Canadian firms are considerably smaller which they interpret as evidence for the market integration between Canada and the U.S.

While Bekaert and Harvey (2000), Henry (2000) and Kim and Singal (2000) examine this issue at the market-level, Errunza and Miller (2000) investigate the impact on the cost of capital for 126 ADR issuing firms from 32 countries. Kim and Singal (2000) investigate the effects of market liberalization on excess returns using 15 emerging market indices and find that stock returns increase immediately after market liberalization but fall afterwards. They attribute the immediate increase to the increased demand from foreign investors and the subsequent falls to the lower expected return required by foreign investors. As Kim and Singal acknowledge, however, their study is limited to the extent that it does not control for other potential confounding effects of concurrent economic reforms. For example, market liberalization is accompanied by many other reform policies. Thus, the observed changes after market liberalization may not be due to market liberalization but could be attributed to other contemporaneous events.

[11] They are Australia (7), Canada (13), Denmark (1), Japan (10), South Africa (2), United Kingdom (1). The number of securities in the sample is in parentheses.

Bekaert and Harvey (2000) investigate the impact of various market liberalizations on the cost of capital by examining the changes in stock returns and dividend yields pre (36 to 7 months prior to) and post (4 to 34 months after) market liberalizations. They exclude 9 months between pre- and post-period to remove any errors in the dating of market liberalizations. After controlling for any potentially confounding effects,[12] their empirical results show that dividend yields, which they consider as a superior proxy to stock returns to measure the cost of capital, decrease from 5 to 75 basis points depending on the specification they use, indicating that the cost of capital decreases after market liberalizations. On the other hand, the realized returns provide mixed results depending on the market liberalization specification.

Henry (2000) focuses on the changes in the stock price during stock market liberalization (revaluation effect). He examines 12 emerging markets[13] using an event study with an 8-month window leading up to and including the implementation of their initial stock market liberalization and finds that stock markets experience statistically and economically significant abnormal returns of 4.7% per month and a cumulative abnormal return of 37.6%. Henry (1999) constructs a data set of economic policy reforms for these 12 emerging markets and uses these time series of economic policy changes with other macroeconomic fundamentals to control explicitly for any potential confounding effects.[14] After controlling for these potential effects, the impact of market liberalization falls to the average abnormal return

[12] Their controlling variables fall into 4 categories: asset concentration (the number of stocks in each of IFCG index, a modified Herfindahl index of concentration), stock market development/economic integration (market capitalization relative to the country's GDP, the size of the traded sector relative to GDP, the cross-sectional standard deviation of the stock returns within each index), microstructure effects (the cross-sectional standard deviation of the stock returns within each index), macroeconomic influences and political risk (the standard deviation of exchange rate changes and the average inflation rates, Institutional Investor country credit rating).

[13] The 12 emerging markets are 6 Latin American countries (Argentina, Brazil, Chile, Mexico, Colombia, and Venezuela) and 6 Asian countries (India, Korea, Malaysia, the Philippines, Taiwan and Thailand).

[14] These controlling variables are: world stock returns, concurrent economic reforms (macroeconomic stabilization, traded liberalization, privatization and the easing of exchange controls), and macroeconomic

of 3.3% per month, but it is still statistically and economically significant. Assuming constant expected future cash flows, he interprets this increase in stock price as a decrease in the cost of capital after market liberalization.

As we mentioned earlier, liberalization at the market-level occurs over a reasonably long period of time and usually follows or is accompanied by other political, economic, or social reforms, which might confound the market liberalization effect. Therefore, to assess the pure impact of market liberalization, it is important to pay attention to other events, which concurrently take place in the country.

While aforementioned studies attempt to solve this problem by controlling for such potentially confounding events, Errunza and Miller (2000) take a different approach and analyze changes in the cost of capital around market liberalization at the firm level. Specifically, they study the impact of the introduction of American Depositary Receipts (ADRs) using a total of 126 firms from 32 countries including 41 ADRs from 11 emerging markets.[15] Methodologically, they use the matched sample long-horizon approach to capture the firm-specific revaluation and cost of capital effects around market liberalization. By selecting a size and country control match firm for each sample firm for benchmarking, the potential problems of confounding effects are presumably removed. To measure long-run stock price performance, Errunza and Miller apply buy-and-hold returns, suggested by Conrad and Kaul (1993) and Barber and Lyon (1996,1998). Their results provide strong evidence that market liberalization decreases the cost of equity capital: significant positive returns (revaluation effect) around the announcement of ADR offerings and 42.2% decrease in long-

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fundamentals (domestic industrial production, the U.S. Treasury bill rate, domestic inflation, the real exchange rate, and a political stability index).

[15] They are Chile (10), India (8), Korea (5), Malaysia (2), Mexico (5), Philippines (1), Portugal (1), Taiwan (6), Thailand (1), Turkey (1), and Venezuela (1). The number of securities in the sample is in parentheses.

run realized returns. Both these results hold for dividend yields, which they perform to check the robustness of their results.

B.3. Stock Market Volatility

It has been claimed that since foreign portfolio investment is mobile compared to direct investment, foreign portfolio investments increase volatility of the domestic stock markets. Policy makers have become increasingly concerned about the impact of these foreign portfolio investments on the volatility of local equity returns. In recent years, many attempts have been made to address this question.

Tesar and Warner (1995) examine whether U.S. equity flows to emerging stock markets from 1978 to 1991 contribute to stock return volatility. They simply plot volume of U.S. transactions in the foreign equity market against two market stability measures of local turnover ratio and standard deviation of excess returns and find no relationship between them. Bekaert (1995) studies whether volatility in emerging markets is related to a number of measures of market openness such as the number of country funds and cross-listed securities, foreign ownership restriction measured by the ratio of the IFC Investable index to IFC Global index. Based on the rank correlation results, he concludes no significant relationship between the openness of a market and stock return volatility. Using monthly data ranging from Jan. 1981 to Dec. 1996 from 17 emerging markets, Errunza (2000) plots market return volatility before and after market liberalization with four different liberalization dates from Bekaert and Harvey (2000) and finds a slight decrease in unconditional volatility after liberalization. All these studies are based on relatively simple analysis.

There are more detailed studies. For example, Bekaert and Harvey (1997) estimate a time-series model for volatility for each country with the conditional mean and the conditional variance based on both world and local information to capture changes in the degree of market integration. Simple plot of average conditional variance for two years before against that of after market liberalization shows a reduction in stock return volatility after market opening: only one increase in stock return volatility (Pakistan) out of 17 countries. Particularly dramatic decreases in conditional volatility are found for countries like Brazil, Mexico, Taiwan and Portugal. Even after controlling for all of the potential influence on the time-series and cross-section of volatility, they find the capital market liberalizations decrease volatility in emerging markets.

Applying the same estimation method as Bekaert and Harvey (1997), but with longer sample period Bekaert and Harvey (2000) obtain series of conditional volatility for emerging markets and examine the impact of market liberalization on return volatility by running the pooled time-series and cross-sectional regression. They find that volatility increases after major capital market liberalization. After controlling for various financial and macroeconomic development indicators, these increased volatility is offset by a considerable decrease in volatility attributed to the financial and macroeconomic development.

De Santis and Imrohoroglu (1997) apply a GARCH (generalized autoregressive conditional heteroskedasticity) model to fit volatility country by country. Because of data constraints they have to limit themselves to only the 5 countries of India, Taiwan, Argentina, Brazil and Colombia out of the original 15 emerging markets. Using the weekly series from the last week of Dec. 1988 to the second week of May 1996, for a total of 384 observations, they

find no supportive evidence of a systematic effect of market liberalization on stock return volatility.

Kim and Singal (2000) use ARCH and GARCH models to fit the volatilities for emerging markets. They find mixed results: a significant reduction in volatility for some countries and a significant increase for others. Overall, aggregated across all countries, there is a marginally significant decrease in volatility after the market opening to foreign investors. They conclude that contrary to the popular belief, foreign investors do not add to stock return volatility. The bottom line of these studies is that the claim that liberalization increases volatility is not supported by empirical evidence.

B.4. Correlation with world market return

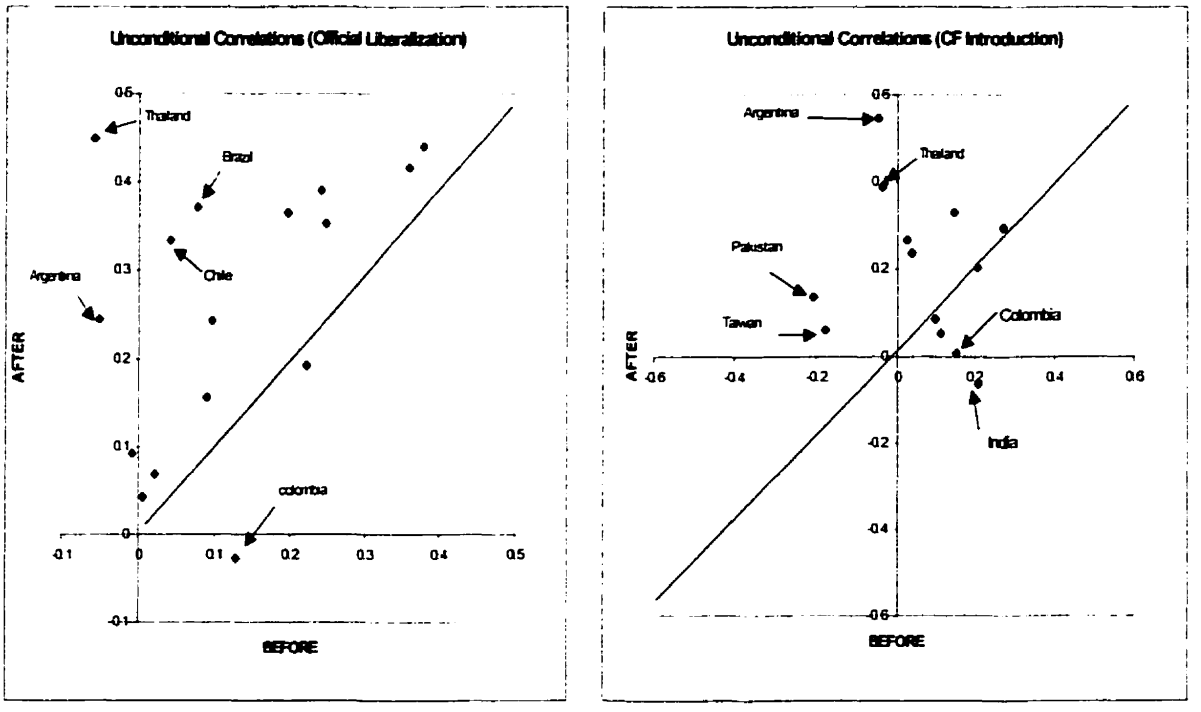
It is generally accepted that the correlation coefficient of market returns can not be used as a direct measure of market integration. For example, Errunza, Hogan and Hung (1999) show that using correlations of market-wide index return as a measure of market integration would underestimate the actual degree of integration given the ability of investors to achieve "home-made" diversification.[16] It is, however, believed that the gradual removal of barriers to international investment as well as political and economic integration could lead to a progressive increase in the international correlation of financial markets. For example, Solnik et al. (1996) attribute the increase of correlation coefficient of British market with the U.S.

[16] They distinguish the difference between international diversification and home-made international diversification as follows: international diversification has involved foreign assets that only trade abroad and home-made international diversification includes claims on foreign assets that trade in the home market. Since their analysis is based on the viewpoint of U.S. investors, the home-made diversification portfolios are constructed by using U.S. market indices, 12 U.S. industry portfolios, 30 multinational corporation (MNC) stocks, closed-end country funds (CFs) and American Depository Receipts (ADRs). They examine whether portfolios of domestically traded securities can mimic foreign indices so that investment in assets that trade only abroad is not necessary to exhaust the gains from international diversification.

market to the deregulation and opening of the British economy initiated by the former Prime Minister Thatcher. Longin and Solnik (1995) study the correlation of monthly excess returns for 7 major countries and find that the cross-country covariance and correlation are changing over time. They report increased correlations among 7 markets over the past 30 years. As they admit, with the correlation alone we cannot conclude whether the market is integrated to the world market and an IAPM must be explicitly applied to test the market integration. Even though correlation coefficient of market returns is not a direct measure of market integration, it is often used to investigate the interdependence between markets. Actually, the low correlation between home and foreign market returns is the source of much of the gains to international diversification.

Simple unconditional correlations of a group of emerging markets with Morgan Stanley Corporation International (MSCI) world index (The World Index) before and after market liberalization are plotted below. Two liberalization dates are applied: "official liberalization date" and Country Fund (CF) introduction date from Bekaert and Harvey (2000). Given the importance of substitute availability, CFs introduction dates are also used.

With official liberalization date, 14 out of 16 countries show increased correlatons and 2 countries show decreases with one marginal decrease. In case of CF introduction date, among 13 countries we observe 7 increases, 3 no changes, 1 marginal decrease and 2 decreases.



After controlling for the potentially confounding effects from other factors which might affect correlations, Bekaert and Harvey (2000) also analyze the behavior of emerging market correlation with world market returns around liberalization. They find that in all tests correlations increase and countries which start out with low correlations experience much higher correlation increases. For example, from pre to post for their official liberalization date, correlation increases by 4.2%, which is significant at the 1% level. They argue, however, the increased correlation is not large enough to deter any foreign investors seeking foreign diversification benefits.

In this section, we have looked at the impact of market liberalization (barriers) on various aspects: differential pricing mechanism, revaluation effect, cost of capital, stock market volatility and correlation with world market return. Empirical studies on the impacts of these barriers support the theoretical prediction of a differential pricing mechanism induced by such barriers. The unrestricted securities are priced with a premium on the restricted ones. The

premium for unrestricted stocks is positively related to foreign investment demand and information richness indicating that foreign investors prefer information-rich securities and drive up domestic stock prices. As the standard IAPMs predict, empirical studies show significant positive returns around market liberalization (revaluation effect) and decreases in the cost of capital after market liberalization. Contrary to general concerns, the claim that market liberalization increases stock market volatility is not supported by empirical evidences. In general, the empirical results show a small increase in correlation with world market returns after market liberalization.

C. Implicit Barrier of Information Asymmetry in International Investment

Market segmentation can arise from barriers to international investment. In general these barriers can be classified into two broad categories of explicit and implicit barriers: Explicit barriers arise from the different legal status of domestic and foreign investors. They are directly observable and quantifiable, for example foreign ownership restriction and discriminatory taxation. Implicit barriers are not directly observable which may arise from the lack of information, political risk or fear of expropriation.

In this section, the importance of implicit barrier of lack of information will be discussed in the context of Merton's (1987) equilibrium model with incomplete information and "home bias" literature in international finance, attempting to explain the unusually low level of international investments despite the well known international diversification benefits.

Since international financial markets do not always move together, investors can benefit from diversifying their portfolios in several countries. The benefits of this international

diversification have long been recognized. In spite of these potential benefits, one of the most puzzling features of international portfolio investment is the extent to which equity portfolios are concentrated in the domestic equity markets of the investors. This phenomenon is the so-called "home bias" in international equity portfolio investment.[17]

Even though barriers to international investment have been removed dramatically, foreign ownership is still much smaller than one would expect in the absence of such barriers. Several studies have attempted to explain this phenomenon in international portfolio investment, but so far no explanation seems to be generally accepted.

French and Poterba (1991) investigate two broad explanations for home bias puzzle. First, institutional factors such as taxes, transaction costs, investment restrictions may reduce returns from investing abroad or they may explicitly limit investors' ability to hold foreign stocks. However, they show that the level of international portfolio investment is well below that which can be explained by these institutional constraints. Second, they suggest investment behavior as an explanation. One possibility is that the return expectations vary systematically across groups of investors. For example, Japanese investors may be more optimistic than their U.S. counterparts with respect to both Japan and U.S. markets and relatively more optimistic about their home market. Another behavioral explanation is the different perception of risk caused by information asymmetry. For example, foreign investors add some extra risk to their foreign investments because they know less about foreign markets, institutions and firms. Along the same line, Stulz (1997) suggests that it is reasonable to assume that domestic investors are in general better informed about their local securities than foreign investors are.

[17] For a more comprehensive review of the home-bias literature see Lewis (1999).

Taking the Adler and Dumas' (1983) equilibrium model with stochastic inflation, Cooper and Kaplanis (1994) test whether the home bias is caused by investors' motivation for hedging inflation risk. They find that for the empirical evidence to be consistent with this motive the investors' level of risk aversion should be unrealistically low and equity returns are negatively correlated with domestic inflation. With conventional levels of risk aversion, the biased structure of international portfolio investment can not be explained by this investors' inflation risk hedging motivation, even if observable costs such as withholding taxes to international investment are included. They suggest an information asymmetry factor as an alternative explanation for the home bias.

Kang and Stulz (1997) investigate the foreign equity ownership in Japanese firms using a disaggregated firm-level data rather than market-level data. In general, they find foreign investors hold more shares of large-size firms, manufacturing firms, and firms with good accounting performance and low leverage. They confirm the existence of a substantial home bias in Japan. In addition to this home bias at the market-level, they also show that foreign ownership is consistently and strongly biased against small firms, even when the expected returns of those assets are higher than those of big-size firms. This is inconsistent with the assumption in the home-bias literature that foreign investors face the same kind and degree of barriers among securities in the same market. Under this assumption, investors are expected to invest less, but equally among the securities in non-resident markets. Kang and Stulz seek an explanation for this firm size bias from information availability, that is, since investors know more about large firms than small firms, they invest more in these more familiar companies which is consistent with Merton's (1987) hypothesis below.

Motivated by the fact that the portfolio held by investors contain only a small fraction of securities available, Merton (1987) constructs an equilibrium model assuming that investors use only securities they know about when constructing portfolios. He emphasizes the importance of information asymmetry in investment by noting that *"concern about asymmetric information among investors could be important reason why some institutional and individual investors do not invest at all in certain securities, such as shares in relatively small firms with few stockholders."* (P.488)

His equilibrium model with incomplete-information states that:

$$E(r_i) = \beta_i E(r_m) + \lambda_i - \beta_i \lambda_m$$

where λ_i is the aggregated shadow cost of incomplete information for security i ($=\Sigma\lambda^j_i/N$, λ^j_i is the shadow cost of investor j for security i and $j=1,2,...,N$), λ_m is the weighted average shadow cost across all securities ($=\Sigma\lambda_i * x_i$, x_i:the fraction of market portfolio invested in security i). The aggregated shadow cost for security i is given as:

$$\lambda_i = \delta\sigma_i^2\omega_i(1-q_i)/q_i$$

where δ is the aggregate risk aversion coefficient, σ_i^2 is the variance of stock i, ω_i is the relative market value of the firm and q_i is the size of the firm's investor base relative to the total number of investors ($=N_i/N$).

When all the securities are known to all the investors, that is, under the complete information assumption, the additional term λ_i-$\beta_i\lambda_m$ becomes zero and the equilibrium model reduces to the standard CAPM. Unless this information-related additional term is zero, the market portfolio is not mean-variance efficient. It shows that the cost of capital for firms with a smaller investor base is higher than that of firms with bigger investor base due to less efficient risk sharing.

Recently, Lewis (1999) discusses two possible explanations for the home bias observed in international equity markets. One explanation is that home equities provide a better hedge for country-specific risks. Three sources of country specific-risks are: first, domestic inflation; second, nontradable assets, especially human capital; and third, the existence of substitute assets such as Multinational Corporations (MNCs). However, none of the explanations seem to explain the home bias towards domestic assets. In some cases, foreign assets hedge better against country-specific risks. The second explanation is that the benefits from international diversification are not big enough to compensate for the costs involved. The costs of international diversification may include barriers such as government restrictions and information acquisition costs. Lewis argues that the costs induced by government restrictions do not seem a plausible explanation even without considering the fact that the barriers imposed by governments have been declining through time. Finally, she suggests information cost as one of the most possible explanation for the home bias puzzle.

In this section we discussed the importance of informational aspect in international finance. In spite of the benefits from international portfolio diversification, the so-called "home bias" in international equity portfolio investment is a well-known phenomenon. Several attempts have been made to explain this phenomenon, but so far no explanation seems to be generally accepted. Information asymmetry is most likely to succeed in explaining the bias among all suggested variables. In addition to the home bias at the market-level, there seems to be a firm level bias, that is, foreign portfolio investors prefer information-rich firms, reflected in firm size and liquidity.

D. Summary

It is well recognized that the structure of the international capital market has important implications for international finance theory and practice. Here we focus on the effect of barriers to international investment on investors' portfolio choice and asset pricing. Empirical studies in general support the theoretical prediction of mild segmentation models that world markets are neither completely segmented nor fully integrated. The degree to which the local market is integrated to the rest of world markets seems to be changing over time.

Empirical studies on the impacts of these barriers support the theoretical prediction that there exists a differential pricing mechanism induced by such barriers. The unrestricted securities are priced with a premium on the restricted ones. The premium for unrestricted stocks seems to be related positively to foreign investment demand and information richness, indicating that foreign investors prefer information-rich securities and drive up domestic stock prices. As the standard IAPMs predict, the cost of capital decreases after market liberalization: a significant positive return around market liberalization (revaluation effect) and a decrease in the proxy for the cost of capital for example, long run realized returns or dividend yields. Contrary to general concerns, the claim that market liberalization increases stock market volatility is not supported by empirical evidence. In general, the empirical results show a small increase in emerging market correlation with world market return after liberalization.

Most of the previous empirical studies use market-level indices to investigate these liberalization effects, so the potential problems aforementioned in the introduction are embedded in these studies. Hence, the purpose of this study is to investigate the impact of stock market liberalization at a more disaggregated firm level. Using firm-level data as well as

market-level data, we will investigate the impact of stock market liberalization on revaluation effect, cost of capital, stock market volatility and correlation with world market return in the following chapters.

Chapter III. Methodological Issues and Data

We introduce our general econometric framework and data, which we apply to all the four tests: revaluation effect, cost of capital, stock market volatility and correlation with world market return. In this chapter we discuss our econometric framework in general and more detailed methodological explanations for each test will be described in later chapters.

A. General Econometric Framework

Our analysis is based on the three estimation results, depending on what level of data set is used (market-level data vs. firm-level data) and whether firm-specific characteristics are considered or not (unconditional vs. conditional estimate). Panel regression with weighted least squares (WLS) estimation is used, and statistical inference is based on heteroskedasticity-consistent (White) standard errors in all our estimations.

A.1. Benchmark Estimate with Market Indices

In order to compare our firm-specific estimates of interest variables from emerging market liberalization to the existing literatures, which use country indices, we first estimate panel regression below using the IFCG indices from EMDB of IFC[18] and define this regression as a benchmark estimate:

$$DV_{it}=\alpha_i+\gamma^*Lib_{it}+\varepsilon_{it}$$

[18] More discussions are in section E. Data of this chapter.

The dependent variable DV_{it} is one of our four interest variables in country i at time t. The intercept α_i allows for a country-specific fixed effect. The liberalization coefficient γ measures average change in the level of DV across all countries. Lib_{it} is a liberalization dummy variable[19] for country i at time t and ε_{it} is an error term. We are interested in the parameter γ being significantly different from zero.

A.2. Firm-specific Unconditional Estimate

As was mentioned earlier, while most of previous studies are based on the market-level data, we focus more on firm-level data in order to explain how the differential foreign investors' demand for local securities affects the changes in our interest variables.

We compare the previous result from the benchmark estimate with the result from following panel regression, which we define as a firm-specific unconditional estimate. We call this an unconditional estimate because so far we do not consider any firm-specific characteristics. The firm-specific unconditional estimate should be similar to the one obtained from a benchmark estimate using the IFCG indices since the firms in the sample are representative of the country indices. Note, however, here they can not be expected to be identical, as firms are dropping in and out of the index, as the IFCG index is value-weighted, and as we allow firm-specific fixed effects.

$$DV_{sit}=\alpha_{si}+\gamma^{*}Lib_{it}+\varepsilon_{sit}$$

The dependent variable DV_{sit} is one of the four interest variables of firm s in country i at time t. The intercept α_{si} allows for a firm-specific fixed effect for a firm s in country i. The liberalization coefficient γ measures average change in the level of DV across all the individual

[19] Issues of constructing test windows will be discussed in section C. Defining Test Windows of this chapter.

firms. Lib_{it} is a liberalization dummy variable for country i at time t and ε_{sit} is an error term for firm s in country i at time t.

A.3. Firm-specific Conditional Estimate

The key contribution of this study to the existing literature is to assess the extent of which the dependent variable (our interest variable) is the function of foreign demand, which is proxied by firm size. We report two conditional estimates below. These regressions are defined as firm-specific conditional estimates.

$$DV_{sit}=\alpha_{si}+\gamma^{*}Lib_{it}+\delta^{*}WRank(size_{si})^{*}Lib_{it}+\varepsilon_{sit}$$

$$DV_{sit}=\alpha_{si}+\gamma^{*}Lib_{it}+\delta^{*}DRank(size_{si})^{*}Lib_{it}+\varepsilon_{sit}$$

Due to the extreme cross-sectional variation in firm size, which we will see in section E. Data in this chapter, we use a rank-based measure of size. Rank-based size is calculated in one of two ways. First, we measure the rank of a firm in relation to all firms in the World (12 emerging markets) on a scale from 0 to 1, with 1 corresponding to the largest firm in the sample based on market capitalization. This variable is denoted, $WRank(size_{si})$. We also calculate country-by-county or domestic rank size measure, and denote it $DRank(size_{si})$. The Firm size itself is measured as the average market capitalization of each firm during the eight months leading up to and including the liberalization date month. This 8-month period is also used as the period on which the revaluation effect test is performed. More information about the choice of this period will be discussed in detail in section C of this chapter, where we define test windows.

Notice that the change in the level of *DV* is not simply γ, but rather $\gamma + \delta WRank(size_{si})$ in the case of world rank size measure, and $\gamma + \delta DRank(size_{si})$ in the case of domestic rank size measure, and both will thus be (nonlinear) functions of firm size.

A.4. Controlling for World market movements

Our *DVs*, which we will see in the next section, could be affected by world market movements. Hence we apply the changes in world market returns and volatility to the previous three estimations to control for any confounding effects,

$$DV_{it} = \alpha_i + \gamma * Lib_{it} + \lambda * WRet_t \text{ (or } WVol_t) + \varepsilon_{it.}$$

$$DV_{sit} = \alpha_{si} + \gamma * Lib_{it} + \lambda * WRet_{it} \text{ (or } WVol_t) + \varepsilon_{sit}$$

$$DV_{sit} = \alpha_{si} + \gamma * Lib_{it} + \delta * WRank(size_{si}) * Lib_{it} + \lambda * WRet_t \text{ (or } WVol_t) + \varepsilon_{sit}$$

$$DV_{sit} = \alpha_{si} + \gamma * Lib_{it} + \delta * DRank(size_{si}) * Lib_{it} + \lambda * WRet_t \text{ (or } WVol_t) + \varepsilon_{sit}$$

where $WRet_t$ ($WVol_t$)is World market return (volatility) at time *t*.

More detailed discussions about controlling world market movements will be presented later.

B. Dependent Variable (*DV*)

We use three different measures to investigate the change in our four variables of interest. By plugging these variables of interest into our general econometric framework as dependent variables (*DVs*), we obtain the estimates for the stock market liberalization impacts on those interest variables.

B.1. Revaluation effect and Cost of Capital

In order to test both the revaluation effect and the changes in the cost of capital, we use continuously compounded returns, that is, the natural log of price ratio of firm s in country i ($=ln(P_{sit}/P_{sit-1})$) for firm-specific estimates with firm level data and that of market index in country i ($=ln(P_{it}/P_{it-1})$) for benchmark estimate with the IFCG indices.

Some authors also use dividend yields for the cost of capital analysis. For example, Bekaert and Harvey (2000) believe the changes in dividend yields to be a better proxy for the cost of capital. Errunza and Miller (2000) also use dividend yields to check the robustness of their results obtained from using realized returns. However, there are some potential problems using dividend yields as the proxy for the cost of capital. For example, dividend yields may decrease not because the cost of capital decreases, but because the firm decides to distribute smaller dividends and to keep them for future growth opportunity brought by market liberalization.[20]

The realized return is of course not a flawless proxy to measure expected return (the cost of capital). The relationship between the expected return (cost of capital) and the realized return before, during and after market liberalization is well described in Errunza and Miller (2000) as follows:

- High equilibrium expected returns before liberalization indicating the high cost of capital.
- Large positive returns during the liberalization period, reflecting price increases as the cost of capital falls (the *revaluation effect*).

[20] For more detailed caveats related to dividend yields used as a proxy for the cost of capital, see Bekaert and Harvey (2000).

- Normal equilibrium expected returns after liberalization, with the difference in the before- versus the after-liberalization period returns (*the change in the cost of capital*) related to the diversification potential of the firm.

B.2. Stock market Volatility and its Correlation with world market return

Volatility itself is the log of realized standard deviation, estimated using squares of the monthly returns to construct an annual variance. Following French, Schwert and Stambaugh (1987) and Schwert (1989), who primarily rely on daily return observations to construct monthly realized stock volatilities, we estimate the yearly standard deviation of stock returns using the monthly returns in that year. This is a model-free estimation in the sense that we do not impose any parametric model to estimate variances. Recently this "realized" volatility measure has received revived attention. For example, Andersen et al. (2000) produce daily volatilities from intradaily data on the prices of large individual stocks and Campbell et al. (2000) construct a monthly variance using daily data within that month.

Campbell et al. (2000) note that "Multivariate volatility models are notoriously complicated and difficult to estimate. Furthermore, while the choice of a parametric model may be essential for volatility forecasting, it is less important for describing historical movements in volatility because all models tend to produce historical fitted volatilities that move closely together. The reason for this was first given by Merton (1980) and was elaborated by Nelson (1992): with sufficiently high-frequency data, volatility can be estimated arbitrarily accurately over an arbitrarily short time interval."

The first step in estimating our conditional volatility is to specify a mean-generating model. Given the existing empirical evidence, financial asset returns at the market and

portfolio level seem to be predictable to some degree (see Harvey (1991), Ferson and Harvey (1993) and Campbell, Lo and Mackinlay (1997) for developed markets and Bekaert (1995) and Harvey (1995) for developing markets). However, the return predictability is less clear at the individual firm level, in other words, the individual stock returns are closely related to random walk processes (see Campbell, Lo and Mackinlay (1997)).

The conditional mean return is assumed either to be constant over time or to follow autoregressive processes ($R_{it}=E_{t-1}[R_{it}]+e_{it}$, where either $E_{t-1}[R_{it}]=C+e_{it}$ or $E_{t-1}[R_{it}]=\alpha_i+\Sigma_j\beta^j R_{it-j}+e_{it}$). The return autocorrelation is usually attributed to the non-synchronous trading of securities (see Fisher(1966) and Scholes and Williams (1977)). Because of this autocorrelation, French, Schwert and Stambaugh (1987) estimate the variance of the monthly return as the sum of the squared daily returns plus twice the sum of the products of adjacent returns as follows:

$$\hat{\sigma}_{mt}^2 = \sum_{i=1}^{N_t} r_{it}^2 + 2\sum_{i=1}^{N_t-1} r_{it} r_{i-1,t}$$

where there are N_t daily returns r_{it} in month t. Notice they do not subtract the sample mean from each daily return.

Since we use monthly data, it is less likely to observe non-synchronous trading problems. However, since our study is based on emerging markets where the possibility of non-synchronous trading problem is much higher than in developed markets, we would better check the return autoregressiveness. We use Schwarz Information Criterion (SIC) to obtain the best model for the conditional mean return process. The 232 firms out of 305 individual firms, which amount to 76% of all the firms, are best fitted with constant mean return process AR(0). The whole test results for all the firms are attached in the end as Appendix A.

	AR(0)	AR(1)	AR(2)	AR(3)	AR(4)	AR(5)	AR(6)	AR(7)	AR(8)	AR(9)	AR (10)	AR (11)	AR (12)	Total
No. of firms	232	51	6	1	4	1	2	2	0	2	0	2	2	305
%	76	17	2	0	1	0	1	1	0	1	0	1	1	100

For simplicity, instead of applying the best model suggested by SIC for each firm's return series, we use a dominant process of constant mean return process for all the firms. The annual mean for firm s in country i at year t is first estimated as,

$$\mu_{sit} = \frac{1}{12}\sum_{\tau=1}^{12} r_{sit,\tau}$$

where μ_{sit} is the estimated average return of firm s in country i for year t and $r_{sit,\tau}$ is the monthly return of firm s in country i at month τ within the year t.

Then the annual realized volatility for firm s in country i at year t is estimated as the square root of the sum of squared monthly deviations from the estimated annual mean below.

$$\sigma_{sit} = \sqrt{\sum_{\tau=1}^{12}(r_{sit,\tau} - \mu_{sit})^2}$$

This estimation is the same as Schwert (1989) except that he uses daily squared mean-adjusted returns to construct the monthly volatility, whereas we construct yearly volatility using monthly squared mean-adjusted returns.

The annual realized correlation with World market return (MSCI World index) is similarly calculated from monthly returns as,

$$CR_{sit} = \frac{\left[\sum_{\tau=1}^{12}(r_{sit,\tau} - \mu_{sit})(r_{wmt,\tau} - \mu_{wmt})\right]}{\sigma_{sit}\sigma_{wmt}}$$

In order to control for effects arising from changes in the world market volatility, we re-estimate the volatility and correlation regressions as follows:

$$V_{it}(CR_{it}) = \alpha_i + \gamma PostLib_{it} + \lambda WVol_t + \varepsilon_{it}$$

$$V_{sit}(CR_{sit}) = \alpha_{si} + \gamma PostLib_{it} + \lambda WVol_t + \varepsilon_{sit}$$

$$V_{sit}(CR_{sit}) = \alpha_{si} + \gamma PostLib_{it} + \delta WRank(size_{si})PostLib_{it} + \lambda WVol_t + \varepsilon_{sit}$$

$$V_{sit}(CR_{sit}) = \alpha_{si} + \gamma PostLib_{it} + \delta DRank(size_{si})PostLib_{it} + \lambda WVol_t + \varepsilon_{sit}$$

where $WVol_t$ is the volatility of World market return at time t.

C. Defining Test Windows

One of the most critical issues in event study is to identify accurate test windows. We have two different sets of test windows: one for the revaluation effect test focusing on the abnormal returns over the event window of 8 months leading up to and including liberalization date[21] and the other for the rest of our tests (changes in cost of capital, volatility and correlation with world market return). The latter use symmetric test windows of either 2 or 3 years preceding and following the 8-month period, used for revaluation effect test.

C.1. Revaluation Effect

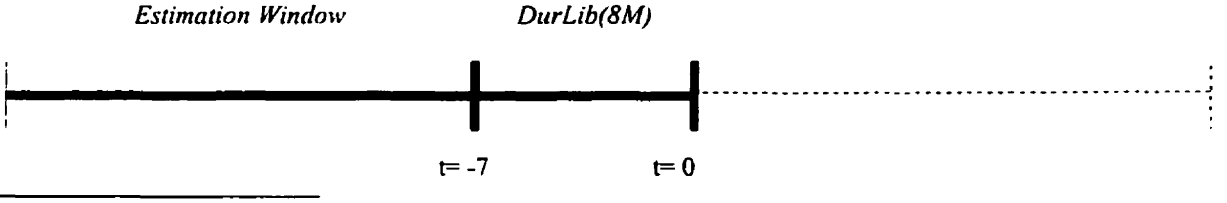
Since stock market liberalization is not a one-shot event, but rather a gradual process, it's not an easy task to pin down the exact liberalization date. And the reporting dates represent only the most significant liberalization of the market. There are also two liberalization dates: the actual opening (implementation) dates and the announcement dates. Since the announcement is

[21] We will discuss in the next section about market liberalization date.

typically made before the actual opening and the stock markets are likely to react to the announcement, caution should be exercised in applying these dates. In addition to the gap between announcement and implementation date, we have one more thing to consider, that is the possibility of information leakage. Exemplifying the case of Indian ADRs, Errunza and Miller (2000) argue that in practice there is likely to be information dissemination (leakage) prior to any official announcement. [22]

We use the 8-month event window ranging from t=-7 to liberalization date t=0 for revaluation effect test. Henry (2000) uses the same event window. We define this 8-month period as *DurLib* period. This 8-month window will mitigate any possible problems stemming from errors in the dating of the liberalization by covering well the effects from announcement and information leakage. [23]

The test windows are graphically shown below. The normal level of return is calculated on the basis of estimation window ranging from the earliest data available to the 7th month before stock market liberalization (t=-7) with t=0 being the stock market liberalization date. The monthly abnormal return is the difference between the monthly average return over the estimation window and that over the 8-month *DurLib* period. For example, in the case of Argentina, the normal level of return is calculated based on the period from Jan. 1976 to Mar. 1989 and the abnormal level of return is based on the period from April 1989 to Nov. 1989.



[22] Errunza and Miller (2000) use the 6-month period preceding the announcement as an event window and this is similar to that of Bekaert and Harvey (2000), in which 6 months prior to and 3 months after market liberalization periods are used.

[23] The same argument is given in Bekaert and Harvey (2000).

It is worth noting that our data period is different from that of Henry (2000), which is closely related to our revaluation effect test. His normal level of realized return is based on the whole period (either from Jan. 1976 to Dec. 1994 or from Jan. 1985 to Dec. 1994 depending on the data availability for each country index) excluding 8-month liberalization period. However, we do not include data following market liberalization date. Since we expect the cost of capital, represented by realized returns, to fall after market liberalization, if we include return data after market liberalization, we might overestimate the revaluation effect. The results of Henry (2000) could overestimate the revaluation effect because of his underestimated normal level of returns, which is attributed to decreased cost of capital represented by realized returns. We will discuss this issue in more detail in chapters IV and V.

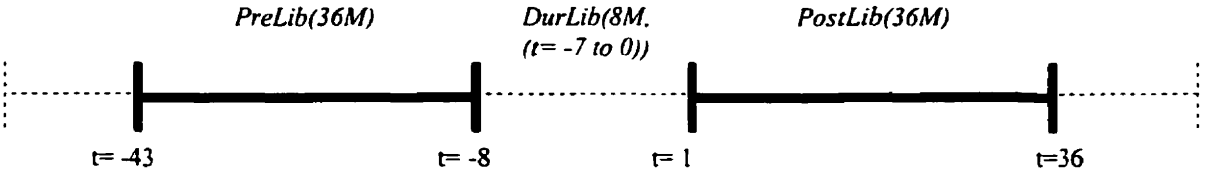
C.2. Cost of Capital

The effect of market liberalization on the cost of capital is analyzed in a framework similar to the one used for revaluation effect. One key difference is that the liberalization dummy now takes the value one in each of the 36 months following the liberalization month and zeros elsewhere. The sample ends 36 months after the liberalization month.

We split our sample into three parts and define as follows: *PreLib* (t=-43 ~t=-8: 36 months prior to market liberalization), *DurLib* (t=-7~t=0: ranging from 7 months prior to market liberalization to market liberalization month) and *PostLib* (t=+1~t=+36: 36 months after market liberalization). The sizes of *PreLib* and *PostLib* are symmetric.

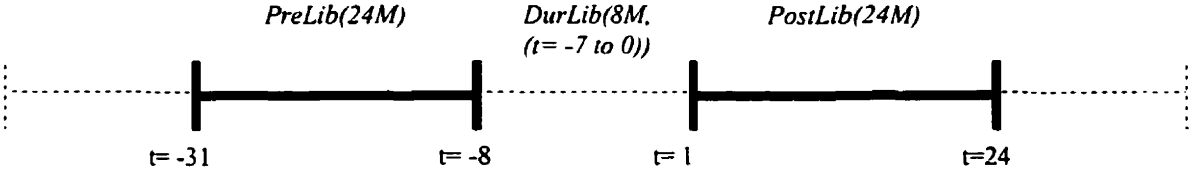
The test windows are graphically shown below. The 8-month *DurLib* period is excluded from the analysis. The 36-month *PreLib* period is used as a control period to assess

the change in the cost of capital from liberalizing capital markets. The change in the cost of capital is the difference between the return levels of *PreLib* and *DurLib* period.



C.3. Volatility and Correlation with the World

The same test windows for the cost of capital test are applied for the volatility and correlation with World market return, but now with 2-year symmetric windows.



The choice of window length attempts to balance the desire of getting a low-variance estimate of change (suggesting a long window), while avoiding confounding effects biasing the estimate of change (suggesting a short window). In the above analysis on cost-of-capital changes, we apply 3-year windows surrounding the liberalization period, as this is standard in the literature. When estimating changes in volatility and correlation, arguments can be made for a shorter window, as the volatility of returns, compared to the mean of return, is more easily estimated using a short span of data, as argued by Andersen et al. (2000). We therefore use 2-year windows. Evidence on the robustness of our results with respect to changes in window lengths is also reported.

D. Liberalization Date

In general, barriers to international investment can be classified into two broad categories of explicit and implicit barriers. Explicit barriers arise from the different legal status of domestic and foreign investors. They are directly observable and quantifiable, for example foreign ownership restriction and discriminatory taxation. Implicit barriers are not directly observable which may arise from the lack of information, the political risk, and the fear of expropriation.

Stock market liberalization is a governmental decision to allow foreign investors to participate in the domestic stock market. What we assume with stock market liberalization is the immediate influx of foreign investment in the domestic stock market and our interest lies on the impact of these foreign money inflows on the domestic stock market. However, since mere governmental announcement of market opening does not necessarily induce foreign investment, and sometimes stock market restriction may not bind, in addition to the official government announcement, several additional proxies are used in empirical studies to identify market liberalization date. For example, the introduction of depository receipts or country funds and structural break in capital flows[24] to the emerging markets are used.

As all agree, it is really difficult to pin down the exact market liberalization dates. Hence, many efforts have been made to minimize the impact of imprecise dating in liberalization. For example, Bekaert and Harvey (2000) use four different liberalization dates based on the official announcement, country funds and ADR introduction and capital flows. Henry (2000) searches for the announcement dates corresponding to the implementation dates

[24] For example, Bekaert and Harvey (2000) use U.S. capital flows to emerging markets since 1985 to construct an approximate measure of the ratio of U.S. ownership to market capitalization. Data are obtained from U.S. Treasury Bulletin. Henry (2000) uses IFCI index, which is the ratio of the market capitalization of stocks that

using the database Lexis/Nexis, but finds that these obtained announcement dates are likely to be poor proxies for the date at which information about the liberalization first reaches market participants. Since it's extremely difficult to date liberalizations at the market-level, Errunza and Miller (2000) take an alternative approach and analyze changes in equity valuations at the firm level using ADR announcement dates as liberalization dates.

Since the market liberalization dates are somewhat different among the authors of previous studies, Table 1 provides a comparison of the liberalization dates used. Columns 2 through 4 list the market liberalization dates of Henry (2000), Bekaert and Harvey (2000) and Kim and Singal (2000), respectively. We use Henry's (2000) market liberalization dates because we use the same data set for country indices, and his liberalization dates seem to put relatively more weight on the introduction of country funds, which is consistent with the empirical evidence of Errunza, Hogan and Hung (1999). Errunza et al. (1999) show the importance of country funds in delivering benefits of international diversification without directly investing in individual emerging markets. Note that the introduction of country funds were the first step in the liberalization process for a number of EMs. Table 2 presents Henry's (2000) stock market liberalization dates for each of the 12 emerging markets with details about the liberalizations. In case the market liberalization is through the introduction of a country fund, the specific name is provided.

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foreigners can legally hold to total market capitalization. A large jump in the index is interpreted as the evidence

E. Data

We use both market-level and firm-level data. International Finance Corporation Global (IFCG) indices from World Bank Emerging Market DataBase (EMDB)[25] are used for market-level analysis and individual firm data from the same database for firm level analysis. Morgan Stanley Corporation International (MSCI) world market index (The World Index) obtained from Datastream is used as a proxy for the world market return and Standard & Poor's (S&P) 500 return series from Center for Research in Stock Prices (CRSP) represents U.S. returns. All returns are logarithmic.

E.1. IFCG Indices

IFC uses size, liquidity and industry as criteria in selecting stocks to include into the index which results in the inclusion of the largest and the most actively traded stocks on the major exchange of each market. These selected firms are representative of the industrial classification of the market with a target coverage of 60% of total market capitalization at the end of each year, and 60% of total value of shares traded during each year.[26]

We use the value-weighted global indices (IFCG) for 12 markets. Monthly return data are available from January 1976 to Oct. 1999 for seven countries (Argentina, Brazil, Chile, India, Korea, Mexico and Thailand) and from January 1985 to Oct. 1999 for five countries (Colombia, Malaysia, Philippines, Taiwan and Venezuela). These 12 emerging markets are also used in Henry (2000).

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of market liberalization.

[25] I would like to thank my advisor Professor V. Errunza for providing this database. IFC EMDB was acquired by Standards and Poor's in January 2000.

[26] See IFC (1999) for more detailed information about IFC indices.

Table 3 reports descriptive statistics of monthly returns of IFCG indices for the 12 emerging markets. Monthly average US dollar returns range from 0.88% for Malaysia to 4.44% for Argentina and the simple average return across all the emerging market countries is 2.01%, which is much higher than the average monthly returns of 1.05% and 0.97% for the U.S. and the World market respectively. The emerging markets also show higher monthly unconditional volatility ranging from 8.1% for India to 25.93% for Argentina compared to the monthly unconditional volatility of 4.3% and 4.0% for the US and the world market return respectively.

The behavior of emerging market returns is similar to that reported in past literature. Emerging market returns on average are much higher with higher volatilities and their tails at least as fat as those in S&P500 and MSCI World returns. The Jarque-Bera statistics also provide evidence against the hypothesis of normality in all the countries.

The unconditional correlations within emerging markets and between emerging markets and benchmark returns of the U.S. and the World are presented in Table 4. Within emerging markets, the correlations range from –0.046 between Taiwan and Venezuela to 0.66 between Malaysia and Thailand. 25 out of 66 correlations are less than 0.10. Between emerging markets and benchmark returns, the correlations range from –0.046 between India and MSCI world return index to 0.438 between Malaysia and the U.S.

E.2. Individual Firms

Our individual firm data are also from the EMDB for the same 12 emerging markets. The number of companies in each country index (IFCG) as of their respective liberalization date is presented in Table 5. Thailand has the smallest number of firms of 10 and Mexico has the

largest number of firms of 52. On average 28 firms exist in each IFCG index of the 12 emerging markets. There are a total of 332 firms in the 12 emerging markets as of the market liberalization date. Market capitalization is the average value of the 8-month *DurLib* period.

The number of stocks under the All Firms in Individual Firm Data in Table 5 should be identical to the number of firms under IFCG Index. However, there is a discrepancy in the number of firms (332 vs. 305) because we exclude firms, which do not exist for the entire 8-month *DurLib* period. For example, most of the countries have the same number of firms, but India shows the biggest discrepancy of 22 firms. There are 47 firms for IFCG index and 25 for individual firm data. As was pointed out earlier, if we use IFCG index to investigate the impact of stock market liberalization for India, the 22 firms would be included in the analysis even though they did not exist when the market liberalization occured. After excluding non-existent firms, we have a total of 305 firms. Our firm-level analysis is based on these 305 firms.

The last five columns in Table 5 show the extent to which large firms dominate the country indices. All the figures are based on the average value of the 8-month *DurLib* period. The first four columns present how much the IFCG index is dominated by either the top (largest) 10 or the top (largest) 5 firms in each country. The dominance ratio by the largest 10 firms ranges from 54% for Mexico to 99.6% for Thailand and its average dominance ratio across all the markets is 78.5%. With the top 5 firms in each market the dominance ratio decreases but not much. The dominance ratio ranges from 34.4% for Mexico to 83.2% for Thailand. These dominance measures are absolute terms in the sense that they do not consider the total number of firms in the index (market).

The last column, Concentration Ratio (CNR) presents a modified Herfindahl index of concentration, previously applied by Roll (1992) and Bekaert and Harvey (1997, 2000) that

complements the absolute dominance measures by taking the number of firms in the market (index) into account. The CNR is calculated as follows:

$$CNR_{i,t} = \sqrt{\frac{N_{i,t}}{N_{i,t}-1}\sum_{j=1}^{N_{i,t}}\left(w_{ji,t}-\frac{1}{N_{i,t}}\right)^2}$$

where $N_{i,t}$ is the number of companies in the country index i at time t and $w_{ji,t}$ is the share of market capitalization of stock j in the country i at time t. If one stock dominates, then *CNR* approaches one. If every stock has equal market capitalization, then *CNR* equals zero. We take the *CNR* of S&P500 as our benchmark that is 0.10 as of 7 Dec. 2000.[27] Compared to this benchmark value, the relative concentration degree in emerging markets is much higher, ranging from 0.15 to 0.31. The average *CNR* across all the emerging markets is 0.23, which is twice the benchmark value of S&P 500. The whole list of shares of individual firms in S&P 500 is presented in Appendix B.

As we will see later, a firm's size represented by its market capitalization plays an important role in our study. We use firm size as a proxy for foreign investors' demand. Table 6 presents the descriptive statistics of size measures for individual firms in 12 emerging markets. All the figures are based on the average value of the eight-month *DurLib* period. In the case of all countries, firm sizes vary very widely ranging from 0.69 to 2,197.36 US million dollars. This wide dispersion of firm size is the same phenomenon in each individual country. The average firms' size across all the firms in 12 emerging markets over the *DurLib* period is 164.66 US million dollars.

[27] Source of information: Bloomberg.

Chapter IV. Revaluation Effects

A. Introduction

This and the next chapters investigate whether stock market liberalization is associated with a revaluation of equity prices and a fall in the cost of capital as standard International Asset Pricing Models (IAPM) predict. If we assume that the market I is completely segmented from the world market, the firm i in the country I would be priced according to the following pricing relationship if the CAPM holds.

$$E(R_i)=R_f+A_IM_ICov(R_i\ R_I)$$

where $E(R_i)$ is the expected return on the security i in country I, R_f is the risk-free rate, A_I is the aggregate risk aversion coefficient for investors from the country I, M_I (R_I) is the market value (return) of the market portfolio in country I. $Cov(R_i\ R_I)$ is the covariance between the return of security i and I's market portfolio return. Hence, the expected return is a function of the local price of risk and the national covariance risk.

If we assume that the market I becomes completely integrated to the world market after market liberalization, the security i would now be priced based on the following pricing relationship.

$$E(R_i)=R_f+AMCov(R_i\ R_w)$$

where A is the aggregate world risk aversion coefficient and M (R_w) is the market value (return) of the world market portfolio. $Cov(R_i\ R_w)$ is the covariance between the security i return and the world market return. Hence, the expected return would depend on the world price of risk and the world global covariance risk.

In general, we would expect that the local price of risk is higher than the world price of risk and the securities are more correlated within a market than across markets (see Bekaert and Harvey (2000), Stulz (1999) and Errunza and Miller (2000)). Therefore, we would expect the expected return (cost of capital) to decrease and the stock price to increase subsequently after market liberalization.

An alternative argument to explain this revaluation effect is that foreign investments will increase the demand for domestic securities that will subsequently increase the stock price (see Bailey and Jagitiani (1994) and Bailey, Chung and Kang (1999)).

In this section, we test whether market liberalization is associated with stock price revaluation using both market-level and firm-level data. If there is any revaluation effect after stock market liberalization, based on our earlier argument saying that foreign investors invest more in the information-rich large firms than the information-poor small firms, we would expect to obtain differential revaluation effect, depending on the firm size.

B. Research Questions

Our main research questions are:

Q1: Does the stock price increase around stock market liberalization as the standard IAPMs predict? Specifically, we are interested in whether the realized returns of both IFCG indices and individual firms increase for the *DurLib* period. We answer this question by estimating the benchmark and the firm-specific unconditional regressions.

Q2: Is there much cross-sectional variation in revaluation effects among firms depending on the firm-specific characteristic of firm size, which is used as a proxy for foreign investors' demand? We use the firm-specific conditional estimate to answer this question.

C. Contribution

Since this study is closely related to Henry (2000), it is worth mentioning the differences between his study and ours. First, while his study is based on market-level indices, we use firm-level data as well as market-level data, emphasizing on the former. Therefore, we can assess the extent to which the revaluation effect, if any, is a function of firm size. Second, his "estimation period" covers not only the pre-liberalization but also the post-liberalization period. Specifically, his normal level of realized return is estimated on the basis of the whole period (either from Jan. 1976 to Dec. 1994 or from Jan. 1985 to Dec. 1994 depending on the data availability for each market index) excluding 8 months leading up to and including stock market liberalization date.

However, our sample ends immediately following the liberalization month. We do not include sample points after the liberalization month since the expected post-liberalization decrease in the cost-of-capital, proxied by realized returns, would tend to overestimate the revaluation effect. In our result below we do indeed get a slightly lower revaluation effect than does Henry (2000). For example, while he reports 37.6% point increase in stock price before controlling for any confounding effects, we obtain 34.7% point increase.[28]

D. Results

We now report the empirical results from revaluation effect estimation in Table 7.

D.1. Benchmark Estimate with Market-level Indices

In order to compare our firm-specific estimates of the revaluation effect from liberalization to the existing literature, which uses country indices, we first estimate the benchmark model using the IFCG indices:

$$R_{it} = \alpha_i + \gamma DurLib_{it} + \varepsilon_{it}$$

where R_{it} is the monthly log-return on the IFCG index in country i at time t. The liberalization dummy $DurLib_{it}$ here takes the value one in the eight-month *DurLib* period and zeros beforehand in each country i.

The first column shows the result from estimating the benchmark model. The coefficient γ of 0.0434 is statistically significant and it can be interpreted that on average the stock market is revalued by 34.7% point (=4.34% per month * 8 months) in U.S. dollars over the *DurLib* period.

D.2. Firm-specific Unconditional Estimate

We first compare the benchmark estimate with a firm-specific unconditional estimate below.

$$R_{sit} = \alpha_{si} + \gamma DurLib_{it} + \varepsilon_{sit}$$

Note that the revaluation effects from the IFCG and the unconditional firm-specific regressions cannot be expected to be identical, as not all firms in the index are represented in

[28] Note Henry (2000) uses real returns whereas our returns are nominal. We have done additional analysis with

our sample, as firms are dropping in and out of the index, as the index is value-weighted, and as we use firm-specific fixed effects.

The coefficient γ of 0.0371 in the second column is also significant, but much smaller than that of IFCG indices. The individual firm is revalued by 29.7% points (=3.71%*8 months) on average over the *DurLib* period. Since the benchmark estimate, using value-weighted IFCG indices, has a higher revaluation effect than the firm-specific unconditional estimate, we expect large firms to display a higher revaluation effect than small ones. This is because since the IFCG indices are value-weighted, more weight is given to large-size firms whereas no explicit weight is given in the estimation using firm level data.

D.3. Firm-specific Conditional Estimate

In order to answer our second research question of cross-sectional differences in the revaluation effect caused by differential foreign investors' demand, we estimate the revaluation effect based on world rank size measure using the regression

$$R_{sit} = \alpha_{si} + \gamma DurLib_{it} + \delta WRank(size_{si})DurLib_{it} + \varepsilon_{sit}$$

and the revaluation effect based on domestic rank size measure using the regression

$$R_{sit} = \alpha_{si} + \gamma DurLib_{it} + \delta DRank(size_{si})DurLib_{it} + \varepsilon_{sit}$$

Notice that the revaluation effect in these cases is not simply γ, but rather $\gamma + \delta WRank(size_{si})$ in the case of world rank size measure, and $\gamma + \delta DRank(size_{si})$ in the case of domestic rank size measure, and it will thus be (nonlinear) functions of firm size.

The third and the fourth columns provide results for the firm-specific conditional estimates above. Coefficients γ and δ are both significant in both panel regressions, indicating

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excess returns, which should approximate the real returns, and find no differences in estimation results.

that firm size matters for the revaluation effect after market liberalization. The revaluation effect for the smallest firm, using the world rank size measure, is 0.0203 (=0.0202+0.0292*0.0033), that is approximately 16.2% points for the *DurLib* period, and for the largest firm it is 0.0494 (=0.0202+0.0292*1), that is 39.5% points for the same period.[29] Using instead the domestic rank size measure, the revaluation effect for the smallest firm is 0.0184 (=0.0176+0.0329*0.025), that is approximately 14.7% points, and for the largest firm it is 0.0505 (=0.0176+0.0329*1), that is 40.4% points.[30] Regardless of the size measures used, the results show that large firms experience higher revaluation effects than do small firms.

D.4. After Controlling for the World Market Return

As the revaluation effect could be confounded by the world market return fluctuations, we need to control for that. In order to control for movements in world market returns, we re-estimate the revaluation regressions as follows:

$$R_{it} = \alpha_i + \gamma DurLib_{it} + \lambda WRet_t + \varepsilon_{it}$$

$$R_{sit} = \alpha_{si} + \gamma DurLib_{it} + \lambda WRet_t + \varepsilon_{sit}$$

$$R_{sit} = \alpha_{si} + \gamma DurLib_{it} + \delta WRank(size_{si})DurLib_{it} + \lambda WRet_t + \varepsilon_{sit}$$

$$R_{sit} = \alpha_{si} + \gamma DurLib_{it} + \delta DRank(size_{si})DurLib_{it} + \lambda WRet_t + \varepsilon_{sit}$$

where $WRet_t$ is World market return at time t.

[29] The numbers 0.0033 and 1 are from 1/305 and 305/305 respectively, where 305 is the total number of firms in our sample of 12 emerging markets and the numerators of 1 and 305 are ranks for the smallest and the largest firm.

[30] The numbers 0.025 and 1 are from 1/40 (for the smallest firm in Malaysia, which has 40 sample firms) and 40/40 respectively where 40 is the number of firms in Malaysia.

The second set of columns in Table 7 presents the results after controlling for changes in the world market return. We use the MSCI World index as a proxy for World market return. The coefficient λ on World returns is significant in every case.

The 5th column shows the result from estimating the benchmark model. The coefficient γ of 0.0397 is statistically significant and it can be interpreted that on average the stock market is revalued by 31.8% point in U.S. dollars over the *DurLib* period. The 6th column presents the result from the firm-specific unconditional estimate using individual firm data. The coefficient γ of 0.0331 is also significant, but smaller than that of IFCG indices. On average, the stock market is revalued by 26.5% point over the *DurLib* period.

The 7th and the 8th columns provide the results for the firm-specific conditional estimate. Both coefficients of γ and δ are still significant for both panel regressions. The revaluation effect for the smallest firm with World rank size measure is approximately 11.8% point and for the largest firm is 37.4% point. Hence the revaluation effect ranges from 11.8% to 37.4% point for the *DurLib* period based on firms' World rank size measure after controlling for changes in World returns. With domestic rank size measure, the revaluation effect ranges from 10.9% to 37.7% points. After controlling for World market return, the magnitude of the revaluation effect decreases slightly in all cases. However, they are still statistically and economically significant.

The revaluation effects after controlling for World market return are shown graphically in Figure 1 for World rank size measure and domestic rank size measure. We plot both $RE_{it} = \gamma + \delta WRank(size_{it})$ and $RE_{it} = \gamma + \delta DRank(size_{it})$ against firm size. The shaded area shows the confidence-band with a 95% confidence level. Large firms clearly show higher

revaluation effects. Thus, large firms are driving the revaluation effect at the IFCG index level after stock market liberalization.

D.5. After controlling for concurrent economic reforms and macroeconomic variables

Stock market liberalization usually coincides with concurrent changes in economic policy. We borrow four concurrent economic reform (CER) variables from Henry (2000) to control for the effect of the following reforms: macroeconomic stabilization, trade liberalization, privatization and the easing of exchange controls.

In addition to these CER variables, we control for four macroeconomic variables in order not to have any macroeconomic fundamentals affect the revaluation effect. We use the continuously compounded growth rates of the following 4 variables: domestic industrial production, domestic inflation, 3-month US T-bill rate and real foreign exchange rate.

After controlling for these variables, the results are the same as before. The estimating results from the benchmark model with market indices and the firm-specific unconditional model show significant revaluation effects and there is a cross-sectional difference in the revaluation effect depending on the firm size. Large firms show a higher revaluation effect than small firms do. The results are reported in Appendix C for completeness, but will not be discussed in detail.

D.6. Robustness Tests for Varying Test Windows

We have performed robustness tests to see whether our results are sensitive to varying test windows. Revaluation effect test has been done again with various size of *DurLib* period. For example, we use 7-, 9- and 10-month event windows and find that our results are consistent. In

other words, the test results from estimating the benchmark model with market indices and the firm-specific unconditional model show significant revaluation effects and there is a cross-sectional difference in the revaluation effect depending on the firm size. Large size firms show a higher revaluation effect than small size firms do. The results are reported in Appendix D for completeness, but will not be discussed in detail.

Chapter V. Cost of Capital

A. Introduction

In Chapter IV, we find there is a revaluation effect after stock market liberalization and in particular there is a significant cross-sectional variation in the revaluation effect depending on firm size, that is large firms show higher revaluation effects than small ones. Since we use the firm size as a proxy for foreign investors' demand, this empirical result can be interpreted that the higher the foreign investors' demand, the bigger the revaluation effect is.

As we mentioned earlier, based on the standard International Asset Pricing Models (IAPM), these revaluation effects are caused by the anticipation of the decreased cost of capital due to the increased ability of risk sharing between domestic and foreign investors. In this chapter, we will examine whether the changes in the cost of capital are associated with the stock market liberalization. This will also test whether the magnitude of changes in the cost of capital are consistent with the revaluation effects presented in the previous chapter. In other words, through this and the previous chapter, we test both of the revaluation effect and the changes in the cost of capital separately and compare results to see whether the theoretical predictions are consistent with our empirical findings. Based on the same reasoning as the revaluation effect test, if there are any changes in the cost of capital, we would expect to obtain differential changes in the cost of capital among individual firms, depending on their firm sizes.

We use realized returns to examine the changes in the cost of capital. The relationship between the expected return (cost of capital) and the realized return before, during and after

market liberalization is well described in Errunza and Miller (2000). We would expect high equilibrium expected returns before liberalization indicating a high cost of capital and normal equilibrium expected returns after liberalization, with the difference in the before- versus the after- period returns denoting the changes in the cost of capital. As we mentioned earlier, of course, realized return is a noisy and not flawless proxy for expected returns.[31]

B. Research Questions

The main research questions we attempt to answer are:

Q1: Does the cost of capital (expected return) decrease after stock market liberalization as the standard IAPMs predict? Specifically, we examine whether the realized returns of both IFCG indices and individual firms decrease after stock market liberalization. We answer this question by estimating the benchmark and the firm-specific unconditional regressions.

Q2: Is there much cross-sectional variation in cost of capital changes among firms depending on the firm-specific characteristics of firm size, which is used as a proxy for foreign investors' demand? We use the firm-specific conditional estimate to answer this question.

C. Methodological Issues

The effect of market liberalization on the cost of capital is analyzed in a framework similar to the one used for the revaluation effect test. One key difference is that the liberalization dummy now takes the value one in each of the 36 months following the liberalization month (*PostLib*

[31] See Errunza and Miller (2000) for a detailed discussion.

period) and zeros elsewhere. The sample ends 36 months after the liberalization month. The 8-month *DurLib* period is excluded from the analysis.

Basically, we are testing the cost of capital hypothesis by comparing realized returns over two 36-month periods preceding and following the test period of the revaluation effect. The 36 months prior to this liberalization period is used as a control period to assess the change in the cost of capital from liberalizing capital markets. The difference in these 36-month windows should be a measure of the changes in the cost of capital.

By excluding the test period of the revaluation effect, we do not bias our results in favor of our hypothesis. In other words, since we find increased returns for the *DurLib* period, if we include this period into the *PreLib* period to estimate the normal level of returns, we are more likely to see decreased realized returns (cost of capital) for the *PostLib* period. Hence we need to exclude the *DurLib* period in order that the increased stock prices for the *DurLib* period are attributed solely to the revaluation effect and do not contribute to a higher realized returns for the *PreLib* period.

D. Results

Table 8 presents the empirical results of the cost of capital estimation.

D.1. Benchmark Estimate with Market-level Indices

We first estimate the benchmark model using the IFCG indices:

$$R_{it} = \alpha_i + \gamma PostLib_{it} + \varepsilon_{it}$$

where R_{it} is the monthly log-return on the IFCG index in country i at time t. The liberalization dummy $PostLib_{it}$ takes the value one in each of the 36-month *PostLib* period and zeros elsewhere. We are interested in the parameter γ being significantly different from zero.

The coefficient γ of 0.0048 is not statistically significant which suggests that the cost of capital measured by realized returns should not change after stock market liberalization. The result is consistent with Bekaert and Harvey (2000), in which they use market-level indices and realized returns to examine the impact of various market liberalization dates on the cost of capital and find no statistically significant changes.

D.2. Firm-Specific Unconditional Estimate

We first compare the result from the previous benchmark estimate with a firm-specific unconditional estimate below.

$$R_{sit} = \alpha_{si} + \gamma PostLib_{it} + \varepsilon_{sit}$$

The coefficient γ of 0.0023 in the second column is also insignificant. This result also suggests that there is no difference in the cost of capital before and after market liberalization.

D.3. Firm-Specific Conditional Estimate

In order to answer our second research question of cross-sectional differences in the changes in the cost of capital driven by foreign investors' demand, we use two additional estimation below.

$$R_{sit} = \alpha_{si} + \gamma PostLib_{it} + \delta WRank(size_{si}) PostLib_{it} + \varepsilon_{sit}$$

$$R_{sit} = \alpha_{si} + \gamma PostLib_{it} + \delta DRank(size_{si}) PostLib_{it} + \varepsilon_{sit}$$

Notice that the changes in the cost of capital in these cases are not simply γ, but rather $\gamma + \delta WRank(size_{si})$ in the case of World rank size measure, and $\gamma + \delta DRank(size_{si})$ in the case of domestic rank size measure, and it will thus be (nonlinear) functions of firm size.

The third and the fourth columns in Table 8 provide the results from the firm-specific conditional estimations above. Now both coefficients of γ and δ become significant for both panel regressions, indicating that a firm size matters for the change in the cost of capital after market liberalization. The abnormal level of the cost of capital for the world's smallest firm is 0.0171 (=0.0172-0.0257*0.0033), that is approximately a 20.5% point per year (=1.71%*12) and that for the world's largest firm the abnormal level is –0.0085 (=0.0172-0.0257*1), that is a –10.2% point per year (=-0.85*12). Hence the abnormal level of the cost of capital ranges from –10.2% to 20.5% point per year based on firms' world rank size measure. With domestic rank size measure, the change in the cost of capital for the smallest firm is 0.0151 (=0.0156-0.0219*0.025), that is approximately an 18.1% (=1.51%*12) point per year and that for the largest firm is -0.0063 (=0.0156-0.0219*1), that is a –7.6% point (=-0.63*12) per year. Hence the change in the cost of capital ranges from –7.6% to 18.1% points per year. There is a distinct difference in the cost of capital changes between large and small size firms. For small firms, the cost of capital increases rather than decreases after market liberalization, showing that they do not get much benefit from stock market liberalization in terms of lowering the cost of capital. On the other hand, the cost of capital for large firms decreases as the IAPMs predict. However, the magnitude is not big enough to match the revaluation effect from the previous revaluation test.

D.4 After Controlling for the World Market Return

Since we use realized return as a proxy for the cost of capital, our test results of the changes in the cost of capital could be arising from World market return movement. We control for world market return using the following panel regressions:

$$R_{it} = \alpha_i + \gamma PostLib_{it} + \lambda WRet_t + \varepsilon_{it}$$

$$R_{sit} = \alpha_{si} + \gamma PostLib_{it} + \lambda WRet_t + \varepsilon_{sit}$$

$$R_{sit} = \alpha_{si} + \gamma PostLib_{it} + \delta WRank(size_{si})PostLib_{it} + \lambda WRet_t + \varepsilon_{sit}$$

$$R_{sit} = \alpha_{si} + \gamma PostLib_{it} + \delta DRank(size_{si})PostLib_{it} + \lambda WRet_t + \varepsilon_{sit}$$

where $WRet_t$ is the world market return (MSCI World Index) at time t.

The second set of columns in Table 8 show the results for the cost of capital changes after controlling for changes in World market return. The 5th column shows the result from estimating the benchmark using the IFCG indices. The coefficient γ of 0.0114 is statistically significant which indicates that the cost of capital measured by realized returns increases by 13.7% point (=1.14%*12) per annum after stock market liberalization. The 6th column presents the result from a firm-specific unconditional estimate with individual firm data. The coefficient γ of 0.0089 is also significant. This result also suggests that the cost of capital increases by 10.7% point (=0.89%*12) per annum after market liberalization.

The 7th and the 8th columns provide the results from the firm-specific conditional estimation. The change in the cost of capital for the world's smallest firm is 0.0222 (=0.0223-0.0230*0.0033), that is approximately a 26.7% point (=2.22%*12) per year and that for the world's largest firm it is –0.0007 (=0.0223-0.0230*1), that is a –0.8% point (=-0.07%*12) per year. Hence the change in the cost of capital ranges from –0.8% to 26.7% point per year based

on firms' world rank size measure. On the other hand, the change in the cost of capital for the smallest firm with domestic rank is 0.0218 (=0.0223-0.0220*0.025), that is approximately a 26.1% point (=2.18%*12) per year and that for the largest firm is 0.0003 (=0.0223-0.0220*1), that is a 0.4% point (=0.03%*12) per year. Thus, while small size firms still show positive changes in the cost of capital, the change in the cost of capital for large size firms are close to zero.

The changes in the cost of capital after controlling for world market return are shown graphically in Figure 2 for world rank size measure and domestic rank size measure. We plot both $\gamma + \delta WRank(size_{si})$ and $\gamma + \delta DRank(size_{si})$ against firm sizes. The shaded area shows the confidence-band with a 95% confidence level. The figure shows that the cost of capital increases for small firms, but does not change significantly for large firms after stock market liberalization.

D.5. After controlling for concurrent economic reforms and macroeconomic variables

Stock market liberalization usually coincides with concurrent changes in economic policy. We borrow four concurrent economic reform (CER) variables from Henry (2000) to control for the effect of the following reforms: macroeconomic stabilization, trade liberalization, privatization and the easing of exchange controls.

In addition to these CER variables, we control for four macroeconomic variables in order not to have any macroeconomic fundamentals affect the changes in the cost of capital. We use the continuously compounded growth rates of the following 4 variables: domestic industrial production, domestic inflation, 3-month US T-bill rate and real foreign exchange rate.

After controlling for these variables, the results are the same. The estimating results from the benchmark model with market indices and the firm-specific unconditional model show significant increases in the cost of capital and there is a cross-sectional difference in the changes in the cost of capital depending on the firm size. Firm size is negatively related to the cost of capital changes. Small firms show increases in the cost of capital, whereas large firms show insignificant changes in the cost of capital. The results are reported in Appendix E for completeness, but will not be discussed in detail.

D.6. Robustness Tests for Varying Test Windows

We have performed robustness tests to assess the sensitivity of our results to various test windows. We apply windows of 2-, 4- and 5-year symmetric width for *PreLib* and *PostLib*. We find that our test results remain the same as results above using 3-year windows. The results are basically the same as before, that is, small size firms show increases in the cost of capital rather than decreases whereas large size firms show insignificant changes in the cost of capital. The results are reported in Appendix F for completeness, but will not be discussed in detail.

Chapter VI. Stock Market Volatility

A. Introduction

As we see in the previous two chapters, there are solid theoretical arguments for the revaluation effect and the cost-of-capital after stock market liberalization. However there is no established theory predicting changes in the volatility of emerging market equities and changes in their correlations with the World market following liberalization. Hence, they are empirical questions to be tested. We will devote this and the next chapters to these two issues respectively.

It has been claimed that since foreign portfolio investment is relatively mobile compared to foreign direct investment, foreign portfolio investment increases volatility of domestic stock markets. Policy makers have become increasingly concerned about the impact of these foreign portfolio investments on the volatility of domestic equity markets. Portfolio managers are also interested if an important event like stock market liberalization has an impact on volatility and correlation which in turn affects portfolio re-balancing decisions and risk management practices.

In recent years, many attempts have been made to address this question. However, as we pointed out in earlier chapters, these market-level indices may not be an appropriate measure for the stock market liberalization impact tests. Here we attempt to investigate the impact of stock market liberalization on stock market volatility and its correlation with the world market return that is driven by real foreign investors' demand in this and the next chapter respectively.

B. Research Questions

The main research questions we attempt to answer are:

Q1: Is the stock market volatility associated with stock market liberalization? Specifically, we examine whether the "realized volatility"[32] of both IFCG indices and individual firms changes after the stock market liberalization date. We answer this question by estimating the benchmark and the firm-specific unconditional regressions.

Q2: Is there much cross-sectional variation in volatility changes among firms depending on the firm-specific characteristic of firm size, which is used as a proxy for foreign investors' demand? We use the firm-specific conditional estimate to answer this question.

C. Contribution[33]

Compared to the previous studies, our approach is different in two aspects. Our volatility estimates are time varying and model-free. Previous studies investigating the stock market volatility after liberalization have been made with two approaches. Some studies use simply a time-invariant unconditional measure. For example, Tesar and Werner (1995) examine whether U.S. equity flows to emerging stock markets contribute to stock return volatility. They simply plot the volume of U.S. transactions in foreign equity market against two market stability measures of local turnover ratio and standard deviation of excess returns and find no relationship between them. Bekaert (1995) studies whether volatility in emerging markets is

[32] For more information see B. Dependent Variable in Chapter III.

related to a number of market openness measures such as the number of country funds and cross-listed securities, foreign ownership restriction measured by the ratio of the IFC Investable index to IFC Global index. Based on the rank correlation results, he concludes no significant relationship between the openness of a market and stock return volatility. Using monthly data for 17 emerging markets, Errunza (2000) plots stock market volatility before and after market liberalization and finds a slight decrease in unconditional volatility after liberalization. Since these time-invariant volatility measures are inconsistent with the empirical findings of time-varying volatility (see French, Schwert and Stambaugh (1987), Schwert (1989)), we account for the time-varying characteristics of stock return volatility by constructing a yearly volatility measure using 12 monthly data within that year.

Other studies use a parametric model to fit the market volatility, so the model-specification errors are potentially imbedded. For example, Bekaert and Harvey (1997) estimate a time-series model for volatility for each country with the conditional mean and the conditional variance based on both world and local information to capture changes in the degree of market integration. A simple plot of average conditional variance for two years before against that of after market liberalization shows a reduction in stock return volatility after the market opening. Applying the same estimation method as Bekaert and Harvey (1997), but with a longer sample period Bekaert and Harvey (2000) obtain a series of conditional volatility for emerging markets and examine the impact of market liberalization on return volatility by running a pooled time-series and cross-sectional regression.

De Santis and Imrohoroglu (1997) apply a GARCH (generalized autoregressive conditional heteroskedasticity) model to fit volatility country by country. Using weekly series,

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[33] For a detailed discussion of previous studies see Chapter II.B.3. Stock market volatility.

they find no supportive evidence of a systematic effect of market liberalization on stock return volatility. Kim and Singal (2000) use ARCH and GARCH models to fit the volatilities for emerging markets. They find mixed results: a significant reduction in volatility for some countries and a significant increase for others. Instead of using a parametric model, we simply estimate a yearly volatility measure, constructed by using monthly returns within that year.

Here we remove these two limitations: our volatility estimates are time-varying and free from model-specification errors. Our approach becomes possible because we increase the number of observations by using individual firm data rather than country indices.

D. Methodological Issues

We estimate the four regression models below regressing on the log of realized volatility, obtained from the estimation procedure mentioned in III.B.2:

$$V_{it} = \alpha_i + \gamma PostLib_{it} + \varepsilon_{it}$$

$$V_{sit} = \alpha_{si} + \gamma PostLib_{it} + \varepsilon_{sit}$$

$$V_{sit} = \alpha_{s1} + \gamma PostLib_{it} + \delta WRank(size_{s1})PostLib_{it} + \varepsilon_{sit}$$

$$V_{sit} = \alpha_{s1} + \gamma PostLib_{it} + \delta DRank(size_{s1})PostLib_{it} + \varepsilon_{sit}$$

The effect of market liberalization on the stock market volatility is analyzed in the same approach as the cost of capital hypothesis test. The only difference is the width of test windows. The sample period covers the 24 months before (*PreLib*) and 24 months after market liberalization (*PostLib*) period excluding the 8-month *DurLib* period. The liberalization dummy variable $PostLib_{it}$ is again a dummy variable that takes on the value one in each of the

PostLib period and zeros elsewhere. The 24-month *PreLib* period is used as a control period to assess the change in the stock market volatility from liberalizing stock markets.

In order to control for effects arising from changes in world market volatility, we re-estimate the volatility regressions as follows,

$$V_{it} = \alpha_i + \gamma PostLib_{it} + \lambda WVol_t + \varepsilon_{it}$$

$$V_{sit} = \alpha_{si} + \gamma PostLib_{it} + \lambda WVol_t + \varepsilon_{sit}$$

$$V_{iit} = \alpha_{ii} + \gamma PostLib_{it} + \delta WRank(size_{it})PostLib_{it} + \lambda WVol_t + \varepsilon_{iit}$$

$$V_{sit} = \alpha_{si} + \gamma PostLib_{it} + \delta DRank(size_{si})PostLib_{it} + \lambda WVol_t + \varepsilon_{sit}$$

where $WVol_t$ is the log of realized volatility of the world market returns at time t. We use MSCI World index as a proxy for world market return.

E. Results

Table 9 presents the empirical results from testing changes in the stock market volatility after stock market liberalization.

E.1. Benchmark Estimate with Market-level Indices

We first estimate the benchmark model using the IFCG indices:

$$V_{it} = \alpha_i + \gamma PostLib_{it} + \varepsilon_{it}$$

where V_{it} is the log of annualized realized volatility on the IFCG index in country i at time t. We are interested in the parameter γ being significantly different from zero.

The coefficient γ of 0.3521 in the first column is statistically significant which suggests that annualized stock market volatility increases by 35.2% after stock market liberalization.[34] The increase in market volatility for benchmark estimate is consistent with the results of Bekaert and Harvey (2000) before controlling for financial and macroeconomic development factors.

E.2. Firm-specific Unconditional Estimate

We first compare the result from the benchmark model with a firm-specific unconditional estimate below:

$$V_{it} = \alpha_i + \gamma PostLib_{it} + \varepsilon_{it}$$

The coefficient γ of 0.1334, presented in the second column, is also significant, implying annualized stock market volatility increases by about 13.3%.

E.3. Firm-Specific Conditional Estimate

In order to answer our second research question of cross-sectional differences in volatility changes caused by differential foreign investors' demand, we estimate the conditional changes in stock return volatility based on world rank size measure using the regression

$$V_{it} = \alpha_{it} + \gamma PostLib_{it} + \delta WRank(size_{it})PostLib_{it} + \varepsilon_{it}$$

and the changes in stock return volatility based on domestic rank size measure using the regression

$$V_{it} = \alpha_{it} + \gamma PostLib_{it} + \delta DRank(size_{it})PostLib_{it} + \varepsilon_{it}$$

[34] Note that since we use the log of realized volatility our results show percentage changes unlike the changes in percentage *points* from the previous results on revaluation effect and cost of capital.

Notice that the changes in the realized volatility in these cases are not simply γ, but rather $\gamma + \delta WRank(size_{it})$ in the case of world rank size measure, and $\gamma + \delta DRank(size_{it})$ in the case of domestic rank size measure, and both will thus be (nonlinear) functions of firm size.

Both coefficients of γ and δ in the third and fourth columns are significant for both panel regressions, indicating that the firm size matters in the volatility changes after stock market liberalization. The change in the volatility for the world's smallest firm is 0.2230 (=0.2235-0.1397*0.0033), that is approximately 22.3% increase. For the world's largest firm it is 0.0838 (=0.2235-0.1397*1), that is 8.4% increase. Hence the change in the realized volatility ranges from 8.4% to 22.3% per year based on firms' world rank size measure. The bigger the firm size is, the lower is the increase in annualized realized volatility.

On the other hand, the change in realized volatility for the smallest firm using domestic rank size measure is 0.0857 (=0.0833+0.0946*0.025), that is approximately an 8.6% increase and that for the largest firm is 0.1779 (=0.0833+0.0946*1), that is a 17.8% increase. Unlike the above result with World rank size measure, large firms show a higher increase in volatility after stock market liberalization than small firms do. Even though there is a discrepancy in the magnitude of changes in the volatility between large and small firms, the bottom line is that stock market liberalization increases the stock market volatility. While previous studies using market indices found no significant change in volatility from market liberalization, we find that volatility increases significantly after market liberalization—in particular for small firms.[35]

E.4. After Controlling for World Market Volatility

[35] Recall that previous studies typically estimate volatility using mean-reverting GARCH-type models. Instead, we take a model-free approach.

Since the stock market volatility changes could be affected by the changes in the world market volatility, we need to control for this effect before concluding the impact of market liberalization on the stock market volatility.

The second set of columns in Table 9 shows the results after controlling for changes in the world market volatility. The 5th column shows the result from estimating the benchmark estimate using the IFCG indices. The coefficient γ of 0.2621 is statistically significant which suggests that stock market volatility increases by 26.2% after stock market liberalization. The coefficient γ for a firm-specific unconditional estimate is 0.0477 and it is also significant, implying that stock market volatility increases by 4.8%.

The 7th and the 8th column provide the results from the firm-specific conditional estimation. Both coefficients of γ and δ are significant for both panel regressions. The changes in the annualized volatility for the world's smallest firm is 0.0946 (=0.0949-0.0880*0.0033), that is approximately a 9.5% increase and for the world's largest firm it is 0.0069 (=0.0949-0.0880*1), that is a 0.7% increase. Hence the increases in the volatility range from 0.7% to 9.5% based on firms' world rank size measure. In the case of domestic rank size measure, the changes in the annualized volatility for the smallest firm is 0.0663 (=0.0671-0.0333*0.025), that is approximately 6.6% increase and for the largest firm it is 0.0338 (=0.0671-0.0333*1), that is 3.4% increase. Hence the volatility increases by the amount ranging from 3.4% to 6.6% per year based on the domestic rank size measure.

The changes in annualized stock return volatility after controlling for world market volatility are shown graphically in Figure 3 for World rank size measure and domestic rank size measure. We plot both $\gamma + \delta WRank(size_{it})$ and $\gamma + \delta DRank(size_{it})$ against firm sizes. The shaded area shows the confidence-band with a 95% confidence level. The figure shows that the

changes in annualized volatility is negatively related to the firm size, indicating that big firms show lower increases in volatility than small firms do.

E.5. Robustness Tests for Varying Test Windows

We have performed robustness tests to assess the sensitivity of our results to various test windows. We apply windows of 3-, 4- and 5-year symmetric width for *PreLib* and *PostLib*. We find that our test results remain the same as results above using 2-year windows. The results are basically the same as before, that is, large size firms show much lower increases in the volatility than small size firms after stock market liberalization, but the differences are not statistically significant. The results are reported in Appendix G for completeness, but will not be discussed in detail.

Chapter VII. Correlation with World Market Return

A. Introduction

It is generally accepted that correlation coefficient of market returns can not be used as a direct measure of market integration. For example, Errunza, Hogan and Hung (1999) show that using correlations of market-wide index return as a measure of market integration would underestimate the actual degree of integration, given the ability of investors to achieve home-made diversification. It is however believed that the gradual removal of barriers to international investment as well as political and economic integration could lead to a progressive increase in the international correlation of financial markets.[36]

Since the low correlation between domestic and foreign security returns is the source of the gains to international diversification, portfolio managers are interested if an important event like stock market liberalization has an impact on market correlation which in turn affects portfolio rebalancing decisions and risk management practices. In chapter II, we have already seen the changes in simple unconditional correlations of a group of emerging markets with MSCI world market index before and after market liberalization. We find on average increased unconditional correlation after market liberalization.

To see a trend across the countries, we compute the cross-country average of correlation coefficient, using a 36-month rolling window basis. The results are depicted in Figure 4. In order to obtain the average correlation of 12 emerging markets with the world market return, first the correlation coefficient of each emerging market with MSCI world index

return is computed over a 36-month moving window and then the cross-country average correlation coefficient at relative time t is estimated as follows:

$$\overline{\rho}_t = \frac{1}{N}\sum_{i=1}^{N}\rho_{iw,t}$$

where $N(=12)$ is the number of countries, t is relative time (-120,-119,...,0,...119,120 : Month 0 refers to the market liberalization date) and the correlation coefficient of IFCG index returns in country i with MSCI world index return w at relative time t, $\rho_{iw,t}$, is computed using 36-month rolling window basis in each country i. Figure 4 shows that the average correlation coefficient appears to be time-varying and increasing after market opening at relative time t=0.

In this chapter, we test whether market liberalization is associated with the changes in the market correlation with the world market return using both country-level and firm-level data.

B. Research Questions

The main research questions we attempt to answer are:

Q1: Is the emerging market correlation with the world market associated with stock market liberalization? Specifically, we examine whether the yearly conditional correlation[37] of both IFCG indices and individual firms changes after the stock market liberalization date. We answer this question by estimating the benchmark and the firm-specific unconditional regressions.

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[36] For more discussion, see II.B.4.

[37] For more information see B. Dependent Variable in Chapter III.

Q2: Is there much cross-sectional variation in correlation changes among firms depending on the firm-specific characteristic of firm size, which is used as a proxy for foreign investors' demand? We use the firm-specific conditional estimate to answer this question.

C. Contribution[38]

Here we discuss our relative contribution to previous studies in this topic. Solnik et al. (1996) attribute the increase of correlation coefficient of British market with the U.S. market to the deregulation and opening of the British economy initiated by former Prime Minister Margaret Thatcher. Longin and Solnik (1995) study the correlation of monthly excess returns for 7 major countries and find that the cross-country covariance and correlation are changing over time. They report increased correlations among 7 markets over the past 30 years. In summary, these two studies find that the market correlation is time varying and seems to be increasing as markets are liberalized. While both of these two studies investigate the changes in the market correlation in developed markets using market-level data, we concentrate on emerging markets and see whether emerging market correlation with world market return changes after the special event of market liberalization, using both market-level and firm-level data.

Bekaert and Harvey (2000) analyze the behavior of emerging market correlation with world market returns around liberalization. After controlling for the potentially confounding effects, they find that in all tests correlations increase and countries, which start out with low correlations, experience much higher correlation increases. They estimate a time-series model for correlation for each country with the conditional mean and the conditional variance based

[38] For a detailed discussion of previous studies see Chapter II.B.4. Correlation with World market return

on both world and local information to capture changes in the degree of market integration. Since they use a parametric model to fit the market correlation, the potential model-specification errors are imbedded. Our conditional correlation is based on the model-free estimation discussed in III.B.2. We also investigate the liberalization impact using not only market-level data but also firm level data.

D. Methodological Issues

We estimate the four regression models below regressing on conditional correlation measures, which we obtained from the estimation procedure mentioned in III.B.2.

$$CR_{it} = \alpha_i + \gamma PostLib_{it} + \varepsilon_{it}$$

$$CR_{sit} = \alpha_{si} + \gamma PostLib_{it} + \varepsilon_{sit}$$

$$CR_{sit} = \alpha_{si} + \gamma PostLib_{it} + \delta WRank(size_{si}) PostLib_{it} + \varepsilon_{sit}$$

$$CR_{sit} = \alpha_{si} + \gamma PostLib_{it} + \delta DRank(size_{si}) PostLib_{it} + \varepsilon_{sit}$$

The market liberalization impacts on the stock market correlation is analyzed in the same approach as the realized volatility test. The sample period again covers the 24 months *PreLib* and 24 months *PostLib* period excluding the 8-month *DurLib* period. $PostLib_{it}$ is again a dummy variable that takes on the value one in each of the *PostLib* period and zeros elsewhere in country *i*. The 24 months *PreLib* period is used as a control period to assess the change in the stock market correlation with world market return from liberalizing stock markets.

Recent studies in international finance have shown that correlation of international equity returns move together with the world market volatility, in particular, this phenomenon

becomes apparent during an extremely volatile period when correlations increase markedly. (see Solnik et. al. (1996), De Santis and Gerard (1997) and Longin and Solnik (1995, 1999) among others). Since our sample period includes some very volatile periods such as the 1987 crash, our result could be affected by the world market volatility. In order to control for effects arising from changes in the world market volatility, we re-estimate the correlation regressions as follows,

$$CR_{it} = \alpha_i + \gamma PostLib_{it} + \lambda WVol_t + \varepsilon_{it}$$

$$CR_{ijt} = \alpha_{ij} + \gamma PostLib_{it} + \lambda WVol_t + \varepsilon_{ijt}$$

$$CR_{ijt} = \alpha_{ij} + \gamma PostLib_{it} + \delta WRank(size_{it})PostLib_{it} + \lambda WVol_t + \varepsilon_{ijt}$$

$$CR_{ijt} = \alpha_{ij} + \gamma PostLib_{it} + \delta DRank(size_{it})PostLib_{it} + \lambda WVol_t + \varepsilon_{ijt}$$

where $WVol_t$ is the annualized realized volatility of the World market returns. We use MSCI World index as a proxy for world market return.

E. Results

Table 10 presents the empirical results from testing changes in correlation with world market return after stock market liberalization.

E.1. Benchmark Estimate with Market-level Indices

In order to compare our firm-specific estimates of the changes in the conditional correlation from liberalization to the existing literature, which uses country indices, we first estimate the benchmark model below using the IFCG indices:

$$CR_{it} = \alpha_i + \gamma PostLib_{it} + \varepsilon_{it}$$

where CR_{it} is the yearly conditional correlation of IFCG index in country i with MSCI World market return at time t. We are interested in the parameter γ being significantly different from zero.

The first column shows the result from estimating the benchmark estimate. The coefficient γ of 0.0157 is not statistically significant implying that correlation with the world market return does not change after the stock market liberalization.

E.2. Firm-specific Unconditional Estimate

We first compare the result from the benchmark model with a firm-specific unconditional estimate:

$$CR_{sit} = \alpha_{si} + \gamma PostLib_{it} + \varepsilon_{sit}$$

The second column presents the result from a firm-specific unconditional estimate with individual firm data. The coefficient γ of 0.0605 becomes significant, indicating that on average the correlation of emerging markets with World market return increases by 0.06 after stock market liberalization.

E.3. Firm-specific Conditional Estimate

In order to answer our second research question of cross-sectional differences in the changes in conditional correlation caused by differential foreign investors' demand, we estimate the changes in correlation based on world rank size measure using the regression

$$CR_{sit} = \alpha_{si} + \gamma PostLib_{it} + \delta WRank(size_{si})PostLib_{it} + \varepsilon_{sit}$$

and the changes in correlation based on domestic rank size measure using the regression

$$CR_{sit} = \alpha_{si} + \gamma PostLib_{it} + \delta DRank(size_{si})PostLib_{it} + \varepsilon_{sit}$$

Notice that the changes in conditional correlation are not simply γ, but rather $\gamma + \delta WRank(size_{it})$ in the case of World rank size measure, and $\gamma + \delta DRank(size_{it})$ in the case of domestic rank size measure, and both will thus be (nonlinear) functions of firm size.

The third and the fourth column in Table 10 provide the results from the firm-specific conditional estimation. With world rank size measure, the coefficient δ is significant, that is, a firm size matters in the correlation changes after stock market liberalization. The change in correlation with the world market return for the world's smallest firm is 0.0005 (= 0+0.1524*0.0033), which shows virtually no change. For the world's largest firm, the change in correlation with world market return is 0.1524 (=0+0.1524*1), an increase in the correlation of about 0.15. There is a distinct difference in the changes in the correlation among firms, depending on their sizes. While large firms show increases in conditional correlation, small firms show virtually no changes in the correlation. On the other hand, with domestic rank size measure only coefficient γ of 0.0652 becomes significant, showing that correlation increases after stock market liberalization, but there is no significant difference among firms, depending on firm size.

E.4. After Controlling for World Market Volatility

As we mentioned earlier, since the correlation with world market could be affected by world market volatility, we need to control for this effect before concluding the impact of stock market liberalization on the market correlation.

The second set of columns in Table 10 shows the results after controlling for changes in the world market volatility, represented by the annualized realized volatility of MSCI World return. The 5th column shows the result from estimating the benchmark model with the IFCG

indices. After controlling for World market volatility, the coefficient γ of 0.0039 is still statistically insignificant, suggesting no changes in the correlation with world market after stock market liberalization. The coefficient γ for the firm-specific unconditional estimate is –0.0223, which is statistically significant, implying that the correlation with World market returns decreases slightly rather than an increase reported prior to controlling for world market volatility.

The 7th and the 8th columns provide the results from the firm-specific conditional estimation. The coefficient of δ from regression with World rank size measure is still significant, showing that a firm size matters in the correlation changes after stock market liberalization. The change in the correlation for the world's smallest firm is -0.1053 (= -0.1058+0.1647*0.0033) and that for the world's largest firm is 0.0589 (= -0.1058+0.1647*1). Hence the change in correlation with the world market return ranges from -0.11 to 0.06 per year based on firms' World rank size measure. On the other hand, with domestic rank size measure, both coefficients γ and δ become insignificant. Thus, after controlling for World market volatility, the results from the firm-specific conditional estimate with World rank size measure remain the same as before, that is, large firms show positive changes in the correlation whereas small firms show negative changes in the correlation.

The change in correlation with the world market returns after controlling for the world market volatility are shown graphically in Figure 5 for World rank size measure. We plot $\gamma + \delta WRank(size_{it})$ against firm size. The shaded area shows the confidence-band with a 95% confidence level. The figure shows that the change in correlation is positively related to the firm size, indicating the big-size firms show increases in the correlation whereas small firms show decreases in the correlation.

E.5. Robustness Tests for Varying Test Windows

We have performed robustness tests to assess the sensitivity of our results to various test windows. We apply windows of 3-, 4- and 5-year symmetric width for *PreLib* and *PostLib*. We find that our test results remain the same as results above using 2-year windows. The results are basically the same as before, that is, large size firms show significant positive changes whereas small size firms show negative changes in the correlation. The results are reported in Appendix H for completeness, but will not be discussed in detail.

Chapter VIII. Summary and Future Studies

Through this study we attempt to answer the following key questions: What are the revaluation effects and the impacts on the cost of capital, volatility, and correlation with world market returns from stock market liberalization in emerging market countries? These questions have been studied extensively at the market-level, i.e. using country indices, but not at the firm level. In the market-level analysis, there is increasing concern whether the country indices are proper means to answer those questions, for example they may not represent the real holdings of foreign portfolio investors after liberalization. Empirically, foreign portfolio investors are known to prefer investment in large and well-known firms. Hence, the opening of capital markets should have a differential impact across securities depending on foreign investors' demand. We therefore use individual firm data as well as market-level indices in our analysis.

Our test results using country indices show statistically and economically significant revaluation effects, and increases in the cost of capital. While the emerging stock market volatility increases, its correlation with world market return does not change after stock market liberalization. More important than these market-level findings, we report significantly different impacts of stock market liberalization, based on firm size, which is used as a proxy for foreign investors' demand. Large firms tend to exhibit large revaluation effects, insignificant change in the cost of capital, small increases in volatility, and increases in correlation with the world market from liberalization. Small firms show small revaluation effects, increases in the cost of capital, large increases in volatility and decreases in correlation with world market returns after liberalization. Thus, even though the IFCG is originally composed of the largest and the most liquid firms in each market, we find that there are

significant cross-sectional differences in the impact of stock market liberalization among firms depending on their sizes.

In this study, we adopt only one firm-specific characteristic, namely firm size, using it as a proxy for the foreign investors' demand. In addition to the lack of information, illiquidity is also considered to be a critical impediment to investing in emerging markets. Hence, liquidity measures can be used as conditioning factors to investigate the impact of stock market liberalization. Also, since industrial factors are known to be important in international diversification strategies, we could further investigate the industry-specific impact of stock market liberalization on the variables we investigated here. We leave these important issues for further study.

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Table 1

Comparison of Market Liberalization Dates in Emerging Markets

Country	Henry(2000)	Bekaert and Harvey (2000)	Kim and Singal (2000)
Argentina	Nov-89	Nov-89	Nov-89
Brazil	Mar-88	May-91	May-91
Chile	May-87	Jan-92	Oct-89
Colombia	Dec-91	Feb-91	Feb-91
India	Jun-86	Nov-92	Nov-92
Korea	Jun-87	Jan-92	Jan-92
Malaysia	May-87	Dec-88	Prior to Jan-85
Mexico	May-89	May-89	May-89
The Philippines	May-86	Jun-91	Mar-86
Taiwan	May-86	Jan-91	Jan-91
Thailand	Jan-88	Sep-87	Aug-88
Venezuela	Jan-90	Jan-90	Jan-90

Table 2
Stock Market Liberalization (from Henry (2000))

Country	Date of Stock Market Liberalization	Details about the Liberalization
Argentina	November 1989	**Policy Decree**: The liberalization began with the New Foreign Investment Regime in November 1989. Legal limits on the type and nature of foreign investments are reduced.
Brazil	March 1988	**Country Fund Introduction**: "The Brazil Fund Incorpoated"
Chile	May 1987	**Country Fund Introduction**: "The Toronto Trust Mutual Fund"
Colombia	December 1991	**Policy Decree**: Resolution 52 allowed foreign investors to purchase up to 100 percent of locally listed companies.
India	June 1986	**Country Fund Introduction**: "The India Fund"
Korea	June 1987	**Country Fund Introduction**: "The Korea Europe Fund Limited"
Malaysia	May 1987	**Country Fund Introduction**: "The Wardley GS Malaysia Fund"
Mexico	May 1989	**Policy Decree**: Restrictions on foreign portfolio inflows were substantially liberalized.
The Philippines	May 1986	**Country Fund Introduction**: "The Thornton Philippines Redevelopment Fund Limited"
Taiwan	May 1986	**Country Fund Introduction**: "The Taipei Fund"
Thailand	January 1988	**Country Fund Introduction**: "The Siam Fund Limited"
Venezuela	January 1990	**Policy Decree**: Decree 727 completely opened the market to foreign investors except for bank stocks.

Table 3: Descriptive Statistics of Monthly Emerging Equity Market Returns

All statistics are based on monthly U.S. dollar returns. Market capitalization and number of firms in index are values as of October 1999. Market capitalization is in millions of US $. The emerging markets data are from Emerging Market Database of the International Financial Corporation. EMs include Argentina (ARG), Brazil(BRA), Chile(CHI), Colombia(COL), India(IND), Korea(KOR), Malaysia(MAL), Mexico(MEX), the Philippines(PHI), Taiwan(TAI), Thaniland(THA) and Venezuela(VEN). S&P500 returns from CRSP are used for U.S. and Morgan Stanley Capital International (MSCI) world market index returns from Datastream are used for the World market.

	ARG	BRA	CHI	COL	IND	KOR	MAL	MEX	PHI	TAI	THA	VEN	S&P500	MSCI
Data start	M1 1976	M1 1976	M1 1976	M1 1985	M1 1976	M1 1976	M1 1985	M1 1976	M1 1985	M1 1985	M1 1976	M1 1985		
Market Capitalization	21,060	70,853	36,927	4,660	76,884	124,137	62,772	93,760	23,516	188,602	21,299	4,484		
No. of firms	29	97	51	24	141	171	147	66	58	106	64	18		
RETURNS														
Mean(%)	4.44	1.94	2.42	2.01	1.36	1.53	0.88	1.99	2.34	2.22	1.27	1.80	1.05	0.97
Median(%)	1.33	0.00	0.88	0.80	1.12	0.04	0.97	2.33	1.78	1.31	0.70	1.03	1.15	1.00
Maximum(%)	178.11	57.53	62.86	37.34	35.27	70.92	53.74	39.60	46.91	53.34	46.89	48.55	13.18	11.57
Minimum(%)	-64.95	-56.89	-28.03	-19.87	-24.38	-33.56	-31.18	-59.32	-29.30	-35.52	-33.82	-49.79	-21.76	-17.12
Std. Dev.(%)	25.93	16.16	10.56	9.12	8.10	11.10	10.57	12.32	11.26	13.40	10.08	14.16	4.26	3.97
Skewness	2.28	0.47	0.90	1.16	0.54	1.33	0.65	-0.84	0.71	0.60	0.31	-0.04	-0.60	-0.52
Kurtosis	13.49	4.39	6.57	6.11	4.35	9.17	7.58	6.46	5.59	4.97	6.49	5.08	5.97	4.88
Jarque-Bera	1557.46	33.68	190.61	111.74	35.46	537.36	168.01	176.60	64.34	39.22	149.69	32.26	121.95	55.29

Table 4: Unconditional Correlations of Monthly Emerging Equity Market Returns

Correlations are based on monthly U.S. dollar returns from Jan. 1976 (or Jan. 1985) to Oct. 1999. The emerging markets data are from Emerging Market Database of the International Financial Corporation. EMDB countries include Argentina (ARG), Brazil(BRA), Chile(CHI), Colombia(COL), India(IND), Korea(KOR), Malaysia(MAL), Mexico(MEX), the Philippines(PHI), Taiwan(TAI), Thailand(THA) and Venezuela(VEN). S&P500 returns from CRSP are used for U.S. and Morgan Stanley Capital International (MSCI) world market index returns from Datastream are used for the World index.

	ARG	BRA	CHI	COL	IND	KOR	MAL	MEX	PHI	TAI	THA	VEN	US	World
ARG	1													
BRA	0.0356	1												
CHI	0.0863	0.2506	1											
COL	-0.0015	0.1406	0.1861	1										
IND	0.1446	0.1073	0.1915	0.0213	1									
KOR	-0.0268	0.0595	0.1714	0.0471	0.0210	1								
MAL	0.0520	0.1190	0.3111	0.0752	0.1092	0.2334	1							
MEX	0.2405	0.1409	0.3794	0.0846	0.0943	0.1616	0.3174	1						
PHI	0.0543	0.1734	0.3636	0.1815	0.0039	0.2523	0.5240	0.2190	1					
TAI	0.0461	0.1200	0.3296	0.1184	0.0048	0.1204	0.3159	0.3481	0.2526	1				
THA	0.1214	0.1107	0.3409	0.0867	0.0870	0.4009	0.6602	0.3357	0.5376	0.3869	1			
VEN	0.1001	0.0109	0.0348	0.2159	0.1120	0.0123	0.1796	0.0770	0.0632	-0.0458	0.0663	1		
US	0.0894	0.1768	0.3176	0.0952	-0.0213	0.2307	0.4381	0.4120	0.3178	0.1921	0.3690	0.0508	1	
World	0.0234	0.2178	0.2530	0.0943	-0.0458	0.3297	0.4153	0.3421	0.3832	0.2671	0.3828	0.0225	0.7731	1

Table 5
Individual Firm Data

No. of Stocks is the number of companies as of the market liberalization date. Market Cap. is the average value of 8-month *DurLib* period. For example, Top 10(5) firms are chosen on the basis of firm size calculated as average market capitalization for 8-month *DurLib* period and its Market Cap. is the sum of these largest 10 (5) firms' average market capitalization for the same period. No. of Stocks under Individual Firm Data count the number of firms, which exist during the entire 8-month *DurLib* period.

Markets	IFCG Index		Individual Firm Data							
			All Firms			Top 10 firms		Top 5 firms		CR[2]
	No. of Stocks	Market Cap.[1]	No. of Stocks	Market Cap.	% in IFCG	Market Cap.	% in IFCG	Market Cap.	% in IFCG	
Argentina	24	2,824	24	2,823	99.9	2,310	81.8	1,663	58.9	0.26
Brazil	30	5,433	28	5,208	95.8	4,176	76.9	2,967	54.6	0.22
Chile	25	2,070	25	2,070	100	1,602	77.4	1,166	56.4	0.24
Colombia	20	1,934	20	1,934	100	1,603	82.9	1,037	53.6	0.19
India	47	5,570	25	4,485	80.5	3,475	62.4	2,762	49.6	0.31
Korea	23	5,893	21	4,903	83.2	4,156	70.5	2,716	46.1	0.20
Malaysia	40	11,499	40	11,499	100	8,767	76.2	5,775	50.2	0.24
Mexico	52	9,172	52	9,172	100	4,957	54.0	3,154	34.4	0.15
Philippines	18	346	18	346	100	314	90.7	246	71.0	0.26
Taiwan	30	4,111	29	4,088	99.5	2,977	72.4	2,228	54.2	0.22
Thailand	10	2,916	10	2,905	99.6	2,905	99.6	2,425	83.2	0.25
Venezuela	13	784	13	784	100	758	96.8	527	67.3	0.20
Total	332	52,557	305	50,222		38,004		26,670		
Average	28	4,379	25	4,185	96.6	3,167	78.5	2,222	56.6	0.23

1. Market capitalization in millions of US$
2. Concentration Ratio (CR): The Absolute Concentration measure using the largest firms (Top 10 or Top 5) does not consider the total number of companies in the market. A modified Herfindahl index of concentration below is used to complement the absolute concentration measure.

$$CR_{i,t} = \sqrt{\frac{N_{i,t}}{N_{i,t}-1}\sum_{j=1}^{N_{i,t}}\left(w_{ij,t} - \frac{1}{N_{i,t}}\right)^2}$$

where $N_{i,t}$ is the number of companies in the country i at time t and $w_{ij,t}$ is the share of market capitalization of stock j in the country i at time t. If one stock dominates, then CR approaches one. If every stock has equal market capitalization, then CR equals zero.

Table 6: Descriptive Statistics on Firm Size (Market Capitalization)

Firm size is based on the average market capitalization value in the 8-month *DurLib* period. All figures are in millions of US$. The emerging markets data are from Emerging Market Database of the International Financial Corporation. EMs include Argentina(ARG), Brazil(BRA), Chile(CHI), Colombia(COL), India(IND), Korea(KOR), Malaysia(MAL), Mexico(MEX), the Philippines(PHI), Taiwan(TAI), Thaniland(THA) and Venezuela(VEN).

	Mean	Median	Standard Deviation	Kurtosis	Skewness	Minimum	Maximum	Count
All Countries	164.66	80.27	235.65	20.46	3.58	0.69	2197.36	305
Individual Country								
ARG	117.62	76.54	149.26	6.49	2.44	0.69	634.00	24
BRA	186.01	126.17	216.08	0.83	1.37	10.29	749.86	28
CHI	82.81	49.66	98.27	5.99	2.41	7.08	412.85	25
COL	96.75	75.36	82.35	0.65	0.98	6.13	307.36	20
IND	179.42	102.68	279.96	11.56	3.36	7.97	1292.73	25
KOR	233.51	158.69	214.67	0.48	1.02	9.53	777.99	21
MAL	287.49	75.97	428.48	9.29	2.67	6.68	2197.36	40
MEX	176.40	104.60	185.93	4.01	1.99	9.43	817.50	52
PHI	19.26	7.74	21.14	0.77	1.30	0.78	72.42	18
TAI	140.99	83.20	165.62	4.21	2.23	10.87	643.40	29
THA	290.52	232.86	232.24	-1.41	0.45	20.85	635.12	10
VEN	60.32	63.61	43.10	-1.53	0.13	6.22	119.02	13

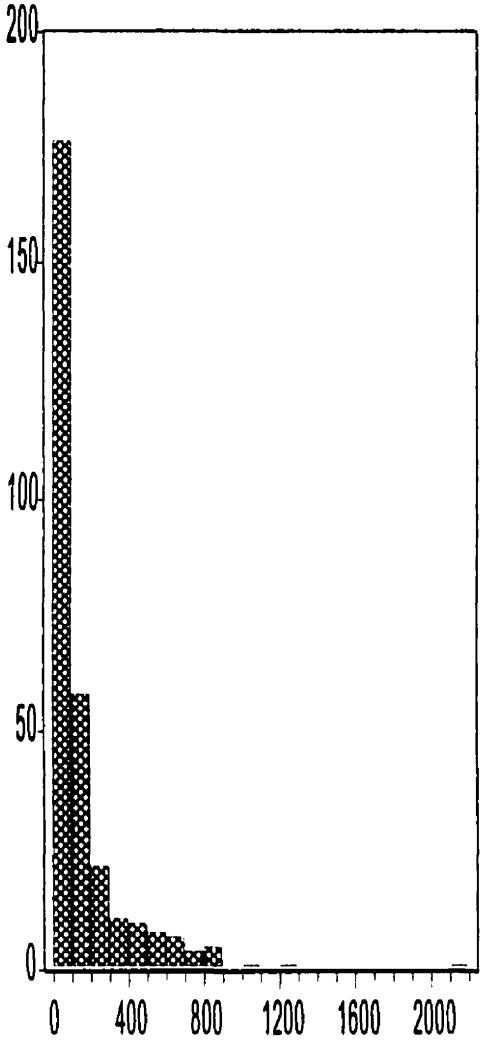


Table 7
Revaluation Effects

M1 (IFCG indices): $R_{it}=\alpha_i+\gamma DurLib_{it}+[\lambda WRet_t]+\varepsilon_{it}$

M2 (Individual Firms): $R_{sit}=\alpha_{si}+\gamma DurLib_{it}+[\lambda WRet_t]+\varepsilon_{sit}$

M3 (Individual Firms with World Rank in Size): $R_{sit}=\alpha_{si}+\gamma DurLib_{it}+\delta(WRank(size_{si})*DurLib_{it})+[\lambda WRet_t]+\varepsilon_{sit}$

M4 (Individual Firms with Domestic Rank in Size): $R_{sit}=\alpha_{si}+\gamma DurLib_{it}+\delta(DRank(size_{si})*DurLib_{it})+[\lambda WRet_t]+\varepsilon_{sit}$

The panel regressions are performed using monthly logarithmic returns of both IFCG indices and individual firms in 12 emerging markets. Data covers Jan. 1976 to the market liberalization date month in each country. For example, Argentina has data from Jan. 1976 to Nov. 1989. Liberalization dates are from Henry (2000). $R_{(s)it}$ is the logarithmic return for country i (for asset s in country i) at time t. $DurLib_{it}$ is a dummy variable that takes on the value one in each of the 8 month *DurLib* period in country i. $\alpha_{(s)i}$ measures the average monthly return for country i (for firm s in country i) before market liberalization and γ measures the average monthly abnormal return after liberalization across all the countries (all the firms). $WRet_t$ is the logarithmic World market return (MSCI World Index). $WRank(size_{si})$ is a worldwide rank measure in firm size {= (firm's rank in the World/total number of firms in 12 markets)}. $DRank(size_{si})$ is a firm's rank in the local market i {= (firm's rank in the country /total number of firms in that market)}. The revaluation effect for M3 and M4 are measured by $\gamma+\delta WRank(size_{si})$ in the case of World rank size measure, and $\gamma+\delta DRank(size_{si})$ in the case of domestic rank size measure. t-statistics based on heteroskedasticity-consistent (White) standard errors are reported in parentheses.

	Before Controlling for World Market Return				*After Controlling for World Market Return*			
	IFCG Indices	*Firm: Average*	*Firm: World Rank*	*Firm: Domestic Rank*	*IFCG Indices*	*Firm: Average*	*Firm: World Rank*	*Firm: Domestic Rank*
γ	**0.0434** (5.11)	**0.0371** (16.12)	**0.0202** (3.32)	**0.0176** (2.94)	**0.0397** (4.65)	**0.0331** (14.23)	**0.0146** (2.39)	**0.0128** (2.13)
δ			**0.0292** (3.32)	**0.0329** (3.85)			**0.0321** (3.65)	**0.0343** (4.00)
λ					**0.2659** (4.15)	**0.2720** (14.74)	**0.2737** (14.82)	**0.2727** (14.78)
Adj. R-squares	0.0258	0.0123	0.0127	0.0128	0.0371	0.0185	0.0189	0.0190
No. of cross sections	12	305	305	305	12	305	305	305
No. of observations	1229	20687	20687	20687	1229	20687	20687	20687

Table 8
Changes in the Cost of Capital

$M1$ (IFCG indices): $R_{it}=\alpha_i+\gamma PostLib_{it}+[\lambda WRet_t]+\varepsilon_{it}$

$M2$ (Individual Firms): $R_{sit}=\alpha_{si}+\gamma PostLib_{it}+[\lambda WRet_t]+\varepsilon_{sit}$

$M3$ (Individual Firms with World Rank in Size): $R_{sit}=\alpha_{si}+\gamma PostLib_{it}+\delta(WRank(size_{si})*PostLib_{it})+[\lambda WRet_t]+\varepsilon_{sit}$

$M4$ (Individual Firms with Domestic Rank in Size): $R_{sit}=\alpha_{si}+\gamma PostLib_{it}+\delta(DRank(size_{si})*PostLib_{it})+[\lambda WRet_t]+\varepsilon_{sit}$

The panel regressions are performed using monthly logarithmic returns of both IFCG indices and individual firms in 12 emerging markets. The data covers 36 months before and 36 months after market liberalization, excluding the 8-month *DurLib* period. Liberalization dates are from Henry (2000). $R_{(s)it}$ is the logarithmic return for country i (for asset s in country i) at time t. $PostLib_{it}$ is a dummy variable that takes on the value one in each of the 36 *PostLib* months in country i. $\alpha_{(s)i}$ measures the average monthly return for country i (for firm s in country i) before market liberalization and γ measures the average monthly abnormal return after liberalization across all the countries. $WRet_t$ is the logarithmic World market return (MSCI World Index). $WRank(size_{si})$ is a worldwide rank measure in firm size {= (firm's rank in the World/total number of firms in 12 markets)}. $DRank(size_{si})$ is a firm's rank in the local market i {= (firm's rank in the country /total number of firms in that market)}. The change in the cost of capital for M3 and M4 are measured by $\gamma+\delta WRank(size_{si})$ in the case of World rank size measure, and $\gamma+\delta DRank(size_{si})$ in the case of domestic rank size measure. t-statistics based on heteroskedasticity-consistent (White) standard errors are reported in parentheses.

	Before Controlling for World Market Return				*After Controlling for World Market Return*			
	IFCG Indices	*Firm: Average*	*Firm: World Rank*	*Firm: Domestic Rank*	*IFCG Indices*	*Firm: Average*	*Firm: World Rank*	*Firm: Domestic Rank*
γ	0.0048 (0.98)	0.0023 (1.50)	**0.0172** (4.22)	**0.0156** (3.67)	**0.0114** (2.41)	**0.0089** (5.86)	**0.0223** (5.52)	**0.0223** (5.29)
δ			**-0.0257** (-4.28)	**-0.0219** (-3.63)			**-0.0230** (-3.91)	**-0.0220** (-3.69)
λ					**0.4678** (6.19)	**0.4493** (24.79)	**0.4479** (24.70)	**0.4492** (24.78)
Adj. R-squares	0.0021	0.0121	0.0126	0.0124	0.0480	0.0300	0.0303	0.0303
No. of cross sections	12	305	305	305	12	305	305	305
No. of observations	795	17810	17810	17810	795	17810	17810	17810

Table 9
Changes in Volatility

M1 (IFCG indices): $V_{it}=\alpha_i+\gamma PostLib_{it}+[\lambda WVol_t]+\varepsilon_{it}$

M2 (Individual Firms): $V_{sit}=\alpha_{si}+\gamma PostLib_{it}+[\lambda WVol_t]+\varepsilon_{sit}$

M3 (Individual Firms with World Rank in Size): $V_{sit}=\alpha_{si}+\gamma PostLib_{it}+\delta(WRank(size_{st})*PostLib_{it})+[\lambda WVol_t]+\varepsilon_{sit}$

M4 (Individual Firms with Domestic Rank in Size): $V_{sit}=\alpha_{si}+\gamma PostLib_{it}+\delta(DRank(size_{st})*PostLib_{it})+[\lambda WVol_t]+\varepsilon_{sit}$

The panel regressions are performed using the log of annually realized volatility (standard deviation) of both IFCG indices and individual firms in 12 emerging markets. The data covers 24 months before and 24 months after market liberalization, excluding the 8-month *DurLib* period. Liberalization dates are from Henry (2000). $V_{(s)it}$ is the log of realized volatility for country i (for asset s in country i) at time t. $PostLib_{it}$ is a dummy variable that takes on the value one in each of the 24 *PostLib* months in country i. $\alpha_{(s)i}$ measures the average yearly volatility for country i (for firm s in country i) before market liberalization and γ measures the average change in the volatility after liberalization across all the countries for IFCG indices and across all the firms for individual firms data. $WVol_t$ is the log of realized volatility of World market return (MSCI World index) that is used to control for world market volatility. $WRank(size_{st})$ is a worldwide rank measure in firm size {= (firm's rank/total number of firms in 12 markets)}. $DRank(size_{st})$ is a firm's rank in the local market i {= (firm's rank/total number of firms in each market)}. The changes in the volatility for M3 and M4 are measured by $\gamma+\delta WRank(size_{st})$ in the case of World rank size measure, and $\gamma+\delta DRank(size_{st})$ in the case of domestic rank size measure. t-statistics based on heteroskedasticity-consistent (White) standard errors are reported in parentheses.

	Before Controlling for World Market Volatility				*After Controlling for World Market Volatility*			
	IFCG Indices	*Firm: Average*	*Firm: World Rank*	*Firm: Domestic Rank*	*IFCG Indices*	*Firm: Average*	*Firm: World Rank*	*Firm: Domestic Rank*
γ	**0.3521** (8.85)	**0.1334** (29.96)	**0.2235** (22.31)	**0.0833** (9.50)	**0.2621** (4.86)	**0.0477** (5.77)	**0.0949** (8.79)	**0.0671** (5.30)
δ			**-0.1397** (-6.34)	**0.0946** (6.57)			**-0.0880** (-3.74)	**-0.0333** (-1.88)
λ					**0.3522** (3.65)	**0.2700** (33.11)	**0.2917** (32.22)	**0.2722** (32.38)
Adj. R-squares	0.8831	0.9571	0.9451	0.9573	0.8785	0.9851	0.9838	0.9850
No. of cross sections	12	305	305	305	12	305	305	305
No. of observations	46	1096	1096	1096	46	1096	1096	1096

Table 10
Changes in Correlation Coefficient with World Market Return

M1 (IFCG indices): $CR_{it}=\alpha_i+\gamma PostLib_{it}+[\lambda WVol_t]+\varepsilon_{it}$

M2 (Individual Firms): $CR_{sit}=\alpha_{si}+\gamma PostLib_{it}+[\lambda WVol_t]+\varepsilon_{sit}$

M3 (Individual Firms with World Rank in Size): $CR_{sit}=\alpha_{si}+\gamma PostLib_{it}+\delta(WRank(size_{si})*PostLib_{it})+[\lambda WVol_t]+\varepsilon_{sit}$

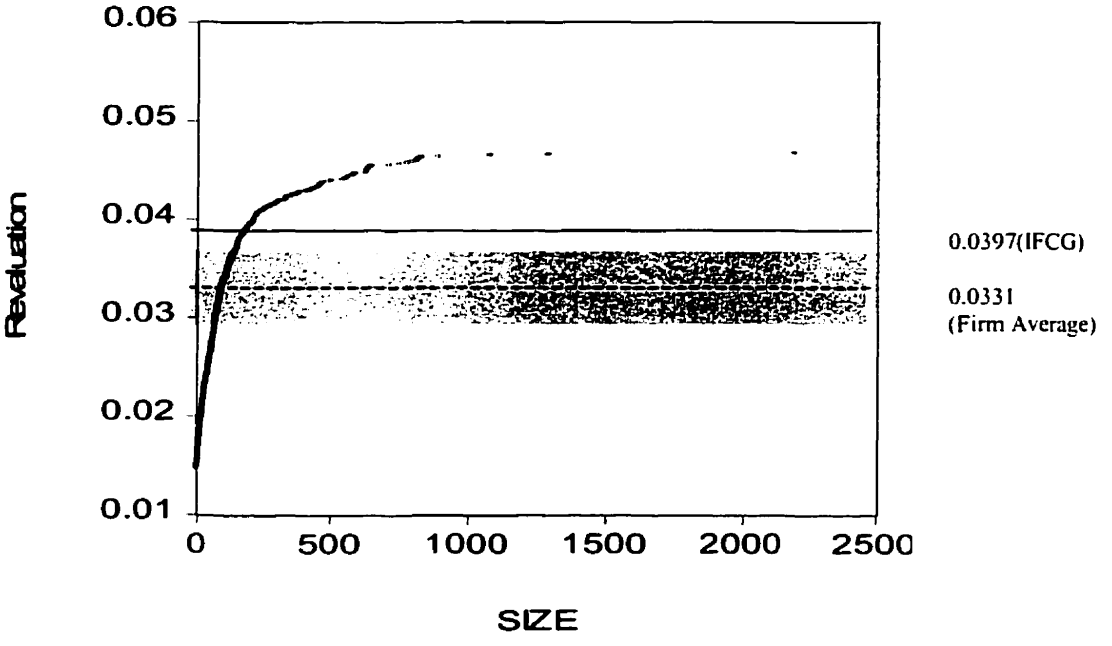
M4 (Individual Firms with Domestic Rank in Size): $CR_{sit}=\alpha_{si}+\gamma PostLib_{it}+\delta(DRank(size_{si})*PostLib_{it})+[\lambda WVol_t]+\varepsilon_{sit}$

The panel regressions are performed using the annually realized correlation coefficient of both IFCG indices and individual firms in 12 emerging markets. The data covers 24 months before and 24 months after market liberalization, excluding the 8-month *DurLib* period. Liberalization dates are from Henry (2000). $CR_{(s)it}$ is the correlation coefficient with World market (MSCI World index) return for country i (for asset s in country i) at time t. $PostLib_{it}$ is a dummy variable that takes on the value one in each of the 24 *PostLib* months in country i. $\alpha_{(s)i}$ measures the average yearly correlation with World market return for country i (for firm s in country i) before market liberalization and γ measures the average change in the correlation after liberalization across all the countries for IFCG indices and across all the firms for individual firms data. $WVol_t$ is the realized volatility of World market return (MSCI World index) that is used to control for World market volatility. $WRank(size_{si})$ is a worldwide rank measure in firm size {= (firm's rank/total number of firms in 12 markets)}. $DRank(size_{si})$ is a firm's rank in the local market i {= (firm's rank/total number of firms in each market)}. The change in the correlation coefficient for M3 and M4 are measured by $\gamma+\delta WRank(size_{si})$ in the case of World rank size measure, and $\gamma+\delta DRank(size_{si})$ in the case of domestic rank size measure. t-statistics based on heteroskedasticity-consistent (White) standard errors are reported in parentheses.

	Before Controlling for World Market Volatility				*After Controlling for World Market Volatility*			
	IFCG Indices	*Firm: Average*	*Firm: World Rank*	*Firm: Domestic Rank*	*IFCG Indices*	*Firm: Average*	*Firm: World Rank*	*Firm: Domestic Rank*
γ	0.0157 (0.37)	**0.0605** (9.40)	-0.0141 (-0.97)	**0.0652** (4.40)	0.0039 (0.08)	**-0.0223** (-3.62)	**-0.1058** (-8.81)	-0.0120 (-0.86)
δ			**0.1524** (5.68)	-0.0094 (-0.31)			**0.1647** (7.33)	-0.0191 (-0.82)
λ					**1.3001** (2.18)	**2.2129** (35.54)	**2.2361** (36.06)	**2.2121** (35.50)
Adj. R-squares	0.4103	0.7218	0.7282	0.7217	0.3965	0.8671	0.8684	0.8669
No. of cross sections	12	305	305	305	12	305	305	305
No. of observations	46	1096	1096	1096	46	1096	1096	1096

Figure 1

Plots of revaluation effects against firm size for all individual companies across 12 EMs



M1 (IFCG indices): $R_{it}=\alpha_i+\gamma DurLib_{it}+\lambda WRet_t+\varepsilon_{it}$

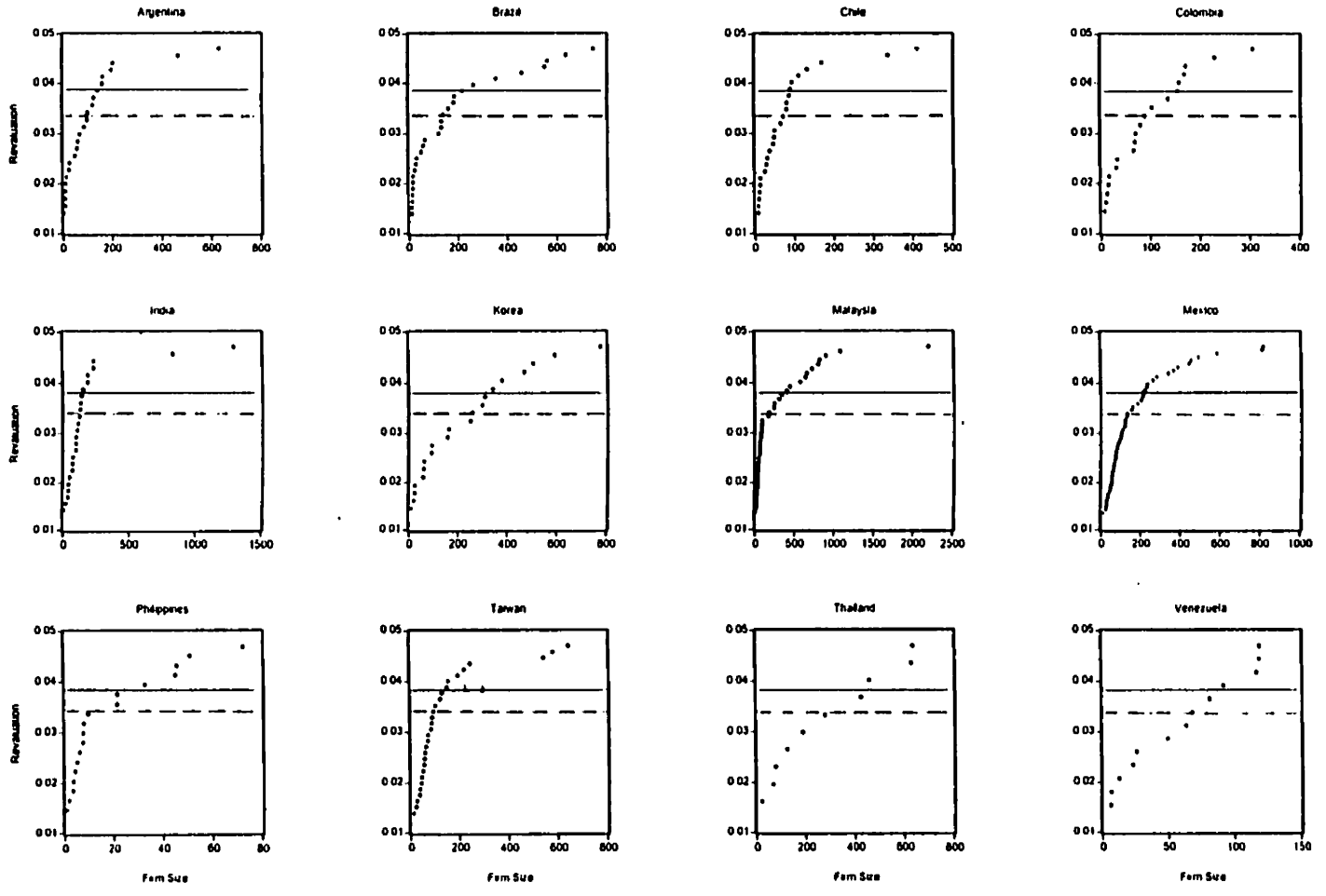
M2 (Individual Firms): $R_{sit}=\alpha_{si}+\gamma DurLib_{it}+\lambda WRet_t+\varepsilon_{sit}$

M3 (Individual Firms with World Rank Size): $R_{sit}=\alpha_{si}+\gamma DurLib_{it}+\delta WRank(size_{si})*DurLib_{it}+\lambda WRet_t+\varepsilon_{sit}$

IFCG and Firm Average represent the revaluation effect for benchmark estimate with IFCG indices and firm-specific unconditional estimate with individual firm data respectively. Confidence interval of Firm Average with a 95% confidence level is shown in shaded area. X axis is firm size (market capitalization) in millions of US $. Y axis represents monthly abnormal level of stock returns (Revaluation Effects), calculated by $\gamma+\delta*WRank(size_{si})$.

Figure 1(continued)

B. Domestic rank size measure

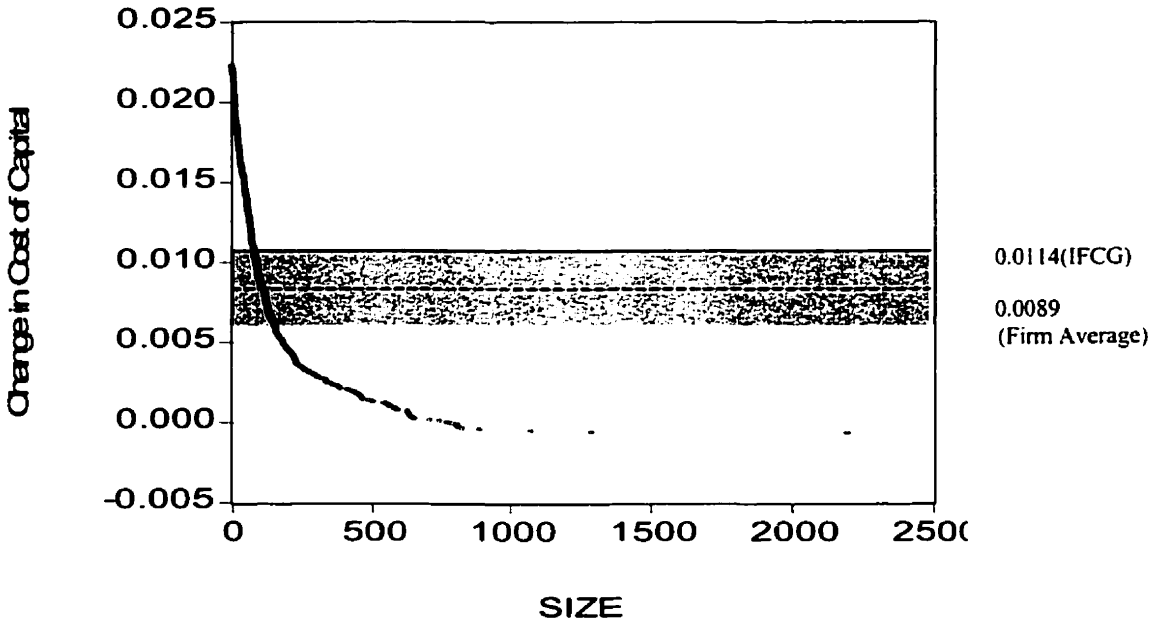


M4 (Individual Firms with Domestic Rank Size): $R_{sit}=\alpha_{si}+\gamma DurLib_{it}+\delta\, Drank(size_{si})*DurLib_{it}+\varepsilon_{sit}$

The straight and dotted lines represent the abnormal levels of revaluation effects for benchmark estimate with IFCG indices and firm-specific unconditional estimate with individual firm data, respectively. X axis is firm size (market capitalization) in millions of US $. Y axis represents monthly abnormal level of stock returns (Revaluation Effects), calculated by $\gamma+\delta^{*}DRank(size_{si})$.

Figure 2

Plots of change in the cost of capital against firm size for all individual companies across 12 EMs



M1 (IFCG indices): $R_{it}=\alpha_t+\gamma PostLib_{it}+\lambda WRet_t+\varepsilon_{it}$

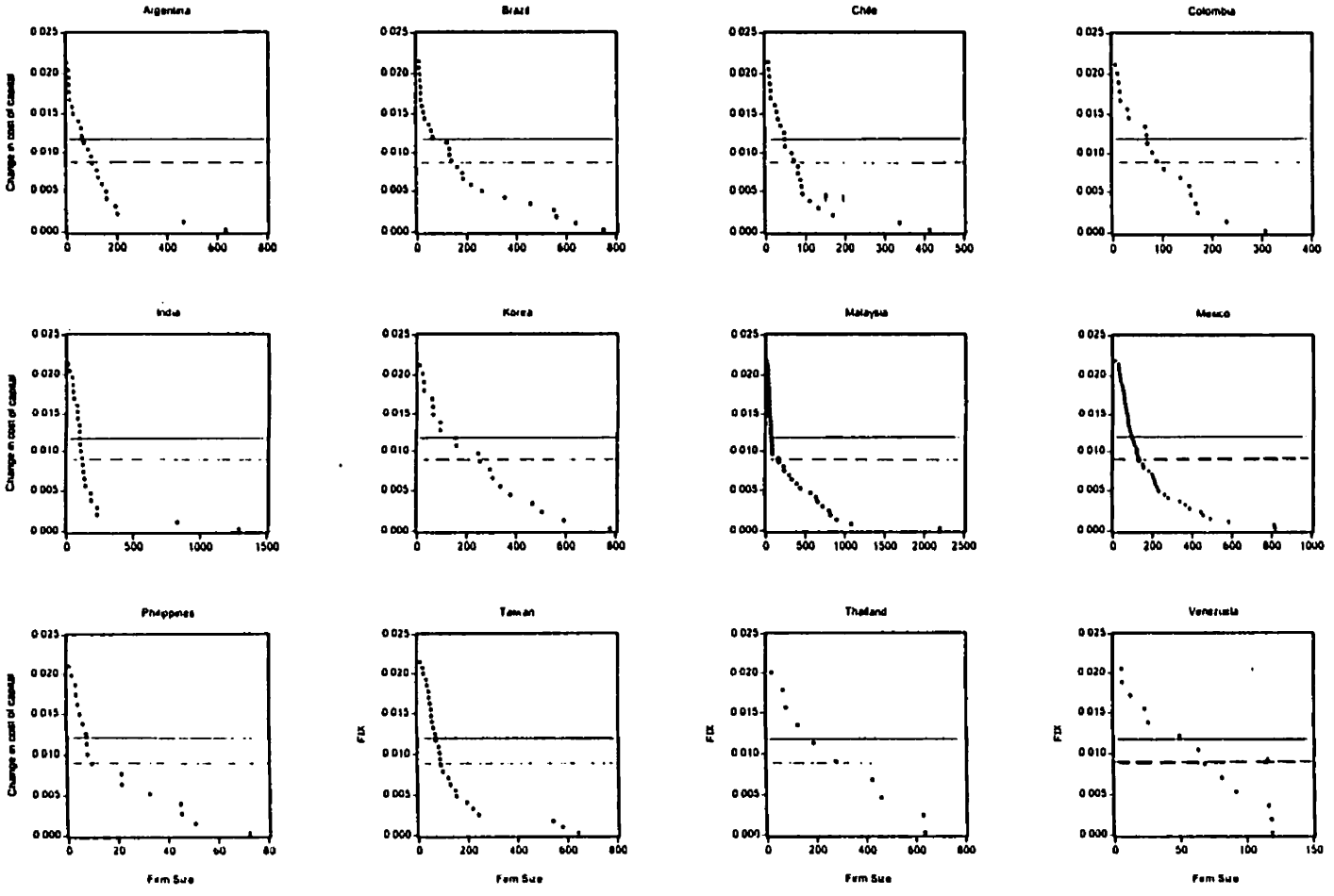
M2 (Individual Firms): $R_{sit}=\alpha_{si}+\gamma PostLib_{it}+\lambda WRet_t+\varepsilon_{sit}$

M3 (Individual Firms with World Rank size): $R_{sit}=\alpha_{si}+\gamma PostLib_{it}+\delta(WRank(size_{si})*PostLib_{it})+\lambda WRet_t+\varepsilon_{sit}$

IFCG and Firm Average represent the changes in the level of the cost of capital for benchmark estimate with IFCG indices and firm-specific unconditional estimate with individual firm data respectively. Confidence interval of Firm Average with a 95% confidence level is shown in shaded area. X axis is firm size (market capitalization) in millions of US $. Y axis represents monthly change in the cost of capital, calculated by $\gamma+\delta*WRank(size_{si})$.

Figure 2(continued)

B. Domestic rank size measure

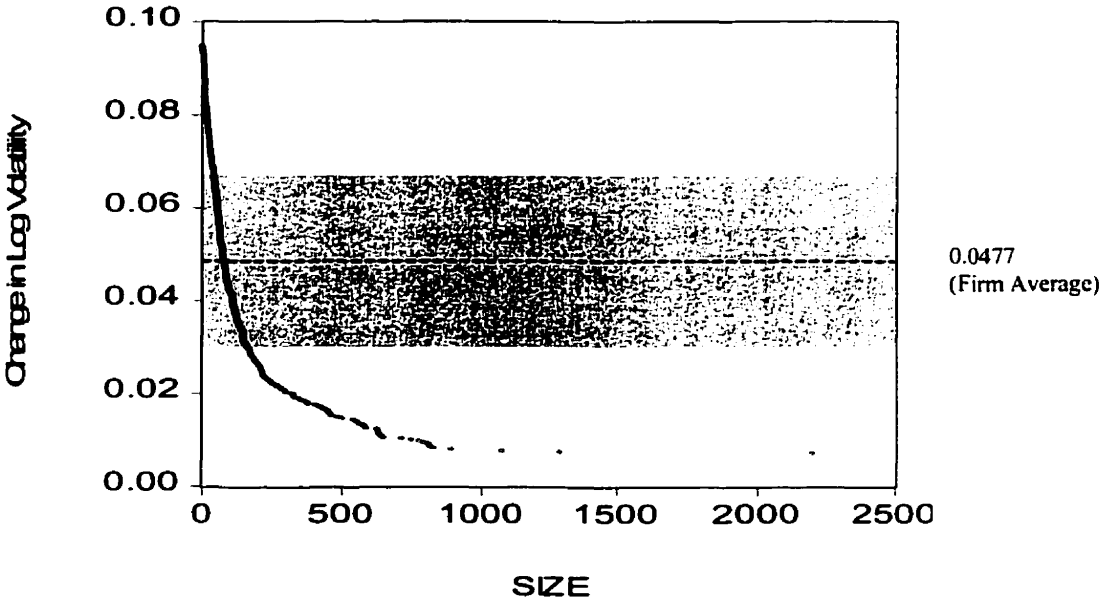


M4 (Individual Firms with Domestic Rank Size): $R_{sit}=\alpha_{si}+\gamma PostLib_{it}+\delta\, Drank(size_{si})*PostLib_{it}+\varepsilon_{sit}$

The straight and dotted lines represent the changes in the cost of capital for benchmark estimate with IFCG indices and firm-specific unconditional estimate with individual firm data, respectively. X axis is firm size (market capitalization) in millions of US $. Y axis represents monthly change in the cost of capital, calculated by $\gamma+\delta*DRank(size_{si})$.

Figure 3

Plots of change in log of volatility against firm size for all individual companies across 12 EMs



M1 (IFCG indices): $V_{it}=\alpha_i+\gamma PostLib_{it}+\lambda WVol_t+\varepsilon_{it}$

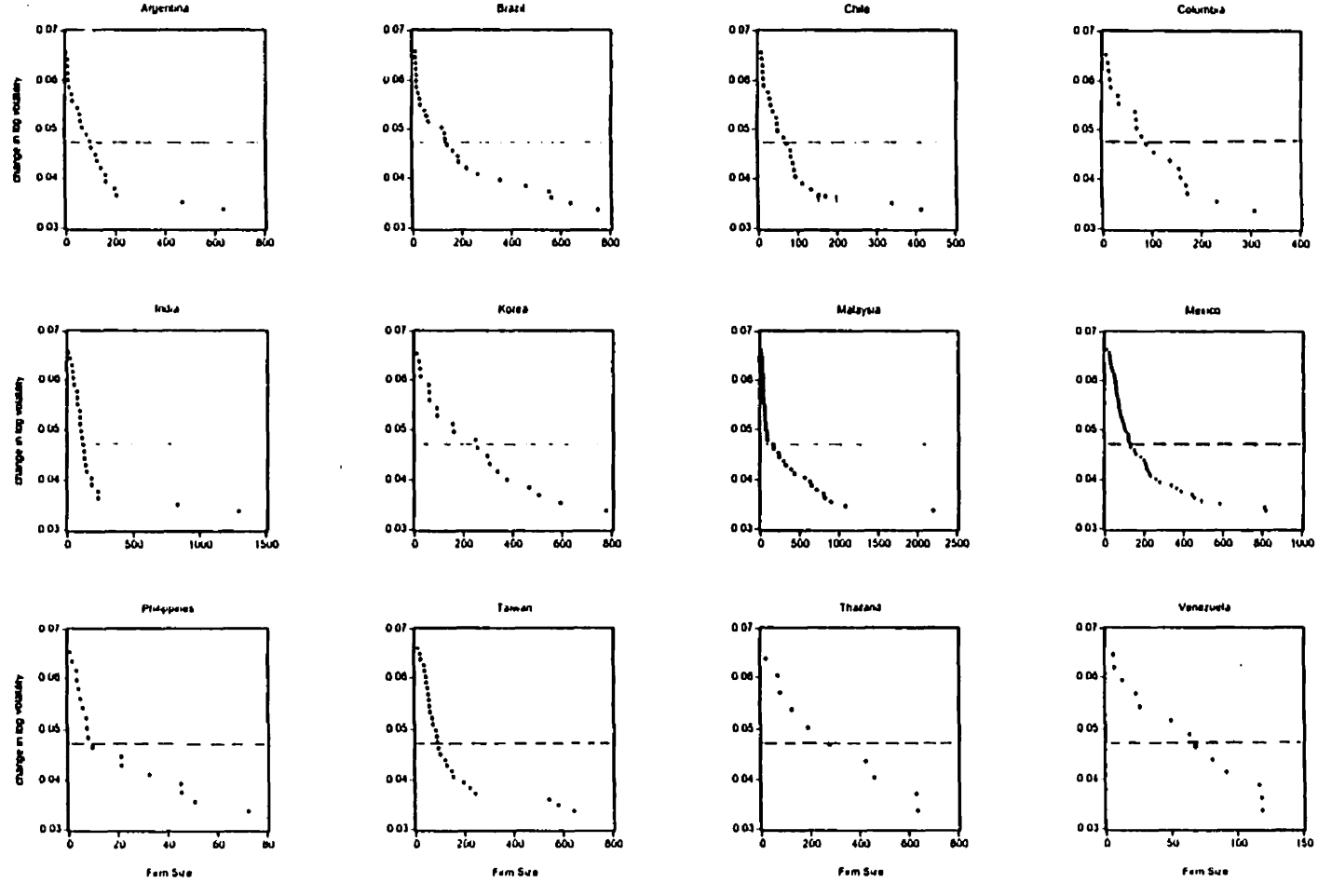
M2 (Individual Firms): $V_{sit}=\alpha_{si}+\gamma PostLib_{it}+\lambda WVol_t+\varepsilon_{sit}$

M3 (Individual Firms with World Rank size): $V_{sit}=\alpha_{si}+\gamma PostLib_{it}+\delta(WRank(size_{si})*PostLib_{it})+\lambda WVol_t+\varepsilon_{sit}$

IFCG and Firm Average represent the change in log of annualized volatility for benchmark estimate with IFCG indices and firm-specific unconditional estimate with individual firm data respectively. IFCG line of 0.2621(IFCG) is not shown on the figure. Confidence interval of Firm Average with a 95% confidence level is shown in shaded area. X axis is firm size (market capitalization) in millions of US $. Y axis represents change in the log of annualized volatility calculated by $\gamma+\delta*WRank(size_{si})$.

Figure 3(continued)

B. Domestic rank size measure

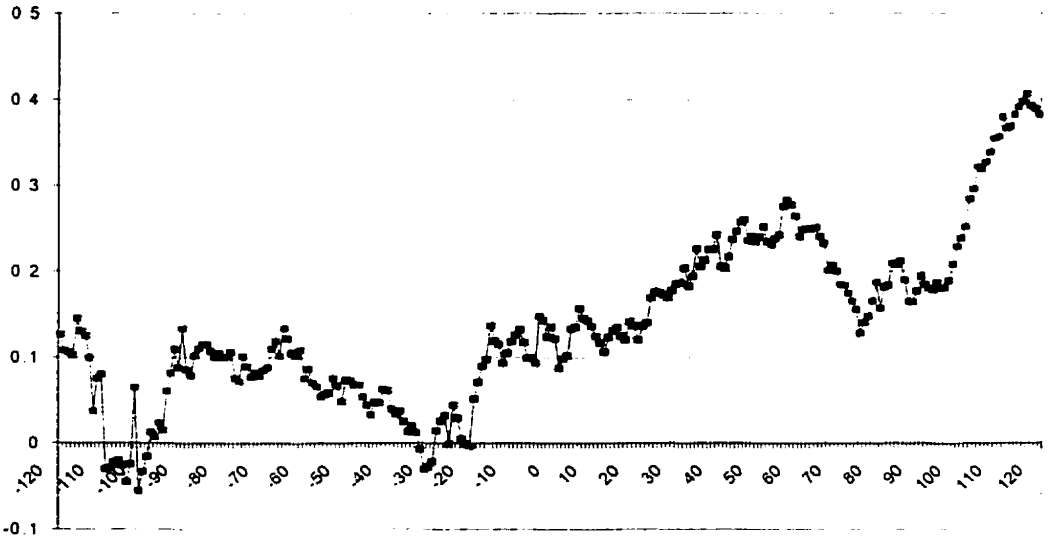


M4 (Individual Firms with Domestic Rank Size): $V_{sit}=\alpha_{si}+\gamma PostLib_{it}+\delta\, Drank(size_{si})*PostLib_{it}+\varepsilon_{sit}$

The dotted line represents the change in the log of annualized volatility for firm-specific unconditional estimate with individual firm data. X axis is firm size (market capitalization) in millions of US $. Y axis represents monthly change in the log of annualized volatility, calculated by $\gamma+\delta*DRank(size_{si})$.

Figure 4

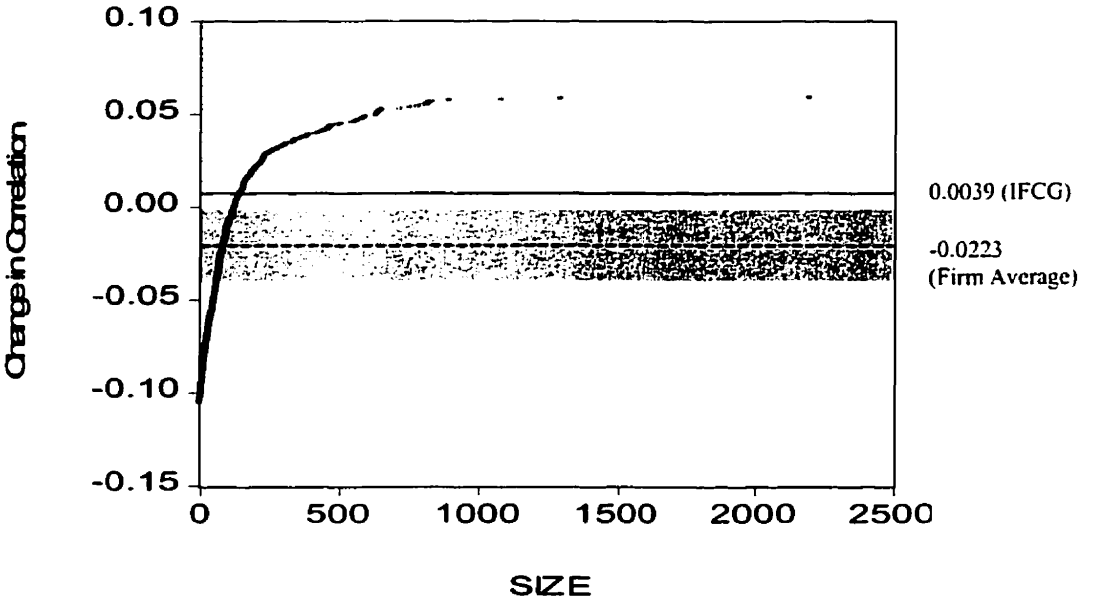
Aggregated correlation coefficients of emerging markets with the world



The figure reports the (unweighted) average correlation of 12 emerging markets with world market return (IFCG indices) with world market return (MSCI Wold Index). The correlation is computed over moving windows of 36 month, using US $ monthly returns. The period covers 10 years before and 10 years after stock market liberalization data t=0.

Figure 5

Plots of change in correlation against firm size for all individual companies across 12 EMs



M1 (IFCG indices): $CR_{it}=\alpha_i+\gamma PostLib_{it}+\lambda WVol_t+\varepsilon_{it}$

M2 (Individual Firms): $CR_{sit}=\alpha_{si}+\gamma PostLib_{it}+\lambda WVol_t+\varepsilon_{sit}$

M3 (Individual Firms with World Rank size): $CR_{sit}=\alpha_{si}+\gamma PostLib_{it}+\delta(WRank(size_{si})*PostLib_{it})+\lambda WVol_t+\varepsilon_{sit}$

IFCG and Firm Average represent change in stock market correlation with world market for benchmark estimate with IFCG indices and firm-specific unconditional estimate with individual firm data respectively. Confidence interval of Firm Average with a 95% confidence level is shown in shaded area. X axis is firm size (market capitalization) in millions of US $. Y axis represents change in correlation calculated by $\gamma+\delta*WRank(size_{si})$.

Appendix A: Statistics for Schwarz Information Criterion

	C	AR(1)	AR(2)	AR(3)	AR(4)	AR(5)	AR(6)	AR(7)	AR(8)	AR(9)	AR(10)	AR(11)	AR(12)
A1_LOGRET	0.37739	0 39811	0 40565	0 41939	0 44164	0 42774	0 45054	0 46995	0 48151	0 49797	0 52217	0 52101	0 51693
A2_LOGRET	0 31037	0 32770	0.29993	0 31216	0 32241	0 32290	0 33268	0 35246	0 37447	0 39635	0 42052	0 38678	0 39290
A3_LOGRET	0.27974	0 32511	0 31389	0 33735	0 37051	0 40478	0 46089	0 47048	0 47808	0 52868	0 58278	0 63807	0 68417
A4_LOGRET	0 03115	0 05258	0 05420	0 03798	0 04986	0 05676	0 06935	0 07216	0 05460	0 07040	0 09422	0.01690	0 04038
A5_LOGRET	0.35572	0 37728	0 39149	0 41150	0 43060	0 39564	0 40207	0 41961	0 40308	0 42222	0 44570	0 42512	0 44887
A10_LOGRET	0.71167	0 73363	0 73308	0 76050	0 75019	0 77407	0 79986	0 81032	0 77278	0 80170	0 82935	0 78563	0 81480
A12_LOGRET	0 48884	0 51881	0 53014	0 55227	0 57713	0 55553	0 58059	0.47328	0 50894	0 53147	0 56822	0 60643	0 62130
A20_LOGRET	0.63279	0 67060	0 71563	0 73626	0 74692	0 75007	0 77754	0 76192	0 80603	0 84413	0 89002	0 93854	0 98208
A21_LOGRET	0.31938	0 33946	0 35815	0 37804	0 39850	0 39514	0 41022	0 43109	0 45468	0 47703	0 50058	0 46894	0 48844
A23_LOGRET	0.50929	0 53083	0 55002	0 57092	0 53161	0 55442	0 53177	0 53209	0 54654	0 56986	0 57683	0 55561	0 56664
A24_LOGRET	0 85368	0 90332	0 88001	0 87305	0 85099	0.83875	0 88637	0 86239	0 91517	0 97063	1 02817	1 08730	1 13817
A25_LOGRET	0.45076	0 47638	0 49268	0 50188	0 52480	0 50003	0 51441	0 54030	0 49419	0 51941	0 54673	0 50751	0 52406
A27_LOGRET	0 06920	0 09144	0 06210	0 07999	0 08886	0 08612	0.06146	0 06890	0 08957	0 10906	0 13324	0 07486	0 08630
A28_LOGRET	1.15302	1 17267	1 19276	1 22903	1 26823	1 28047	1 33980	1 35542	1 40984	1 45870	1 51737	1 58406	1 65036
A32_LOGRET	0.12331	0 14488	0 14755	0 16366	0 17515	0 16001	0 16704	0 18071	0 18255	0 20589	0 22729	0 19458	0 20224
A33_LOGRET	0.41077	0 43397	0 44083	0 46043	0 47887	0 49666	0 51339	0 52196	0 49172	0 50941	0 53004	0 52542	0 53393
A34_LOGRET	0 18667	0 20688	0 20343	0 22453	0 23402	0 21733	0 20921	0 19542	0 16903	0 18480	0 19581	0.15806	0 16926
A36_LOGRET	0.53883	0 55437	0 59044	0 59830	0 58196	0 59622	0 63221	0 60543	0 61633	0 64788	0 68677	0 70628	0 73842
A38_LOGRET	0.24090	0 27599	0 31522	0 35476	0 36615	0 39478	0 43192	0 47714	0 51960	0 55570	0 59608	0 63579	0 68532
A39_LOGRET	0 66359	0 68260	0 68299	0 69419	0 68939	0 69736	0 65530	0 66539	0 63078	0.62847	0 64272	0 64662	0 65336
A40_LOGRET	0.39407	0 41718	0 43289	0 45708	0 46794	0 48675	0 48225	0 50277	0 49924	0 49301	0 51612	0 53745	0 55952
A44_LOGRET	-0 06501	-0 03456	-0 00647	-0 01521	0 00043	-0 03464	-0 00376	-0.11032	-0 08334	-0 05090	-0 02194	0 01212	0 01287
A45_LOGRET	0.57685	0 60501	0 60659	0 62409	0 62488	0 61393	0 61963	0 64477	0 66649	0 69198	0 72443	0 69675	0 72903
A50_LOGRET	0.54508	0 57340	0 58482	0 60569	0 61170	0 61002	0 63387	0 64440	0 64598	0 67419	0 70054	0 67014	0 69883
B1_LOGRET	0.52730	0 55033	0 57385	0 58342	0 60707	0 62856	0 64267	0 64992	0 67287	0 68919	0 70745	0 72392	0 74332
B3_LOGRET	0.67480	0 67411	0 69422	0 71117	0 73061	0 75289	0 77555	0 79316	0 81841	0 83815	0 86387	0 87208	0 85450
B4_LOGRET	-0.11142	-0 07612	-0 05185	-0 01677	-0 01924	0 02361	0 06679	0 11289	0 13712	0 15592	0 19876	0 21058	0 25361
B10_LOGRET	-0 21817	-0.22334	-0 20131	-0 18427	-0 16190	-0 14441	-0 12584	-0 10345	-0 08081	-0 06315	-0 03975	-0 01824	0 00602
B13_LOGRET	-0.35802	-0 35483	-0 33442	-0 31191	-0 28888	-0 26841	-0 24474	-0 22337	-0 20195	-0 17833	-0 15945	-0 13616	-0 11323
B17_LOGRET	0.10874	0.14961	0 18924	0 20477	0 24863	0 28591	0 29327	0 33474	0 38389	0 43649	0 43942	0 43434	0 48567
B18_LOGRET	-0.08789	-0 06495	-0 04414	-0 03781	-0 01243	0 00968	0 03283	0 05961	0 08596	0 10710	0 12721	0 12985	0 14517
B21_LOGRET	0.71979	0 75100	0 77985	0 80560	0 83615	0 86197	0 88009	0 88845	0 90727	0 93298	0 96872	1 00238	1 03890
B22_LOGRET	0.05376	0 05914	0 09085	0 11897	0 14378	0 17044	0 19883	0 23530	0 26655	0 29250	0 31346	0 34453	0 38289
B23_LOGRET	0.02569	0 03384	0 05412	0 07792	0 07721	0 09923	0 12302	0 16324	0 20067	0 20523	0 23956	0 27496	0 24413
B24_LOGRET	0.42784	0 45710	0 49983	0 54497	0 58146	0 59991	0 59155	0 63572	0 68437	0 70836	0 72652	0 76440	0 78738
B25_LOGRET	0.99199	1 01625	1 05742	1 09755	1 14120	1 18007	1 21502	1 25318	1 30012	1 31773	1 36302	1 41046	1 45663
B26_LOGRET	-0.10449	-0 08153	-0 04780	-0 02688	0 00836	0 02971	0 03966	0 07514	0 09867	0 09593	0 08231	0 11431	0 13524
B30_LOGRET	0.16328	0 18526	0 22271	0 25827	0 27072	0 31045	0 34588	0 38553	0 42666	0 43364	0 43367	0 47306	0 51406
B31_LOGRET	0.87442	0 88894	0 94536	0 97979	1 03549	1 08829	1 13211	1 18802	1 24502	1 25868	1 27454	1 33379	1 40206
B32_LOGRET	0.54833	0 58750	0 62875	0 66796	0 64212	0 68855	0 72044	0 75559	0 80035	0 84953	0 88449	0 93153	0 97732
B33_LOGRET	0.27828	0 31156	0 33435	0 36510	0 39091	0 38331	0 40451	0 40748	0 43347	0 46509	0 50087	0 51474	0 52425
B34_LOGRET	0.08119	0 11508	0 15104	0 19009	0 21176	0 24385	0 27913	0 31146	0 34712	0 38481	0 40519	0 44694	0 48915
B35_LOGRET	0.05504	0 07408	0 09755	0 11135	0 12959	0 15282	0 17080	0 19336	0 21616	0 22701	0 23561	0 26011	0 28201
B36_LOGRET	-0.05400	-0 04179	-0 02507	-0 00625	0 01515	0 03892	0 05459	0 07755	0 08149	0 08162	0 10453	0 12790	0 14911
B37_LOGRET	0.61051	0 64368	0 68021	0 71285	0 74753	0 75255	0 78117	0 81309	0 83616	0 86187	0 85595	0 84680	0 88389
B38_LOGRET	0.91001	0 96460	0 98174	1 04819	1 05074	1 12838	1 15769	1 18520	1 27264	1 36029	1 36796	1 44610	1 50106
B39_LOGRET	-0 50154	-0.57404	-0 55257	-0 53758	-0 52199	-0 49994	-0 47647	-0 46561	-0 46230	-0 43832	-0 41558	-0 39633	-0 37343
B40_LOGRET	0 20451	0.20198	0 23391	0 25170	0 27085	0 30745	0 31973	0 35670	0 39026	0 42462	0 45213	0 48669	0 50773
B41_LOGRET	-0.18041	-0 16838	-0 13696	-0 11252	-0 07534	-0 06420	-0 07826	-0 04404	-0 01684	0 02283	0 06163	0 06907	0 09066
B42_LOGRET	-0.15515	-0 13712	-0 11507	-0 09664	-0 07964	-0 05754	-0 03423	-0 01163	0 00564	0 01243	0 03475	0 03574	0 05693
B43_LOGRET	0.16383	0 18206	0 20358	0 21824	0 22552	0 24921	0 26626	0 28823	0 30262	0 31639	0 33148	0 35429	0 37176
B44_LOGRET	0 71054	0.66356	0 67918	0 71409	0 74677	0 77699	0 80485	0 82933	0 86346	0 87817	0 91062	0 94709	0 98442
C1_LOGRET	-0.41878	-0 39058	-0 40514	-0 37232	-0 32964	-0 36477	-0 35775	-0 33512	-0 33423	-0 30614	-0 26233	-0 24813	-0 21902
C27_LOGRET	-1 18062	-1.21353	-1 21021	-1 19282	-1 18797	-1 16523	-1 15026	-1 13796	-1 12117	-1 10481	-1 09459	-1 08661	-1 07163
C14_LOGRET	-1.28919	-1 28179	-1 27283	-1 26715	-1 27801	-1 25884	-1 24131	-1 24350	-1 24152	-1 22553	-1 20432	-1 21727	-1 20403
C65_LOGRET	-0 27159	-0 26842	-0 28399	-0 26477	-0.29500	-0 27371	-0 25254	-0 23733	-0 22964	-0 20803	-0 19347	-0 22558	-0 20332
C61_LOGRET	-1 49553	-1.54740	-1 52894	-1 51242	-1 50203	-1 47039	-1 44426	-1 43801	-1 40156	-1 36677	-1 33044	-1 29307	-1 27118
C15_LOGRET	-1 16565	-1 16644	-1 15600	-1 16928	-1 15988	-1 18931	-1 19770	-1 17593	-1 15885	-1 22103	-1 21649	-1 28708	-1.29737
C43_LOGRET	-0.41408	-0 39913	-0 37339	-0 34433	-0 32747	-0 30610	-0 30888	-0 29855	-0 28255	-0 25266	-0 23230	-0 20512	-0 19312
C38_LOGRET	-0.91410	-0 89763	-0 87854	-0 85554	-0 84054	-0 82133	-0 81812	-0 82042	-0 80322	-0 78281	-0 76566	-0 74190	-0 73281
C53_LOGRET	-2.05394	-2 02160	-1 99724	-1 97698	-1 94647	-1 92259	-1 89503	-1 88503	-1 85368	-1 83276	-1 81901	-1 78881	-1 75367
C24_LOGRET	-1 03040	-1 04357	-1 01913	-1.11092	-1 09023	-1 06445	-1 04504	-1 02107	-0 99520	-0 97255	-0 95039	-0 92377	-0 89838
C67_LOGRET	-1.23200	-1 20870	-1 23051	-1 20981	-1 19426	-1 17839	-1 17086	-1 16193	-1 14391	-1 13309	-1 11910	-1 12634	-1 10413
C33_LOGRET	-1 13245	-1.17140	-1 15678	-1 13676	-1 12122	-1 12564	-1 11106	-1 10247	-1 08520	-1 09781	-1 08111	-1 06349	-1 04247
C13_LOGRET	-1 19389	-1.23083	-1 21346	-1 20237	-1 16767	-1 13427	-1 10201	-1 06675	-1 03233	-0 99660	-0 98252	-0 95403	-0 92316
C40_LOGRET	-1.44632	-1 43690	-1 41560	-1 41749	-1 38160	-1 35951	-1 32630	-1 30922	-1 27447	-1 24031	-1 20417	-1 17949	-1 15443
C50_LOGRET	-1.11007	-1 10461	-1 07390	-1 07653	-1 05247	-1 02723	-0 99104	-0 98882	-0 96253	-0 95383	-0 93722	-0 91640	-0 89432
C46_LOGRET	-0.30061	-0 27678	-0 28958	-0 27453	-0 25692	-0 22531	-0 19471	-0 18053	-0 16333	-0 24346	-0 25489	-0 24578	-0 21475
C45_LOGRET	-0 78389	-0 76226	-0 78604	-0 77266	-0.79470	-0 77229	-0 74885	-0 74083	-0 72647	-0 70294	-0 67888	-0 67743	-0 67402
C26_LOGRET	-1.19111	-1 17882	-1 15735	-1 14432	-1 14453	-1 13186	-1 13647	-1 11496	-1 09810	-1 09367	-1 08043	-1 06858	-1 05092
C56_LOGRET	-0.85703	-0 84255	-0 81549	-0 80888	-0 79468	-0 77733	-0 75404	-0 74414	-0 74899	-0 71624	-0 69406	-0 66903	-0 65581
C32_LOGRET	-0.91735	-0 89739	-0 87718	-0 85732	-0 83943	-0 82347	-0 81682	-0 79557	-0 78444	-0 75956	-0 74545	-0 74993	-0 72652
C68_LOGRET	-0.90873	-0 79595	-0 67775	-0 66331	-0 53890	-0 39696	-0 30871	-0 19537	-0 03458	0 12666	0 30259	0 45269	0 45448
C60_LOGRET	-1.43221	-1 42231	-1 40266	-1 36252	-1 30166	-1 25945	-1 24971	-1 19421	-1 12867	-1 09146	-1 03017	-1 01090	-0 95131
C21_LOGRET	-0.86314	-0 80783	-0 75731	-0 71945	-0 65863	-0 60943	-0 54753	-0 49519	-0 48789	-0 43741	-0 37309	-0 31282	-0 24481
C16_LOGRET	-0.45621	-0 45420	-0 43738	-0 44464	-0 42104	-0 39979	-0 39291	-0 36932	-0 35746	-0 34403	-0 33267	-0 32052	-0 30294
C42_LOGRET	-1.28399	-1 17050	-1 07206	-0 94717	-0 82418	-0 71133	-0 59743	-0 46539	-0 40154	-0 73506	-0 54672	-0 47003	-0 41824
CO1_LOGRET	-0.42720	-0 39295	-0 35882	-0 31708	-0 27469	-0 23555	-0 19977	-0 16379	-0 12278	-0 07632	-0 04377	-0 01073	0 02391
CO4_LOGRET	-1 40992	-1.42315	-1 38843	-1 35640	-1 32712	-1 29148	-1 26204	-1 22521	-1 19207	-1 16402	-1 12830	-1 09258	-1 12194
CO5_LOGRET	-1.57035	-1 55370	-1 52777	-1 49542	-1 46012	-1 45781	-1 42261	-1 38607	-1 35149	-1 31465	-1 28076	-1 24587	-1 20967

CO6_LOGRET	-1 18621	**-1.19094**	-1 15965	-1 14373	-1 12545	-1 09263	-1 06793	-1 03204	-1 15264	-1 11877	-1 09289	-1 06294	-1 02791
CO9_LOGRET	-1 28049	**-1.29687**	-1 26335	-1 22789	-1 19598	-1 19390	-1 16007	-1 12945	-1 09878	-1 07120	-1 05064	-1 03033	-1 03380
CO10_LOGRET	**-1.15876**	-1 15160	-1 12572	-1 10139	-1 07420	-1 06820	-1 03671	-1 00920	-0 97353	-0 96444	-0 95129	-0 92453	-0 88998
CO11_LOGRET	**-1.50483**	-1 50250	-1 47785	-1 44105	-1 46553	-1 46953	-1 45162	-1 42143	-1 39277	-1 35895	-1 38233	-1 36754	-1 34864
CO13_LOGRET	-1 27245	**-1.30168**	-1 27715	-1 24145	-1 20969	-1 18534	-1 15003	-1 12054	-1 08515	-1 06002	-1 04760	-1 03426	-1 00647
CO14_LOGRET	-1 19217	**-1.22044**	-1 18823	-1 15282	-1 13480	-1 10502	-1 07231	-1 03714	-1 00076	-0 97435	-0 95489	-0 91890	-0 89519
CO20_LOGRET	-1 40842	-1 45685	**-1.48520**	-1 45498	-1 42526	-1 40596	-1 37013	-1 33424	-1 29734	-1 28255	-1 24907	-1 21081	-1 17823
CO21_LOGRET	**-0.55480**	-0 52628	-0 49844	-0 46221	-0 42709	-0 39729	-0 35247	-0 31080	-0 27496	-0 23720	-0 19137	-0 19025	-0 16354
CO22_LOGRET	-1 29033	**-1.29285**	-1 25782	-1 22497	-1 18920	-1 15904	-1 12551	-1 09126	-1 05476	-1 04259	-1 00833	-0 97030	-0 95981
CO23_LOGRET	**-0.36241**	-0 32945	-0 29269	-0 25715	-0 22039	-0 19810	-0 16790	-0 13519	-0 11092	-0 07231	-0 04724	-0 01516	0 02482
CO26_LOGRET	**-1.01184**	-0 97360	-0 97264	-0 93849	-0 90092	-0 86013	-0 81620	-0 77623	-0 73128	-0 68514	-0 66794	-0 63860	-0 61214
CO28_LOGRET	**-0.81157**	-0 77398	-0 73995	-0 73340	-0 69654	-0 67805	-0 72878	-0 68902	-0 66137	-0 61925	-0 59980	-0 55686	-0 54977
CO31_LOGRET	**-0.90666**	-0 87491	-0 83811	-0 80508	-0 76935	-0 73302	-0 69412	-0 67366	-0 64178	-0 60260	-0 57625	-0 54099	-0 49701
CO32_LOGRET	**-0.58657**	-0 54515	-0 50552	-0 49094	-0 44483	-0 39853	-0 39200	-0 36371	-0 31514	-0 26840	-0 23560	-0 18919	-0 13980
CO34_LOGRET	0 21822	**-0.22448**	-0 19086	-0 16141	-0 12692	-0 09114	-0 06096	-0 02715	-0 00722	0 01208	0 04725	0 08507	0 10397
CO35_LOGRET	-1 14205	**-1.15973**	-1 12612	-1 09097	-1 06963	-1 03547	-0 99877	-0 96551	-0 92938	-0 94383	-0 92011	-0 88434	-0 86557
CO36_LOGRET	**-1.14084**	-1 10465	-1 06468	-1 02476	-0 99217	-0 94871	-0 91352	-0 87031	-0 84047	-0 79482	-0 74974	-0 72494	-0 71890
I1_LOGRET	**-1.11361**	-1 09314	-1 07598	-1 05903	-1 03897	-1 02062	-1 01235	-0 98863	-0 98136	-0 96696	-0 97694	-0 95732	-0 93875
I13_LOGRET	**-1.66746**	-1 64298	-1 60033	-1 58227	-1 53651	-1 49612	-1 45390	-1 43536	-1 40576	-1 41674	-1 41509	-1 37986	-1 33192
I18_LOGRET	**-1.15939**	-1 14641	-1 13662	-1 13836	-1 12153	-1 11734	-1 10259	-1 08200	-1 06771	-1 04830	-1 02345	-1 01587	-0 99441
I31_LOGRET	-2 09823	**-2.14523**	-2 12631	-2 08247	-2 08071	-2 05538	-2 02043	-1 98268	1 93853	-1 89533	-1 86512	-1 81524	-1 76518
I33_LOGRET	**-1.40741**	-1 38693	-1 36986	-1 34634	-1 33621	-1 31254	-1 31892	-1 29722	-1 30596	-1 28240	-1 26562	-1 24176	-1 22008
I58_LOGRET	**-1.25634**	-1 23314	-1 20172	-1 18121	-1 15493	-1 11290	-1 06789	-1 02888	-0 98585	-0 94663	-0 91002	-0 88587	-0 85528
I64_LOGRET	**-1.55066**	-1 54342	-1 52889	-1 50712	-1 50731	-1 48440	-1 46927	-1 44913	-1 42525	-1 40579	-1 39164	-1 36710	-1 35245
I65_LOGRET	**-1.66655**	-1 65393	-1 63107	-1 60788	-1 58416	-1 56213	-1 54537	-1 52426	-1 52250	-1 50885	-1 48692	-1 46316	-1 45003
I70_LOGRET	-1 04498	-1 05362	-1 05167	-1 04672	**-1.06359**	-1 05803	-1 05727	-1 05168	-1 06150	-1 05090	-1 04212	-1 03387	-1 03909
I72_LOGRET	**-1.73380**	-1 73278	-1 72466	-1 71418	-1 70875	-1 70032	-1 69868	-1 69921	-1 71490	-1 70737	-1 69834	-1 69684	-1 69391
I84_LOGRET	-2 41555	-2 47528	-2 45233	-2 43416	-2 43905	-2 46405	-2 46730	-2 44840	**-2.49095**	-2 46999	-2 45555	-2 43130	-2 41740
I85_LOGRET	**-1.16153**	-1 15704	-1 14515	-1 13255	-1 12100	-1 10906	-1 09825	-1 08856	-1 10115	-1 09130	-1 07964	-1 08006	-1 07432
I87_LOGRET	**-1.45281**	-1 44804	-1 44328	-1 43757	-1 43519	-1 42878	-1 42991	-1 42797	-1 41960	-1 41340	-1 40359	-1 39747	-1 38748
I97_LOGRET	-1 18367	-1 18266	-1 17170	-1 16129	-1 15493	-1 15635	**-1.18483**	-1 17881	-1 16781	-1 16759	-1 17745	-1 16610	-1 15722
I110_LOGRET	-1 44612	-1 44516	-1 43707	-1 44112	-1 43814	-1 46468	**-1.48812**	-1 48180	-1 47716	-1 47270	-1 47665	-1 46696	-1 45878
I113_LOGRET	-2 36181	-2 36300	-2 35163	-2 32880	-2 31280	-2 35045	-2 34519	**-2.38397**	-2 38025	-2 37826	-2 37994	-2 38236	-2 36267
I115_LOGRET	-1 10839	-1 10399	-1 10194	-1 09933	-1 10849	-1 10774	**-1.12897**	-1 12640	-1 11913	-1 11781	-1 10523	-1 09522	-1 08411
I124_LOGRET	**-0.90598**	-0 89135	-0 88159	-0 87914	-0 87754	-0 87928	-0 88873	-0 87450	-0 87883	-0 86226	-0 84800	-0 84268	-0 83625
I125_LOGRET	-2 22116	-2 22167	-2 22225	-2 20144	-2 17856	-2 20505	-2 18228	-2 25214	**-2.25222**	-2 23493	-2 21698	-2 19441	-2 18316
I131_LOGRET	-1 70664	**-1.70734**	-1 69039	-1 66927	-1 65922	-1 63378	-1 60945	-1 58300	-1 56462	-1 55923	-1 53402	-1 50924	-1 49226
I143_LOGRET	-0 98300	**-0.98816**	-0 96445	-0 93943	-0 92979	-0 91212	-0 89296	-0 86792	-0 86001	-0 84118	-0 81787	-0 80300	-0 78378
I152_LOGRET	**-1.50288**	-1 47803	-1 49239	-1 46706	-1 43242	-1 38733	-1 34606	-1 32430	-1 28375	-1 24359	-1 20977	-1 16517	-1 13493
I159_LOGRET	**-1.25218**	-1 22827	-1 21471	-1 21305	-1 18709	-1 16015	-1 13447	-1 11647	-1 09209	-1 06354	-1 03963	-1 01159	-1 03815
I166_LOGRET	**-1.32032**	-1 30483	-1 28262	-1 26056	-1 23687	-1 21331	-1 19038	-1 16835	1 14957	-1 12708	-1 10377	-1 08083	-1 05693
I180_LOGRET	-1 11747	**-1.12844**	-1 10544	-1 09599	-1 09085	-1 06797	-1 05252	-1 03365	-1 01733	-0 99843	-0 97403	-0 96409	-0 95795
K5_LOGRET	-0 53280	**-0.53474**	-0 51523	-0 50058	-0 47339	-0 44058	-0 45143	-0 42894	-0 40353	-0 38643	-0 40715	-0 41009	-0 38327
K14_LOGRET	**-0.87779**	-0 86535	-0 84210	-0 81910	-0 79538	-0 77525	-0 75563	-0 73295	-0 71001	-0 69726	-0 67506	-0 65725	-0 64568
K15_LOGRET	-0 77956	**-0.78223**	-0 76021	-0 72829	-0 69537	-0 68883	-0 69651	-0 68935	-0 67849	-0 64654	-0 60882	-0 57478	-0 53613
K16_LOGRET	**-1.05126**	-1 03295	-1 01116	-0 98904	-0 97433	-0 95712	-0 94167	-0 93796	-0 92007	-0 89790	-0 87948	-0 85715	-0 83425
K32_LOGRET	**-1.13882**	-1 13723	-1 11676	-1 09447	-1 07531	-1 05393	-1 04413	-1 02352	-1 00397	-0 98042	-0 96954	-0 95103	-0 92832
K36_LOGRET	**-0.14975**	-0 12469	-0 10781	-0 09929	-0 06284	-0 02274	-0 07937	-0 04185	0 00466	0 03417	0 07662	0 10479	0 14811
K37_LOGRET	**-0.46595**	-0 41287	-0 35759	-0 30177	-0 24839	-0 18825	-0 16272	-0 15733	-0 09158	-0 02921	0 01603	0 03524	0 09317
K46_LOGRET	**-0.85896**	-0 82893	-0 80024	-0 76943	-0 74327	-0 70714	-0 72955	-0 74497	-0 71745	-0 70611	-0 68136	-0 68452	-0 64759
K47_LOGRET	**-0.83620**	-0 80345	-0 76871	-0 73684	-0 71760	-0 69440	-0 65792	-0 62811	-0 59555	-0 55982	-0 52194	-0 48697	-0 44889
K48_LOGRET	**-1.09585**	-1 08266	-1 06567	-1 04386	-1 03422	-1 02016	-1 00354	-0 98032	-0 96363	-0 94483	-0 92103	-0 89880	-0 87797
K53_LOGRET	-1 02055	**-1.06960**	-1 04779	-1 02567	-1 00211	-0 97906	-0 97420	-0 95901	-0 93495	-0 91430	-0 89122	-0 86991	-0 84800
K56_LOGRET	**-0.63701**	-0 60836	-0 61394	-0 58660	-0 55594	-0 52020	-0 48629	-0 47525	-0 47228	-0 51084	-0 49720	-0 46419	-0 43202
K60_LOGRET	**-0.65986**	-0 62101	-0 58941	-0 55361	-0 51889	-0 48263	-0 47776	-0 44530	-0 40605	-0 44736	-0 41340	-0 40468	-0 36595
K61_LOGRET	**-0.80643**	-0 79266	-0 76940	-0 74993	-0 72645	-0 70569	-0 68302	-0 66543	-0 64460	-0 63606	-0 61291	-0 58842	-0 57302
K69_LOGRET	**-1.23074**	-1 21286	-1 19563	-1 17228	-1 14913	-1 12696	-1 11343	-1 10368	1 08334	-1 05932	-1 03553	-1 01326	-0 98867
K73_LOGRET	**-0.72927**	-0 69622	-0 67782	-0 64012	-0 62022	-0 58329	-0 56873	-0 54453	-0 51379	-0 49262	-0 49780	-0 46593	-0 44102
K75_LOGRET	**-1.23689**	-1 16726	-1 12409	-1 04541	-0 99965	0 94645	-0 86724	-0 81182	-0 78622	-0 71093	-0 63130	-0 66491	-0 63167
K81_LOGRET	-0 87943	**-0.88050**	-0 85728	-0 84283	-0 83319	-0 81010	-0 79689	-0 77675	0 75484	-0 76313	-0 74684	-0 72470	-0 70336
K85_LOGRET	**-1.08084**	-1 07927	-1 05928	-1 03638	-1 02456	-1 00450	-0 98103	-0 96994	-0 94830	-0 94238	-0 91979	-0 89574	-0 88530
K86_LOGRET	**-0.66944**	-0 65827	-0 62417	-0 59993	-0 56757	-0 53357	-0 51818	-0 51177	-0 49175	-0 46488	-0 42561	-0 38818	-0 35157
K88_LOGRET	**-1.14782**	-1 14189	-1 11909	-1 09891	-1 07784	-1 05605	-1 03499	-1 01642	-0 99795	-0 97791	-0 95355	-0 95036	-0 92891
M1_LOGRET	-0 41316	-0 44156	-0 42629	-0 37021	-0 33538	-0 31227	-0 28926	-0 44118	-0 57351	**-0.59206**	-0 55564	-0 52438	-0 51113
M17_LOGRET	**-0.68358**	-0 65431	-0 62317	-0 61987	-0 59297	-0 55679	-0 52954	-0 54289	-0 51122	-0 47757	-0 45691	-0 45547	-0 41813
M22_LOGRET	**-0.36676**	-0 30316	-0 23518	-0 16345	-0 09459	-0 01889	0 05027	0 11525	0 18756	0 21921	0 28969	0 35736	0 38179
M29_LOGRET	**-1.63629**	-1 58674	-1 53743	-1 49390	-1 44469	-1 39922	-1 38094	-1 33157	-1 29280	-1 25498	-1 21141	-1 17219	-1 12297
M36_LOGRET	**-0.78519**	-0 75588	-0 74591	-0 71602	-0 69181	-0 66229	-0 64785	-0 61367	-0 57818	-0 55721	-0 52166	-0 48474	-0 45383
M37_LOGRET	**-0.66901**	-0 59932	-0 60291	-0 50036	-0 53145	-0 39310	-0 24039	-0 12740	-0 03201	0 06887	0 19302	0 13497	-0 02295
M39_LOGRET	**-0.94476**	-0 92583	-0 88260	-0 86605	-0 80640	-0 76327	-0 71669	-0 66264	-0 60273	-0 55589	-0 50695	-0 45316	-0 40392
M42_LOGRET	**-2.09839**	-2 06607	-2 09285	-2 06983	-2 04947	-2 02110	-1 98588	-1 99819	-1 96247	-1 92515	-1 88818	-1 85175	-1 83036
M48_LOGRET	**-0.17634**	-0 06360	0 06917	0 14427	0 17535	0 30800	0 40863	0 56783	0 70926	0 70892	0 80439	0 50159	0 60409
M50_LOGRET	**-1.44643**	-1 36598	-1 32532	-1 24669	-1 17026	-1 07937	-0 98792	-0 91874	-0 84867	-0 79300	-0 68867	-0 61361	-0 53119
M52_LOGRET	**-0.69551**	-0 65656	-0 58880	-0 52107	-0 44621	-0 36707	-0 29862	-0 21948	-0 14679	-0 09767	-0 04839	0 03534	0 12470
M54_LOGRET	**-1.51731**	-1 48621	-1 46175	-1 43405	-1 39971	-1 37015	-1 33695	-1 30303	-1 27072	-1 24425	-1 21226	-1 18857	-1 17269
M59_LOGRET	**-0.97283**	-0 97058	-0 94081	-0 88731	-0 87743	-0 81833	-0 78340	-0 73607	-0 67671	-0 62463	-0 57908	-0 52976	-0 53293
M62_LOGRET	**-0.76151**	-0 73180	-0 71721	-0 68562	-0 67640	-0 66626	-0 65814	-0 64884	-0 63536	-0 63082	-0 60586	-0 57280	-0 53362
M64_LOGRET	**-1.31861**	-1 30948	-1 28412	-1 27022	-1 24625	-1 21308	-1 18807	-1 15828	-1 12862	-1 09292	-1 06441	-1 03390	-1 01660
M74_LOGRET	**-0.97301**	-0 91458	-0 85512	-0 79587	-0 73840	-0 72217	-0 66325	-0 61395	-0 55236	-0 54571	-0 49261	-0 45457	-0 43250
M85_LOGRET	-1 14718	**-1.19010**	-1 15520	-1 14027	-1 12731	-1 10823	-1 08185	-1 10643	-1 07931	-1 06242	-1 03180	-0 99426	-0 97031
M90_LOGRET	**-0.53663**	-0 47915	-0 41901	-0 37667	-0 31973	-0 25743	-0 19145	-0 14539	-0 07878	-0 20604	-0 12552	-0 12441	-0 12993
M94_LOGRET	**-1.43502**	-1 42019	-1 36837	-1 31404	-1 25248	-1 20729	-1 16412	-1 09967	-1 08666	-1 03167	-0 97946	-0 93923	-0 89294
M95_LOGRET	-1 13614	-1 11396	-1 12393	-1 09942	-1 11780	-1 06032	-1 01140	-1 00431	-0 97508	-0 92570	-0 86327	-0 79724	-0 73380
M97_LOGRET	**-0.29593**	-0 27591	-0 24287	-0 22151	-0 18620	-0 15003	-0 12138	-0 09261	-0 06084	-0 02623	0 01125	0 04750	0 07865
M103_LOGRET	**-1.19650**	-1 18471	-1 16594	-1 14433	-1 10975	-1 09023	-1 06461	-1 03445	-0 99910	-0 99381	-0 96788	-0 94346	-0 92085
M106_LOGRET	**-1.07975**	-1 04611	-1 07023	-1 04095	-1 01113	-0 97575	-0 94696	-0 94848	-0 91659	-0 88260	-0 84645	-0 81728	-0 82016

MI14_LOGRET	-1.01754	-1.00715	-0.97759	-0.98301	-0.98624	-0.94862	-0.91813	-0.93865	-0.91403	-0.88240	-0.86674	-0.84471	-0.82469
MI17_LOGRET	-0.93103	-0.94327	-0.89258	-0.84613	-0.79097	-0.73416	-0.69419	-0.63631	-0.57749	-0.61069	-0.55353	-0.50747	-0.52050
MI20_LOGRET	-0.63215	-0.60175	-0.59478	-0.57521	-0.57158	-0.53908	-0.50894	-0.51044	-0.50613	-0.47984	-0.47176	-0.45254	-0.41960
MI27_LOGRET	-0.82840	-0.79356	-0.76375	-0.75170	-0.71615	-0.68559	-0.68018	-0.69316	-0.65621	-0.62737	-0.59176	-0.56009	-0.56382
MI29_LOGRET	-0.47673	-0.44692	-0.42123	-0.39253	-0.36021	-0.33468	-0.32527	-0.31424	-0.27923	-0.24778	-0.21256	-0.17871	-0.15173
MI30_LOGRET	-1.09941	-1.07069	-1.02740	-0.98789	-0.94512	-0.89081	-0.84544	-0.80264	-0.74091	-0.69084	-0.63995	-0.60880	-0.69929
MI36_LOGRET	-2.36518	-2.28530	-2.20082	-2.12662	-2.05706	-1.99775	-1.91343	-1.82156	-1.77033	-1.69701	-1.63222	-1.58013	-1.68201
MI47_LOGRET	-1.11674	-1.07767	-1.02674	-0.97528	-0.95358	-0.89188	-0.83328	-0.78302	-0.72021	-0.72050	-0.69909	-0.66494	-0.63137
MI50_LOGRET	-1.08638	-1.05211	-1.04363	-1.01720	-0.98319	-0.95517	-0.94249	-0.96550	-0.93399	-0.89885	-0.86212	-0.82844	-0.80953
MI51_LOGRET	-0.50775	-0.48477	-0.45391	-0.42618	-0.39446	-0.37486	-0.35516	-0.37607	-0.33943	-0.35107	-0.31681	-0.30026	-0.28715
MI59_LOGRET	-1.58126	-1.57424	-1.54019	-1.50703	-1.48895	-1.45338	-1.42426	-1.41570	-1.37852	-1.34505	-1.32766	-1.29307	-1.25981
MI60_LOGRET	-0.68238	-0.62384	-0.56615	-0.52307	-0.48753	-0.45166	-0.39577	-0.37455	-0.31097	-0.47904	-0.42170	-0.44086	-0.39393
MI64_LOGRET	-1.41043	-1.39175	-1.35931	-1.32463	-1.28960	-1.26246	-1.24541	-1.27007	-1.23835	-1.20084	-1.16387	-1.13653	-1.10786
MI68_LOGRET	-0.61669	-0.55147	-0.48249	-0.40380	-0.33392	-0.26248	-0.17909	-0.09348	-0.03186	-0.04024	0.04726	0.13817	0.22923
MI71_LOGRET	-0.55514	-0.49658	-0.44098	-0.40990	-0.33548	-0.25516	-0.17471	-0.09346	-0.04618	-0.06215	0.02056	0.10318	0.14367
MI80_LOGRET	-0.41059	-0.36589	-0.30604	-0.24891	-0.25233	-0.17672	-0.13013	-0.08592	-0.34748	-0.26234	-0.21409	-0.23697	-0.23371
MI93_LOGRET	-1.61354	-1.53233	-1.46275	-1.39687	-1.30771	-1.22478	-1.17040	-1.07926	-1.17510	-1.15925	-1.07238	-0.98051	-0.93006
ME1_LOGRET	-1.50375	-1.60867	-1.51145	-1.43979	-1.36368	-1.36822	-1.35187	-1.24653	-1.25861	-1.16111	-1.05932	-1.28849	-1.19051
ME6_LOGRET	-1.17461	-1.14530	-1.12872	-1.08427	-1.07907	-1.03839	-0.99668	-0.98243	-0.94261	-0.90107	-0.85505	-0.83088	-0.79488
ME8_LOGRET	-2.08776	-2.07802	-1.99265	-1.90196	-1.81171	-1.72258	-1.65197	-1.59385	-1.75428	-1.70854	-1.60319	-1.50248	-1.41718
ME9_LOGRET	-2.57298	-2.48431	-2.41219	-2.30801	-2.35584	-2.25384	-2.14141	-2.04020	-2.03332	-1.91879	-1.78593	-1.78826	-1.91980
ME10_LOGRET	-0.94854	-0.93278	-0.89997	-0.85560	-0.84260	-0.84011	-0.81795	-0.77985	-0.75412	-0.72147	-0.67202	-0.64592	-0.61409
ME14_LOGRET	0.62483	0.69628	0.76451	0.81648	0.85337	0.93071	0.99030	1.07067	1.15168	1.23473	1.32041	1.39607	1.48810
ME15_LOGRET	-2.67621	-3.05233	-2.88190	-2.70584	-2.51244	-2.85864	-7.83118	-7.63508	-7.78281	-7.60084	-7.52237	-7.41726	-7.75854
ME21_LOGRET	-1.25577	-1.16611	-1.09030	-1.01216	-0.91916	-0.87864	-0.80928	-0.78103	-0.76763	-0.68034	-0.62180	-0.52412	-0.41562
ME23_LOGRET	-0.84065	-0.75073	-0.68608	-0.65325	-0.56290	-0.47708	-0.46140	-0.41785	-0.37362	-0.27058	-0.33736	-0.32184	-0.20100
ME26_LOGRET	-1.23284	-1.17091	-1.08631	-1.00355	-0.93290	-0.85406	-0.79721	-0.70179	-0.60425	-0.52731	-0.50692	-0.47764	-0.38200
ME27_LOGRET	-1.35283	-1.32639	-1.28330	-1.24620	-1.21246	-1.21105	-1.17961	-1.13328	-1.08865	-1.06858	-1.04712	-1.01057	-0.98994
ME29_LOGRET	0.26755	0.30227	0.32420	0.36265	0.41741	0.45116	0.49500	0.52546	0.58583	0.61149	0.64047	0.67638	0.73348
ME31_LOGRET	0.11180	0.12334	0.13457	0.12239	0.15624	0.23171	0.29034	0.36948	0.40493	0.49264	0.48744	0.56698	0.65594
ME32_LOGRET	-0.57881	-0.57952	-0.55752	-0.55196	-0.53653	-0.52199	-0.49820	-0.47388	-0.45095	-0.46609	-0.46994	-0.45022	-0.42589
ME33_LOGRET	-0.33031	-0.36779	-0.37456	-0.34312	-0.30383	-0.28068	-0.27968	-0.24284	-0.20334	-0.18037	-0.13884	-0.11371	-0.08200
ME40_LOGRET	-0.98091	-0.97686	-0.95375	-0.93141	-0.90900	-0.89298	-0.86996	-0.84518	-0.81851	-0.79305	-0.77338	-0.74612	-0.72212
ME43_LOGRET	-1.62439	-1.52307	-1.60555	-1.48885	-1.51213	-1.39308	-1.31021	-1.19031	-1.03716	-0.87749	-0.71920	-0.54620	-0.35316
ME44_LOGRET	-1.97427	-1.86398	-1.92165	-1.87863	-1.81123	-1.79021	-1.66433	-1.59648	-1.45007	-1.29875	-1.18877	-1.05642	-0.88559
ME48_LOGRET	-0.79119	-0.76420	-0.84045	-0.83258	-0.80190	-0.75272	-0.70430	-0.65319	-0.61626	-0.59865	-0.54274	-0.49357	-0.45334
ME52_LOGRET	-0.82745	-0.84875	-0.79108	-0.73594	-0.71121	-0.65985	-0.64015	-0.62335	-0.60161	-0.56774	-0.66303	-0.59751	-0.57654
ME53_LOGRET	-0.37770	-0.40466	-0.38352	-0.37064	-0.34763	-0.32660	-0.30294	-0.28076	-0.28446	-0.27588	-0.26375	-0.24054	-0.21571
ME54_LOGRET	-0.51220	-0.54982	-0.54038	-0.51809	-0.49501	-0.47768	-0.45549	-0.44267	-0.42528	-0.41200	-0.39973	-0.37850	-0.35520
ME61_LOGRET	-1.06131	-0.99640	-0.95428	-0.88112	-0.95008	-0.86021	-0.79545	-0.75828	-0.67763	-0.65012	-0.68561	-0.58852	-0.52233
ME62_LOGRET	-1.18879	-1.15381	-1.11540	-1.04337	-1.10774	-1.02174	-0.98920	-0.93046	-0.88536	-0.80994	-0.83472	-0.73475	-0.65032
ME63_LOGRET	-0.64996	-0.59454	-0.54664	-0.48985	-0.42603	-0.38011	-0.32744	-0.27828	-0.23203	-0.17889	-0.11869	-0.04766	0.01151
ME68_LOGRET	-0.57616	-0.56402	-0.53462	-0.50781	-0.47974	-0.46087	-0.44623	-0.42087	-0.39591	-0.36509	-0.35594	-0.33061	-0.32366
ME84_LOGRET	0.20018	0.22050	0.24411	0.26972	0.29663	0.32925	0.35805	0.39181	0.41167	0.44338	0.47141	0.49577	0.52916
ME89_LOGRET	-0.76499	-0.75839	-0.74465	-0.72163	-0.69959	-0.67709	-0.65448	-0.63126	-0.61353	-0.60220	-0.58555	-0.56189	-0.54949
ME97_LOGRET	-1.88755	-1.78719	-1.79615	-1.75300	-1.70987	-1.59762	-1.49558	-1.39762	-1.27456	-1.25774	-1.20315	-1.22226	-1.15897
ME99_LOGRET	-0.71853	-0.72823	-0.71775	-0.69471	-0.68909	-0.67072	-0.65407	-0.63025	-0.62038	-0.61132	-0.59714	-0.57262	-0.55952
ME100_LOGRET	-0.98036	-0.97632	-0.95576	-0.93423	-0.91227	-0.89013	-0.86907	-0.84537	-0.83144	-0.81823	-0.80250	-0.79095	-0.77591
ME105_LOGRET	-0.45677	-0.43993	-0.40814	-0.37518	-0.35326	-0.34078	-0.30976	-0.27914	-0.27447	-0.25941	-0.22837	-0.29826	-0.28255
ME106_LOGRET	-0.70668	-0.71069	-0.67408	-0.62786	-0.57642	-0.52186	-0.55801	-0.50374	-0.46493	-0.43248	-0.39060	-0.33108	-0.29020
ME109_LOGRET	-0.75961	-0.66244	-0.56281	-0.49520	-0.45737	-0.42638	-0.32520	-0.32048	-0.20675	-0.14351	-0.01816	-0.00043	0.05910
ME110_LOGRET	-0.43977	-0.40479	-0.35981	-0.32153	-0.29143	-0.26579	-0.23351	-0.20270	-0.16706	-0.12894	-0.11952	-0.11424	-0.09025
ME113_LOGRET	-0.71649	-0.69913	-0.67615	-0.65344	-0.63124	-0.61632	-0.59737	-0.57392	-0.55013	-0.53431	-0.52860	-0.50775	-0.49919
ME119_LOGRET	-1.98370	-2.11111	-1.97096	-1.82038	-1.63890	-1.50249	-2.14656	-3.09506	-2.83978	-2.72051	-2.54659	-5.93978	-9.91703
ME120_LOGRET	-2.52007	-2.42805	-2.33401	-2.22797	-2.11678	-2.00287	-1.89847	-2.02774	-1.98491	-1.85113	-1.71547	-1.67585	-1.74611
ME121_LOGRET	-2.83429	-2.74612	-2.67290	-2.57121	-2.47996	-2.36737	-2.25891	-2.30824	-2.33662	-2.20045	-2.13606	-2.49195	-2.46722
ME123_LOGRET	-0.52404	-0.51906	-0.50032	-0.48096	-0.45901	-0.45680	-0.43370	-0.41175	-0.39417	-0.39601	-0.38186	-0.37365	-0.34999
ME127_LOGRET	-1.12581	-1.06917	-1.01765	-0.96719	-0.90887	-0.84816	-0.81510	-0.75078	-0.69945	-0.65171	-0.58928	-0.55197	-0.51869
ME129_LOGRET	0.17298	0.19194	0.23770	0.28498	0.32735	0.32718	0.37329	0.42538	0.45901	0.51229	0.56547	0.55580	0.61168
ME130_LOGRET	0.37298	0.40315	0.37576	0.41573	0.45510	0.48313	0.52611	0.57687	0.61634	0.63272	0.65593	0.70588	0.75863
ME135_LOGRET	-0.25401	-0.26652	-0.24049	-0.22046	-0.19167	-0.17157	-0.14185	-0.11661	-0.12181	-0.10231	-0.10035	-0.07047	-0.03887
ME136_LOGRET	-0.40477	-0.43824	-0.41827	-0.41126	-0.38736	-0.37338	-0.34648	-0.31931	-0.29210	-0.29445	-0.28068	-0.26688	-0.24062
ME137_LOGRET	-0.22610	-0.21607	-0.19308	-0.18351	-0.16299	-0.13935	-0.12216	-0.10850	-0.08471	-0.07895	-0.07175	-0.06578	-0.04412
ME139_LOGRET	-0.91020	-0.90928	-0.88744	-0.86429	-0.84168	-0.82416	-0.83980	-0.81825	-0.79607	-0.81117	-0.80953	-0.80147	-0.78409
ME144_LOGRET	-1.45866	-1.43644	-1.31938	-1.26735	-1.17555	-1.04319	-0.87860	-0.73356	-0.57470	-0.41836	-0.29704	-0.11392	0.07320
ME148_LOGRET	-2.16822	-2.30073	-2.20806	-2.18324	-2.49367	-2.39900	-2.30676	-2.24443	-2.16918	-2.22452	-2.37528	-2.30187	-2.18426
ME149_LOGRET	-2.14510	-2.15021	-2.10766	-2.01763	-2.39739	-2.30070	-2.29421	-2.19588	-2.11472	-2.10855	-2.08411	-1.97505	-1.97787
ME151_LOGRET	-0.95373	-1.11117	-1.06473	-1.03629	-1.06104	-1.06643	-1.08077	-1.07763	-1.01721	-0.97446	-0.94451	-0.89559	-0.84938
ME152_LOGRET	-0.53385	-0.60448	-0.57797	-0.56043	-0.52404	-0.50161	-0.49965	-0.46030	-0.42026	-0.38917	-0.38225	-0.34135	-0.30364
P1_LOGRET	-1.05557	-0.98359	-0.91580	-0.86738	-0.79392	-0.71362	-0.66024	-0.58368	-0.51033	-0.44188	-0.38181	-0.28836	-0.24365
P6_LOGRET	-0.34367	-0.31127	-0.28608	-0.24950	-0.24848	-0.22243	-0.17744	-0.14257	-0.10286	-0.07540	-0.03023	0.01818	0.05033
P9_LOGRET	-0.52808	-0.45875	-0.40173	-0.32712	-0.25060	-0.19114	-0.26015	-0.18603	-0.10891	-0.05799	0.00055	0.08836	0.15137
P14_LOGRET	0.04306	0.03576	0.05515	0.09054	0.05988	0.08956	0.13647	0.11515	0.15131	0.19578	0.24074	0.28610	0.33546
P17_LOGRET	-0.78221	-0.73924	-0.70591	-0.66264	-0.62506	-0.58072	-0.54029	-0.49451	-0.45823	-0.40925	-0.36193	-0.31485	-0.26454
P25_LOGRET	-0.30374	-0.27992	-0.24462	-0.21123	-0.17559	-0.14436	-0.11666	-0.08176	-0.07304	-0.06404	-0.04209	-0.01304	0.02523
P32_LOGRET	-0.68126	-0.65011	-0.63595	-0.61752	-0.59029	-0.55902	-0.53736	-0.51082	-0.50143	-0.46768	-0.43071	-0.41353	-0.37610
P40_LOGRET	-0.85948	-0.87466	-0.83844	-0.79683	-0.76527	-0.71875	-0.69423	-0.66733	-0.61847	-0.57969	-0.53306	-0.50314	-0.46537
P41_LOGRET	-0.71068	-0.70785	-0.66770	-0.62746	-0.58419	-0.53730	-0.53126	-0.49050	-0.44477	-0.40335	-0.35387	-0.33016	-0.29659
P46_LOGRET	-0.38744	-0.35251	-0.32670	-0.28076	-0.24613	-0.20721	-0.15957	-0.11148	-0.06818	-0.05901	-0.02188	0.02108	0.07095
P59_LOGRET	-0.90434	-0.88049	-0.84654	-0.81180	-0.78860	-0.76605	-0.74886	-0.72099	-0.68493	-0.64854	-0.61555	-0.57924	-0.54433
P60_LOGRET	-0.74538	-0.72593	-0.69517	-0.67008	-0.63693	-0.61884	-0.59414	-0.58220	-0.55874	-0.53496	-0.50128	-0.46560	-0.43033
P61_LOGRET	-0.40142	-0.40798	-0.36662	-0.32053	-0.28423	-0.24689	-0.20096	-0.15295	-0.11430	-0.07346	-0.02687	0.01379	0.04389
P64_LOGRET	-1.19298	-1.20664	-1.17180	-1.14134	-1.11500	-1.08184	-1.05142	-1.02864	-0.99309	-0.96199	-0.92575	-0.92380	-0.88941
P70_LOGRET	-1.40130	-1.39001	-1.38680	-1.35600	-1.32458	-1.28846	-1.25402	-1.23066	-1.20179	-1.17485	-1.14327	-1.12116	-1.08578
P71_LOGRET	-1.03099	-1.02909	-1.00729	-0.97179	-0.94686	-0.93368	-0.89952	-0.87309	-0.84494	-0.81636	-0.77899	-0.74195	-0.71283
P74_LOGRET	-0.71159	-0.66909	-0.64146	-0.63468	-0.59096	-0.55446	-0.56244	-0.51656	-0.46912	-0.42322	-0.39279	-0.36387	-0.32176

P78_LOGRET	-0.86147	-0.85838	-0.84119	-0.81658	-0.77330	-0.75129	-0.70786	-0.68568	-0.63681	-0.58823	-0.54342	-0.49550	-0.46393
T7_LOGRET	-0.58145	-0.55115	-0.52353	-0.50626	-0.48627	-0.44855	-0.42620	-0.41079	-0.37234	-0.33928	-0.32467	-0.28657	-0.27563
T13_LOGRET	-1.02015	-0.98655	-0.95141	-0.91638	-0.88687	-0.87707	-0.84800	-0.82159	-0.78914	-0.75786	-0.72710	-0.68927	-0.67657
T14_LOGRET	-1.04012	-0.93749	-0.80951	-0.80175	-0.68875	-0.68570	-0.56597	-0.64251	-0.55075	-0.38473	-0.19988	-0.15388	-0.04490
T19_LOGRET	-0.84785	-0.81309	-0.79131	-0.75678	-0.72512	-0.68892	-0.65375	-0.61805	-0.59885	-0.56233	-0.52607	-0.49058	-0.45831
T25_LOGRET	-0.50749	-0.49931	-0.45168	-0.40802	-0.38899	-0.34214	-0.29807	-0.24781	-0.21072	-0.16231	-0.13501	-0.11441	-0.09978
T29_LOGRET	-0.67175	-0.64507	-0.61423	-0.57916	-0.55254	-0.52630	-0.49541	-0.47471	-0.46184	-0.42458	-0.39817	-0.35995	-0.34663
T39_LOGRET	-1.05627	-1.03375	-1.00377	-0.96895	-0.94257	-0.91551	-0.88744	-0.86019	-0.84912	-0.81752	-0.81981	-0.78330	-0.74713
T45_LOGRET	-1.19194	-1.15745	-1.12229	-1.09524	-1.06289	-1.03388	-0.99755	-0.96226	-0.93004	-0.89487	-0.86432	-0.82969	-0.81044
T46_LOGRET	-1.16941	-1.13511	-1.10022	-1.06804	-1.03420	-0.99826	-0.96368	-0.93152	-0.90669	-0.87023	-0.85498	-0.81779	-0.78665
T54_LOGRET	0.05135	0.17792	0.31452	0.45140	0.59734	0.72857	0.88478	0.44421	0.48353	0.63715	0.81520	0.69673	0.76732
T57_LOGRET	-0.66741	-0.64571	-0.61413	-0.57931	-0.54447	-0.52205	-0.50257	-0.49217	-0.46471	-0.42970	-0.40177	-0.37079	-0.33861
T58_LOGRET	-0.74342	-0.69568	-0.56769	-0.55754	-0.45256	-0.30891	-0.26729	-0.10450	0.02700	0.20974	0.38336	0.58547	0.79813
T66_LOGRET	-1.06110	-1.02769	-0.99741	-0.96481	-0.93309	-0.93901	-0.90303	-0.88066	-0.86283	-0.84080	-0.81664	-0.77844	-0.76408
T70_LOGRET	-0.49807	-0.47544	-0.43903	-0.40513	-0.38798	-0.35515	-0.32177	-0.29870	-0.26044	-0.22569	-0.21131	-0.17156	-0.13164
T72_LOGRET	-0.45573	-0.43645	-0.40467	-0.37540	-0.34017	-0.30869	-0.27243	-0.24704	-0.20983	-0.18111	-0.14875	-0.11425	-0.08188
T83_LOGRET	-1.19533	-1.16251	-1.12807	-1.10438	-1.06974	-1.03896	-1.01043	-0.98046	-0.95060	-0.91536	-0.88595	-0.84868	-0.81762
T86_LOGRET	-0.98113	-0.94761	-0.91810	-0.89590	-0.86234	-0.83217	-0.79728	-0.77747	-0.74944	-0.72129	-0.68674	-0.65125	-0.62082
T87_LOGRET	-0.95397	-0.92053	-0.89302	-0.86300	-0.83782	-0.80173	-0.77193	-0.74457	-0.70784	-0.67691	-0.64102	-0.60429	-0.57549
T90_LOGRET	-0.68658	-0.55623	-0.45256	-0.42383	-0.30969	-0.32775	-0.36473	-0.22320	-0.18451	-0.06410	-0.09813	-0.12812	-0.04922
T93_LOGRET	-0.51988	-0.41914	-0.30266	-0.17728	-0.07683	0.01387	0.07582	-0.10840	0.02722	0.14539	0.32989	0.49988	0.54752
T94_LOGRET	-0.22562	0.14813	0.03112	-0.05275	0.06161	0.11419	0.19122	-0.05246	0.07452	0.22709	0.29446	0.45985	0.47341
T111_LOGRET	-0.63274	0.60209	-0.56726	-0.54345	-0.52155	-0.48971	-0.45339	-0.43262	-0.39738	-0.36152	-0.33422	-0.29880	-0.27685
T116_LOGRET	-1.09077	1.05697	-1.02197	-0.98673	-0.95485	-0.93259	-0.90757	-0.88465	-0.85729	-0.82536	-0.79374	-0.76169	-0.75355
T117_LOGRET	-0.64827	-0.61855	-0.58375	-0.55108	-0.51881	-0.48473	-0.46175	-0.44387	-0.41059	-0.37813	-0.35215	-0.31590	-0.32906
T118_LOGRET	-0.78002	0.74876	-0.71576	-0.68568	-0.65252	-0.62380	-0.59129	-0.56172	-0.52498	-0.49373	-0.46317	-0.42629	-0.40343
T120_LOGRET	-1.34434	-1.31567	-1.28623	-1.25740	-1.26453	-1.24045	-1.20318	-1.17129	-1.13289	-1.10117	-1.06975	-1.03333	-0.99788
T128_LOGRET	-0.81845	-0.76541	-0.74238	-0.69681	-0.64572	-0.58507	-0.52516	-0.47339	-0.43643	-0.37144	-0.31727	-0.27916	-0.22801
T129_LOGRET	-0.99406	-0.96166	-0.92713	-0.89202	-0.85691	-0.82232	-0.78652	-0.75809	-0.72090	-0.68624	-0.65441	-0.62332	-0.59444
T133_LOGRET	-0.83451	-0.80188	-0.76847	-0.74630	-0.71379	-0.67903	-0.64539	-0.62555	-0.58925	-0.55455	-0.52034	-0.48236	-0.46445
TH13_LOGRET	-1.64875	-1.67848	-1.65738	-1.65463	-1.64797	-1.62883	-1.60691	-1.60843	-1.58877	-1.56467	-1.54159	-1.52122	-1.51608
TH18_LOGRET	-1.27752	-1.21473	-1.17497	-1.12461	-1.07278	-1.00793	-0.93899	-0.86598	-0.79164	-0.73841	-0.67292	-0.60689	-0.53026
TH21_LOGRET	-0.60599	-0.57464	-0.55112	-0.53567	-0.51369	-0.47725	-0.51437	-0.49186	-0.49065	-0.49938	-0.46444	-0.42427	-0.39235
TH41_LOGRET	-0.15247	0.11962	0.08539	-0.09742	-0.06673	-0.03513	-0.00819	0.02560	0.03459	0.06615	0.10314	0.13759	0.17455
TH44_LOGRET	-1.47226	-1.46647	-1.43537	-1.43498	-1.40981	-1.38049	-1.35030	-1.32183	-1.28921	-1.26060	-1.22751	-1.19706	-1.16480
TH56_LOGRET	-1.09801	1.09391	-1.29998	-1.29029	-1.25741	-1.22974	-1.18299	-1.13997	-1.19134	-1.16848	-1.11892	-1.07498	-1.03092
TH87_LOGRET	-1.29348	-1.30707	-1.30703	-1.29019	-1.28281	-1.26212	-1.24324	-1.24151	-1.21862	-1.19419	-1.17101	-1.14643	-1.12336
TH89_LOGRET	-0.55482	-0.52491	-0.49840	-0.46573	-0.47466	-0.44124	-0.44766	-0.41156	-0.37442	-0.33689	-0.30167	-0.26357	-0.23378
TH91_LOGRET	-0.66380	-0.64775	-0.62407	-0.60150	-0.59677	-0.56285	-0.61561	-0.58691	-0.55460	-0.52735	-0.49180	-0.47612	-0.44817
TH106_LOGRET	-1.54044	-1.56545	-1.54616	-1.54388	-1.54970	-1.53138	-1.53518	-1.51548	-1.49511	-1.47119	-1.45014	-1.42645	-1.41496
V1_LOGRET	-0.58121	-0.54213	-0.51942	-0.46917	-0.42138	-0.40168	-0.34905	-0.30449	-0.25126	-0.20240	-0.17074	-0.13960	-0.09803
V2_LOGRET	-0.63814	-0.63317	-0.60623	-0.57475	-0.54594	-0.50992	-0.47569	-0.44431	-0.40727	-0.37710	-0.34057	-0.30612	-0.32749
V4_LOGRET	-0.76058	-0.78647	-0.79649	-0.76471	-0.73142	-0.69718	-0.66447	-0.63558	-0.60106	-0.56375	-0.52654	-0.49549	-0.55435
V5_LOGRET	-0.92112	-0.94083	-0.91530	-0.88063	-0.86741	-0.84134	-0.81419	-0.78673	-0.75244	-0.71698	-0.68258	-0.64714	-0.75559
V10_LOGRET	-0.09553	-0.09310	-0.06348	-0.02956	0.00581	0.03789	0.07413	0.10914	0.14620	0.18231	0.21300	0.23400	0.22129
V12_LOGRET	-0.52022	-0.57750	-0.55002	-0.53332	-0.47601	-0.41550	-0.35260	-0.29753	-0.23247	-0.18926	-0.13466	-0.12250	-0.18900
V13_LOGRET	-0.25391	-0.23347	-0.19808	-0.15469	-0.11617	-0.07271	-0.03908	0.00364	0.03974	0.08576	0.12288	0.12631	0.17301
V14_LOGRET	-0.22678	-0.23862	-0.22335	-0.18808	-0.16049	-0.12964	-0.09300	-0.07764	-0.04199	0.00395	0.03448	0.06321	0.04625
V19_LOGRET	-0.47951	-0.52993	-0.48478	-0.44848	-0.39632	-0.34228	-0.32027	-0.27339	-0.22993	-0.16337	-0.18090	-0.13462	-0.22944
V20_LOGRET	-0.23880	-0.23248	-0.19904	-0.16904	-0.13435	-0.10575	-0.07161	-0.05144	-0.01519	0.02188	0.05957	0.07091	0.05062
V21_LOGRET	-0.21681	-0.24814	-0.22230	-0.18226	-0.14159	-0.10807	-0.07848	-0.03863	-0.01284	0.02393	0.05570	0.09800	0.06060
V24_LOGRET	-0.37611	-0.38831	-0.36854	-0.34562	-0.32328	-0.29323	-0.25831	-0.26377	-0.23445	-0.19788	-0.16092	-0.13468	-0.16672
V26_LOGRET	-0.47008	-0.48463	-0.46362	-0.45019	-0.42272	-0.39093	-0.35786	-0.32821	-0.31469	-0.27866	-0.24698	-0.22989	-0.25830

Appendix B: Share of S&P 500 as of 7 December 2000

A UN 0.202
AA UN 0.2194
AAPL UQ 0.0395
ABI UN 0.1491
ABS UN 0.0779
ABT UN 0.66
ABX UN 0.0524
ACV UN 0.0173
ADBE UQ 0.1345
ADCT UQ 0.1542
ADI UN 0.1658
ADM UN 0.0711
ADP UN 0.3446
ADPT UQ 0.01
ADSK UQ 0.0136
AEE UN 0.0512
AEP UN 0.1226
AES UN 0.1818
AET UN 0.0826
AFL UN 0.1553
AGC UN 0.1729
AGN UN 0.091
AHC UN 0.0457
AHP UN 0.6086
AIG UN 2.0035
AL UN 0.0912
ALL UN 0.2625
ALTR UQ 0.0925
AM UN 0.0047
AMAT UQ 0.2768
AMD UN 0.039
AMGN UQ 0.5546
AMR UN 0.0445
ANDW UQ 0.0131
AOC UN 0.0693
AOL UN 0.8431
APA UN 0.0604
APC UN 0.131
APCC UQ 0.0213
APD UN 0.0685
ASH UN 0.0188
ASO UN 0.0497
AT UN 0.1664
ATI UN 0.013
AV UN 0.0288
AVP UN 0.0828
AVY UN 0.0498
AW UN 0.0215
AXP UN 0.6085
AZA UN 0.0799
AZO UN 0.0273
BA UN 0.5132
BAC UN 0.532
BAX UN 0.212
BBBY UQ 0.0514
BBT UN 0.1142
BBY UN 0.0429
BC UN 0.0128
BCC UN 0.0144
BCR UN 0.0205
BDK UN 0.0268
BDX UN 0.0703
BEN UN 0.0778
BF B UN 0.039
BGEN UQ 0.0695
BGG UN 0.007
BHI UN 0.0923
BK UN 0.3353
BLL UN 0.0096
BLS UN 0.6936
BMCS UQ 0.0377
BMET UQ 0.0549
BMS UN 0.013
BMY UN 1.1045
BNI UN 0.0888
BOL UN 0.0186
BR UN 0.0798
BRCM UQ 0.2031
BS UN 0.0021
BSC UN 0.0438
BSX UN 0.0423
BUD UN 0.3629
BVSN UQ 0.0485
C UN 2.1353
CA UN 0.1333
CAG UN 0.1118
CAH UN 0.2237
CAT UN 0.121
CB UN 0.1283
CBE UN 0.0341
CC UN 0.0176
CCE UN 0.0785
CCK UN 0.004
CCL UN 0.1246
CCR UN 0.0377
CCU UN 0.2558
CD UN 0.0565
CEG UN 0.0498
CEN UN 0.0281
CF UN 0.0464
CGP UN 0.1432
CHIR UQ 0.0687
CHV UN 0.4485
CI UN 0.1731
CIN UN 0.0432
CINF UQ 0.0535
CIT UN 0.0373
CL UN 0.2785
CLX UN 0.0809
CMA UN 0.071
CMB UN 0.4376
CMCSK UQ 0.259
CMS UN 0.0281
CMVT UQ 0.1286
CNC UN 0.0231
CNS UN 0.0081
CNXT UQ 0.048
COC/B UN 0.1382
COF UN 0.0973
COST UQ 0.1255
CPB UN 0.1153
CPL UN 0.0771
CPN UN 0.0806
CPQ UN 0.2859
CPWR UQ 0.0212
CR UN 0.0134
CS UN 0.0282
CSC UN 0.1037
CSCO UQ 2.9996
CSX UN 0.0477
CTB UN 0.0058
CTL UN 0.0438
CTX UN 0.0186
CTXS UQ 0.043
CUM UN 0.0117
CVG UN 0.0652
CVS UN 0.1744
D UN 0.1209
DAL UN 0.0492
DCN UN 0.0201
DD UN 0.3853
DDS UN 0.0096
DE UN 0.0852
DELL UQ 0.3904
DG UN 0.0472
DHR UN 0.0802
DIS UN 0.5502
DJ UN 0.0381
DLX UN 0.0141
DNY UN 0.0235
DOV UN 0.0704
DOW UN 0.1965
DPH UN 0.0609
DRI UN 0.0267
DTE UN 0.0445
DUK UN 0.2705
DVN UA 0.0563
DYN UN 0.1276
EC UN 0.0217
ECL UN 0.045
ED UN 0.066
EDS UN 0.2313
EFX UN 0.0391
EIX UN 0.0601
EK UN 0.1028
EMC UN 1.6277
EMN UN 0.029
EMR UN 0.2724
ENE UN 0.4518
EOG UN 0.0461
EPG UN 0.1269
ETN UN 0.0438
ETR UN 0.0757
EXC UN 0.1783
F UN 0.3891
FBF UN 0.2676
FCX UN 0.0115
FD UN 0.0603
FDC UN 0.1848
FDX UN 0.1127
FE UN 0.059
FITB UQ 0.2209
FMC UN 0.0185
FNM UN 0.7065
FO UN 0.0396
FON UN 0.173
FPL UN 0.0979
FRE UN 0.3716
FRX UN 0.0996
FSR UN 0.1688
FTU UN 0.2056
G UN 0.2845
GAS UN 0.0154
GCI UN 0.1195
GD UN 0.1167
GDT UN 0.1402
GDW UN 0.0832
GE UN 4.4522
GIS UN 0.0959
GLK UN 0.0159
GLW UN 0.5202
GM UN 0.233
GP UN 0.0501
GPC UN 0.0296
GPS UN 0.1904
GPU UN 0.0363
GR UN 0.0304
GRA UN 0.001
GT UN 0.0239
GTW UN 0.0485
GWW UN 0.0298
GX UN 0.1032
H UN 0.0345
HAL UN 0.1326
HAS UN 0.013
HBAN UQ 0.0324
HCA UN 0.1852
HCR UN 0.0141
HD UN 0.8912
HDI UN 0.1156
HET UN 0.0269
HI UN 0.2046
HIG UN 0.1466
HLT UN 0.0293
HM UN 0.0111
HNZ UN 0.128
HON UN 0.355
HOT UN 0.0533
HPC UN 0.0176
HRB UN 0.0292
HRC UN 0.0412
HSY UN 0.071
HUM UN 0.0175
HWP UN 0.5337
IBM UN 1.4125
IFF UN 0.0166
INTC UQ 1.8319
IP UN 0.1456
IPG UN 0.1108
IR UN 0.0573
ITT UN 0.0267
ITW UN 0.1512
JCI UN 0.0404
JCP UN 0.0215
JDSU UQ 0.5107
JNJ UN 1.13
JP UN 0.0629
JPM UN 0.196
JWN UN 0.0179
K UN 0.0834
KBH UN 0.014
KEY UN 0.0957
KG UN 0.0678
KLAC UQ 0.0477
KM UN 0.023
KMB UN 0.309
KMG UN 0.0491
KO UN 1.2905
KR UN 0.1732
KRB UN 0.2548
KRI UN 0.0325
KSE UN 0.0453
KSS UN 0.1622
LDG UN 0.0061
LEG UN 0.0279
LEH UN 0.1162
LIZ UN 0.0178
LLTC UQ 0.1344
LLY UN 0.8699
LMT UN 0.1156
LNC UN 0.0792
LOW UN 0.1284
LPX UN 0.0073
LSI UN 0.0506
LTD UN 0.0626
LTR UN 0.0786
LU UN 0.4337
LUV UN 0.1279
LXK UN 0.0451
MAR UN 0.0843
MAS UN 0.0846
MAT UN 0.0475
MAY UN 0.077
MBI UN 0.0596
MCD UN 0.3347
MCK UN 0.0797
MCO UN 0.0364
MDP UN 0.013
MDR UN 0.004
MDT UN 0.5461
MEA UN 0.0253
MEDI UQ 0.0911
MEE UN 0.0257
MEL UN 0.2033
MER UN 0.4354
MERQ UQ 0.0561
MHP UN 0.0882
MIL UN 0.0178
MMC UN 0.2822
MMM UN 0.377
MO UN 0.7495
MOLX UQ 0.0705
MOT UN 0.3164
MRK UN 1.7404
MRO UN 0.0709
MSFT UQ 2.3461
MTG UN 0.0569
MU UN 0.147
MWD UN 0.0666
MXIM UQ 0.125
MYG UN 0.0197
N UN 0.0227
NAV UN 0.0096
NBR UA 0.0585
NCC UN 0.1328
NCR UN 0.0411
NEM UN 0.0232
NGH UN 0.081
NI UN 0.0466
NKE UN 0.0971
NMK UN 0.0223
NOC UN 0.0501
NOVL UQ 0.0172
NSC UN 0.0468
NSI UN 0.0073
NSM UN 0.0269
NT UN 0.9831
NTAP UQ 0.2011
NTRS UQ 0.1679
NUE UN 0.0269
NVLS UQ 0.0322
NWL UN 0.0453
NXTL UQ 0.2017
NYT UN 0.0546
OAT UN 0.105
ODP UN 0.0161
OI UN 0.0047
OK UN 0.0472
OKE UN 0.0107
OMC UN 0.1306
ONE UN 0.3378
ORCL UQ 1.377
OXY UN 0.0679
P UN 0.1167
PALM UQ 0.2228
PAYX UQ 0.1444
PBI UN 0.0667
PCAR UQ 0.0282
PCG UN 0.0834
PCH UN 0.0077
PCS UN 0.204
PD UN 0.0341
PDG UN 0.0265
PEG UN 0.0816
PEP UN 0.5652
PFE UN 2.2837
PG UN 0.8155
PGL UN 0.0129
PGR UN 0.0643
PH UN 0.0382
PHA UN 0.6359
PHM UN 0.0146
PKI UN 0.0411
PLL UN 0.0198
PMTC UQ 0.0275
PNC UN 0.1592
PNW UN 0.0327
PPG UN 0.0639
PPL UN 0.0516
PRD UN 0.0025
PSFT UQ 0.0995
PTV UN 0.0175
PVN UN 0.1109
PWER UQ 0.0362
PX UN 0.0503
Q UN 0.5614
QCOM UQ 0.6228
QTRN UQ 0.0177
R UN 0.0088
RAL UN 0.0696
RBK UN 0.0113
RD UN 1.0326
RDC UN 0.0163
REI UN 0.0949
RGBK UQ 0.0466
RHI UN 0.0446
RIG UN 0.0626
RKY UN 0.0236
RML UN 0.004
ROH UN 0.0567
ROK UN 0.0661
RSH UN 0.0716
RTN/B UN 0.0854
RX UN 0.068
S UN 0.1021
SAFC UQ 0.0327
SANM UQ 0.1039
SAPE UQ 0.014
SBC UN 1.5414
SBUX UQ 0.073
SCH UN 0.3433
SEBL UQ 0.3176
SEE UN 0.0224
SFA UN 0.0667
SGP UN 0.6616
SHW UN 0.0309
SIAL UQ 0.0269
SLB UN 0.3323
SLE UN 0.1819
SLM UN 0.0785
SLR UN 0.1496
SMI UN 0.0038
SNA UN 0.0136
SNV UN 0.056
SO UN 0.1552
SOTR UQ 0.0497
SPC UN 0.1006
SPLS UQ 0.0458
SRE UN 0.041
STI UN 0.1304
STJ UN 0.0404
STT UN 0.1719
SUB UN 0.052
SUN UN 0.0214
SUNW UQ 1.1785
SV UN 0.0715
SVU UN 0.0145
SWK UN 0.0205
SWY UN 0.2305
SYY UN 0.1571
T UN 0.6437
TEK UN 0.0213
TER UN 0.0512
TGT UN 0.2507
THC UN 0.1031
TIF UN 0.0394
TIN UN 0.0213
TJX UN 0.0689
TKR UN 0.0076
TLAB UQ 0.2174
TMK UN 0.043
TMO UN 0.0435
TNB UN 0.007
TOS UN 0.0365
TOY UN 0.0292
TRB UN 0.0975
TROW UQ 0.0409
TRW UN 0.0339
TSG UN 0.0406
TUP UN 0.0091
TWX UN 0.7225
TX UN 0.2713
TXN UN 0.6334
TXT UN 0.0556
TXU UN 0.0883
TYC UN 0.7999
U UN 0.0241
UCL UN 0.0728
UIS UN 0.037
UK UN 0.0569
UN UN 0.2795
UNH UN 0.1604
UNM UN 0.055
UNP UN 0.0963
UPC UN 0.0396
USB UN 0.1639
UST UN 0.0324
UTX UN 0.2951
VC UN 0.0113
VFC UN 0.0287
VIA/B UN 0.6889
VMC UN 0.0382
VO UN 0.1971
VRTS UQ 0.3892
VZ UN 1.3461
W UN 0.0243
WAG UN 0.3266
WB UN 0.0842
WCOM UQ 0.367
WEN UN 0.0241
WFC UN 0.6898
WHR UN 0.026
WIN UN 0.0227
WLL UN 0.0459
WLP UN 0.0554
WM UN 0.2238
WMB UN 0.1392
WMI UN 0.132
WMT UN 2.064
WOR UN 0.0058
WPI UN 0.0377
WWY UN 0.0869
WY UN 0.088
X UN 0.0118
XEL UN 0.0781
XLNX UQ 0.1126
XOM UN 2.5862
XRX UN 0.0249
YHOO UQ 0.1635
YUM UN 0.0426

Appendix C

Revaluation Effects after controlling for concurrent economic reforms and macroeconomic variables

$$M1\ (IFCG\ indices):\ R_{it}=\alpha_i+\gamma DurLib_{it}+[\lambda WRet_t]+\boldsymbol{\phi}'\boldsymbol{CER}+\boldsymbol{\Gamma}'\boldsymbol{MF}+\varepsilon_{it}$$

$$M2\ (Individual\ Firms):\ R_{sit}=\alpha_{si}+\gamma DurLib_{it}+[\lambda WRet_t]+\boldsymbol{\phi}'\boldsymbol{CER}+\boldsymbol{\Gamma}'\boldsymbol{MF}+\varepsilon_{sit}$$

$$M3\ (World\ Rank\ in\ Size):\ R_{sit}=\alpha_{si}+\gamma DurLib_{it}+\delta(WRank(size_{st})*DurLib_{it})+[\lambda WRet_t]+\boldsymbol{\phi}'\boldsymbol{CER}+\boldsymbol{\Gamma}'\boldsymbol{MF}+\varepsilon_{sit}$$

$$M4\ (Domestic\ Rank\ in\ Size):\ R_{sit}=\alpha_{si}+\gamma DurLib_{it}+\delta(DRank(size_{st})*DurLib_{it})+[\lambda WRet_t]+\boldsymbol{\phi}'\boldsymbol{CER}+\boldsymbol{\Gamma}'\boldsymbol{MF}+\varepsilon_{sit}$$

The panel regressions are performed using monthly logarithmic returns of both IFCG indices and individual firms in 12 emerging markets. Data covers Jan. 1976 to the market liberalization date month in each country. For example. Argentina has data from Jan. 1976 to Nov. 1989. Liberalization dates are from Henry (2000). $R_{(s)it}$ is the logarithmic return for country i (for asset s in country i) at time t. $DurLib_{it}$ is a dummy variable that takes on the value one in each of the 8 month $DurLib$ period in country i. $\alpha_{(s)i}$ measures the average monthly return for country i (for firm s in country i) before market liberalization and γ measures the average monthly abnormal return after liberalization across all the countries (all the firms). $WRet_t$ is the logarithmic World market return (MSCI World Index). Four dummy variables are used to control for the effect of the concurrent economic reforms (CER): Stabilization, Trade, Privatization and the easing of exchange control. Four macroeconomic fundamentals (MF) are also used: domestic industrial production, domestic inflation rate, 3 month US T-bill rate, and real exchange rate. $WRank(size_{st})$ is a worldwide rank measure in firm size {= (firm's rank in the World/total number of firms in 12 markets)}. $DRank(size_{st})$ is a firm's rank in the local market i {= (firm's rank in the country /total number of firms in that market)}. The revaluation effect for M3 and M4 are measured by $\gamma+\delta WRank(size_{st})$ in the case of World rank size measure, and $\gamma+\delta DRank(size_{st})$ in the case of domestic rank size measure. t-statistics based on heteroskedasticity-consistent (White) standard errors are reported in parentheses.

	IFCG Indices	*Firm: Average*	*Firm: World Rank*	*Firm: Domestic Rank*
γ	**0.0514** **(4.31)**	**0.0481** **(15.10)**	**0.0247** **(3.74)**	**0.0292** **(4.53)**
δ			**0.0416** **(4.48)**	**0.0331** **(3.70)**
λ	**0.2406** **(3.59)**	**0.3058** **(14.00)**	**0.3060** **(14.02)**	**0.3057** **(14.01)**
Stability	**-0.0509** **(-2.99)**	**-0.0638** **(-16.79)**	**-0.0638** **(-16.81)**	**-0.0634** **(-16.67)**
Trade	-0.0111 (-0.84)	0.0009 (0.23)	0.0015 (0.39)	-0.0001 (-0.03)
Privatization	**0.0479** **(2.55)**	**0.0622** **(14.04)**	**0.0620** **(13.98)**	**0.0614** **(13.76)**
Exchange rate	0.0137 (0.85)	**-0.0170** **(-4.13)**	**-0.0169** **(-4.12)**	**-0.0168** **(-4.09)**
Industrial Production	-0.0302 (-0.98)	**-0.0327** **(-3.73)**	**-0.0325** **(-3.71)**	**-0.0329** **(-3.75)**
US T-bill rate	**-0.0506** **(-1.78)**	**-0.0221** **(-2.36)**	**-0.0226** **(-2.42)**	**-0.0223** **(-2.38)**
Domestic Inflation	-0.0939 (-0.14)	-0.0457 (-0.29)	-0.0445 (-0.28)	-0.0455 (-0.29)
Real Foreign Exchange	**-0.4791** **(-2.38)**	2.96E-05 (0.02)	3.55E-05 (0.03)	3.1E-05 (0.02)

Appendix D

Revaluation Effects (7 M)

M1 (IFCG indices): $R_{it}=\alpha_i+\gamma DurLib_{it}+[\lambda WRet_t]+\varepsilon_{it}$

M2 (Individual Firms): $R_{sit}=\alpha_{si}+\gamma DurLib_{it}+[\lambda WRet_t]+\varepsilon_{sit}$

M3 (Individual Firms with World Rank in Size): $R_{sit}=\alpha_{si}+\gamma DurLib_{it}+\delta(WRank(size_{st})*DurLib_{it})+[\lambda WRet_t]+\varepsilon_{sit}$

M4 (Individual Firms with Domestic Rank in Size): $R_{sit}=\alpha_{si}+\gamma DurLib_{it}+\delta(DRank(size_{st})*DurLib_{it})+[\lambda WRet_t]+\varepsilon_{sit}$

The panel regressions are performed using monthly logarithmic returns of both IFCG indices and individual firms in 12 emerging markets. Data covers Jan. 1976 to the market liberalization date month in each country. For example, Argentina has data from Jan. 1976 to Nov. 1989. Liberalization dates are from Henry (2000). $R_{(s)it}$ is the logarithmic return for country *i* (for asset *s* in country *i)* at time *t*. $DurLib_{it}$ is a dummy variable that takes on the value one in each of the 7 month *DurLib* period in country *i*. $\alpha_{(s)i}$ measures the average monthly return for country *i* (for firm *s* in country *i*) before market liberalization and γ measures the average monthly abnormal return after liberalization across all the countries (all the firms). $WRet_t$ is the logarithmic World market return (MSCI World Index). $WRank(size_{st})$ is a worldwide rank measure in firm size {= (firm's rank in the World/total number of firms in 12 markets)}. $DRank(size_{st})$ is a firm's rank in the local market *i* {= (firm's rank in the country /total number of firms in that market)}. The revaluation effect for M3 and M4 are measured by $\gamma+\delta WRank(size_{st})$ in the case of World rank size measure, and $\gamma+\delta DRank(size_{st})$ in the case of domestic rank size measure. t-statistics based on heteroskedasticity-consistent (White) standard errors are reported in parentheses.

	Before Controlling for World Market Return				*After Controlling for World Market Return*			
	IFCG Indices	*Firm: Average*	*Firm: World Rank*	*Firm: Domestic Rank*	*IFCG Indices*	*Firm: Average*	*Firm: World Rank*	*Firm: Domestic Rank*
γ	**0.0390** (4.09)	**0.0313** (12.49)	**0.0238** (3.61)	**0.0173** (2.66)	**0.0355** (3.76)	**0.0274** (10.84)	**0.0181** (2.75)	**0.0124** (1.90)
δ			0.0131 (1.36)	**0.0238** (2.54)			**0.0162** (1.69)	**0.0254** (2.72)
λ					**0.2727** (4.27)	**0.2798** (15.14)	**0.2805** (15.18)	**0.2803** (15.17)
Adj. R-squares	0.0212	0.0096	0.0096	0.0098	0.0334	0.0162	0.0162	0.0164
No. of cross sections	12	305	305	305	12	305	305	305
No. of observations	1229	20687	20687	20687	1229	20687	20687	20687

Appendix D (continued)

Revaluation Effects (9 M)

$$M1\ (IFCG\ indices):\ R_{it}=\alpha_i+\gamma DurLib_{it}+[\lambda WRet_t]+\varepsilon_{it}$$
$$M2\ (Individual\ Firms):\ R_{sit}=\alpha_{si}+\gamma DurLib_{it}+[\lambda WRet_t]+\varepsilon_{sit}$$
$$M3\ (Individual\ Firms\ with\ World\ Rank\ in\ Size):R_{sit}=\alpha_{si}+\gamma DurLib_{it}+\delta(WRank(size_{si})*DurLib_{it})+[\lambda WRet_t]+\varepsilon_{sit}$$
$$M4\ (Individual\ Firms\ with\ Domestic\ Rank\ in\ Size):R_{sit}=\alpha_{si}+\gamma DurLib_{it}+\delta(DRank(size_{si})*DurLib_{it})+[\lambda WRet_t]+\varepsilon_{sit}$$

The panel regressions are performed using monthly logarithmic returns of both IFCG indices and individual firms in 12 emerging markets. Data covers Jan. 1976 to the market liberalization date month in each country. For example, Argentina has data from Jan. 1976 to Nov. 1989. Liberalization dates are from Henry (2000). $R_{(s)it}$ is the logarithmic return for country i (for asset s in country i) at time t. $DurLib_{it}$ is a dummy variable that takes on the value one in each of the 9 month *DurLib* period in country i. $\alpha_{(s)i}$ measures the average monthly return for country i (for firm s in country i) before market liberalization and γ measures the average monthly abnormal return after liberalization across all the countries (all the firms). $WRet_t$ is the logarithmic World market return (MSCI World Index). $WRank(size_{si})$ is a worldwide rank measure in firm size {= (firm's rank in the World/total number of firms in 12 markets)}. $DRank(size_{si})$ is a firm's rank in the local market i {= (firm's rank in the country /total number of firms in that market)}. The revaluation effect for M3 and M4 are measured by $\gamma+\delta WRank(size_{si})$ in the case of World rank size measure, and $\gamma+\delta DRank(size_{si})$ in the case of domestic rank size measure. t-statistics based on heteroskedasticity-consistent (White) standard errors are reported in parentheses.

	Before Controlling for World Market Return				*After Controlling for World Market Return*			
	IFCG Indices	*Firm: Average*	*Firm: World Rank*	*Firm: Domestic Rank*	*IFCG Indices*	*Firm: Average*	*Firm: World Rank*	*Firm: Domestic Rank*
γ	**0.0427** (5.49)	**0.0380** (17.53)	**0.0164** (2.82)	**0.0125** (2.20)	**0.0399** (5.14)	**0.0351** (16.10)	**0.0120** (2.07)	0.0087 (1.53)
δ			**0.0375** (4.50)	**0.0433** (5.39)			**0.0399** (4.80)	**0.0446** (5.55)
λ					**0.2710** (4.27)	**0.2767** (15.11)	**0.2785** (15.20)	**0.2777** (15.18)
Adj. R-squares	0.0270	0.0135	0.0143	0.0145	0.0390	0.0200	0.0208	0.0210
No. of cross sections	12	305	305	305	12	305	305	305
No. of observations	1229	20687	20687	20687	1229	20687	20687	20687

Appendix D (concluded)

Revaluation Effects(10 M)

M1 (IFCG indices): $R_{it}=\alpha_i+\gamma DurLib_{it}+[\lambda WRet_t]+\varepsilon_{it}$

M2 (Individual Firms): $R_{sit}=\alpha_{si}+\gamma DurLib_{it}+[\lambda WRet_t]+\varepsilon_{sit}$

M3 (Individual Firms with World Rank in Size): $R_{sit}=\alpha_{si}+\gamma DurLib_{it}+\delta(WRank(size_{si})*DurLib_{it})+[\lambda WRet_t]+\varepsilon_{sit}$

M4 (Individual Firms with Domestic Rank in Size): $R_{sit}=\alpha_{si}+\gamma DurLib_{it}+\delta(DRank(size_{si})*DurLib_{it})+[\lambda WRet_t]+\varepsilon_{sit}$

The panel regressions are performed using monthly logarithmic returns of both IFCG indices and individual firms in 12 emerging markets. Data covers Jan. 1976 to the market liberalization date month in each country. For example, Argentina has data from Jan. 1976 to Nov. 1989. Liberalization dates are from Henry (2000). $R_{(s)it}$ is the logarithmic return for country i (for asset s in country i) at time t. $DurLib_{it}$ is a dummy variable that takes on the value one in each of the 10 month *DurLib* period in country i. $\alpha_{(s)i}$ measures the average monthly return for country i (for firm s in country i) before market liberalization and γ measures the average monthly abnormal return after liberalization across all the countries (all the firms). $WRet_t$ is the logarithmic World market return (MSCI World Index). $WRank(size_{si})$ is a worldwide rank measure in firm size {= (firm's rank in the World/total number of firms in 12 markets)}. $DRank(size_{si})$ is a firm's rank in the local market i {= (firm's rank in the country /total number of firms in that market)}. The revaluation effect for M3 and M4 are measured by $\gamma+\delta WRank(size_{si})$ in the case of World rank size measure, and $\gamma+\delta DRank(size_{si})$ in the case of domestic rank size measure. t-statistics based on heteroskedasticity-consistent (White) standard errors are reported in parentheses.

	Before Controlling for World Market Return				*After Controlling for World Market Return*			
	IFCG Indices	*Firm: Average*	*Firm: World Rank*	*Firm: Domestic Rank*	*IFCG Indices*	*Firm: Average*	*Firm: World Rank*	*Firm: Domestic Rank*
γ	**0.0391** (5.27)	**0.0354** (17.01)	**0.0101** (1.80)	0.0088 (1.63)	**0.0367** (5.01)	**0.0329** (15.82)	0.0065 (1.17)	0.0056 (1.03)
δ			**0.0440** (5.51)	**0.0451** (5.86)			**0.0458** (5.77)	**0.0463** (6.03)
λ					**0.2755** (4.35)	**0.2805** (15.36)	**0.2819** (15.44)	**0.2814** (15.44)
Adj. R-squares	0.0251	0.0129	0.0141	0.0141	0.0377	0.0196	0.0208	0.0208
No. of cross sections	12	305	305	305	12	305	305	305
No. of observations	1229	20687	20687	20687	1229	20687	20687	20687

Appendix E

Changes in the Cost of Capital after controlling for concurrent economic reforms and macroeconomic variables

M1 (IFCG indices): $R_{it}=\alpha_i+\gamma PostLib_{it}+[\lambda WRet_t]+\boldsymbol{\phi'CER}+\boldsymbol{\Gamma MF}+\varepsilon_{it}$

M2 (Individual Firms): $R_{sit}=\alpha_{si}+\gamma PostLib_{it}+[\lambda WRet_t]+\boldsymbol{\phi'CER}+\boldsymbol{\Gamma MF}+\varepsilon_{sit}$

M3 (World Rank in Size): $R_{sit}=\alpha_{si}+\gamma PostLib_{it}+\delta(WRank(size_{si})*PostLib_{it})+[\lambda WRet_t]+\boldsymbol{\phi'CER}+\boldsymbol{\Gamma MF}+\varepsilon_{sit}$

M4 (Domestic Rank in Size): $R_{sit}=\alpha_{si}+\gamma PostLib_{it}+\delta(DRank(size_{si})*PostLib_{it})+[\lambda WRet_t]+\boldsymbol{\phi'CER}+\boldsymbol{\Gamma MF}+\varepsilon_{sit}$

The panel regressions are performed using monthly logarithmic returns of both IFCG indices and individual firms in 12 emerging markets. The data covers 36 months before and 36 months after market liberalization, excluding the 8-month *DurLib* period. Liberalization dates are from Henry (2000). $R_{(s)it}$ is the logarithmic return for country *i* (for asset *s* in country *i*) at time *t*. $PostLib_{it}$ is a dummy variable that takes on the value one in each of the 36 *PostLib* months in country i. $\alpha_{(s)i}$ measures the average monthly return for country *i* (for firm *s* in country *i*) before market liberalization and γ measures the average monthly abnormal return after liberalization across all the countries. $WRet_t$ is the logarithmic World market return (MSCI World Index). Four dummy variables are used to control for the effect of the concurrent economic reforms (CER): Stabilization, Trade, Privatization and the easing of exchange control. Four macroeconomic fundamentals (MF) are also used: domestic industrial production, domestic inflation rate, 3 month US T-bill rate, and real exchange rate. $WRank(size_{si})$ is a worldwide rank measure in firm size {= (firm's rank in the World/total number of firms in 12 markets)}. $DRank(size_{si})$ is a firm's rank in the local market *i* {= (firm's rank in the country /total number of firms in that market)}. The change in the cost of capital for M3 and M4 are measured by $\gamma+\delta WRank(size_{si})$ in the case of World rank size measure, and $\gamma+\delta DRank(size_{si})$ in the case of domestic rank size measure. t-statistics based on heteroskedasticity-consistent (White) standard errors are reported in parentheses.

	IFCG Indices	*Firm: Average*	*Firm: World Rank*	*Firm: Domestic Rank*
γ	**0.0130** **(1.94)**	**0.0038** **(2.18)**	**0.0183** **(4.35)**	**0.0206** **(4.68)**
δ			**-0.0256** **(-4.10)**	**-0.0283** **(-4.47)**
λ	**0.3948** **(4.62)**	**0.4427** **(23.16)**	**0.4424** **(23.17)**	**0.4433** **(23.22)**
Stability	0.0024 (0.15)	**-0.0206** **(-5.43)**	**-0.0205** **(-5.40)**	**-0.0209** **(-5.51)**
Trade	**-0.0435** **(-2.28)**	0.0020 (0.39)	0.0024 (0.46)	0.0023 (0.44)
Privatization	0.0166 (0.64)	**0.0254** **(3.89)**	**0.0246** **(3.78)**	**0.0256** **(3.94)**
Exchange rate	0.0082 (0.39)	-0.0091 (-1.57)	-0.0085 (-1.48)	-0.0091 (-1.57)
Industrial Production	0.1061 (1.53)	**-0.0790** **(-7.15)**	**-0.0794** **(-7.18)**	**-0.0788** **(-7.13)**
US T-bill rate	-0.2481 (-0.80)	**0.1862** **(9.45)**	**0.1879** **(9.55)**	**0.1872** **(9.51)**
Domestic Inflation	0.0276 (0.21)	**-0.2530** **(-3.50)**	**-0.2544** **(-3.52)**	**-0.2548** **(-3.52)**
Real Foreign Exchange	-0.0461 (-1.16)	0.0028 (0.08)	0.0027 (0.08)	0.0020 (0.06)

Appendix F
Changes in the Cost of Capital (2Y window)

M1 (IFCG indices): $R_{it}=\alpha_i+\gamma PostLib_{it}+[\lambda WRet_t]+\varepsilon_{it}$

M2 (Individual Firms): $R_{sit}=\alpha_{si}+\gamma PostLib_{it}+[\lambda WRet_t]+\varepsilon_{sit}$

M3 (Individual Firms with World Rank in Size): $R_{sit}=\alpha_{si}+\gamma PostLib_{it}+\delta(WRank(size_{st})*PostLib_{it})+[\lambda WRet_t]+\varepsilon_{sit}$

M4 (Individual Firms with Domestic Rank in Size): $R_{sit}=\alpha_{si}+\gamma PostLib_{it}+\delta(DRank(size_{st})*PostLib_{it})+[\lambda WRet_t]+\varepsilon_{sit}$

The panel regressions are performed using monthly logarithmic returns of both IFCG indices and individual firms in 12 emerging markets. The data covers 24 months before and 24 months after market liberalization, excluding the 8-month *DurLib* period. Liberalization dates are from Henry (2000). $R_{(s)it}$ is the logarithmic return for country *i* (for asset *s* in country *i*) at time *t*. $PostLib_{it}$ is a dummy variable that takes on the value one in each of the 24 *PostLib* months in country i. $\alpha_{(s)i}$ measures the average monthly return for country *i* (for firm *s* in country *i*) before market liberalization and γ measures the average monthly abnormal return after liberalization across all the countries. $WRet_t$ is the logarithmic World market return (MSCI World Index). $WRank(size_{st})$ is a worldwide rank measure in firm size {= (firm's rank in the World/total number of firms in 12 markets)}. $DRank(size_{st})$ is a firm's rank in the local market *i* {= (firm's rank in the country /total number of firms in that market)}. The change in the cost of capital for M3 and M4 are measured by $\gamma+\delta WRank(size_{st})$ in the case of World rank size measure, and $\gamma+\delta DRank(size_{st})$ in the case of domestic rank size measure. t-statistics based on heteroskedasticity-consistent (White) standard errors are reported in parentheses.

	Before Controlling for World Market Return				*After Controlling for World Market Return*			
	IFCG Indices	*Firm: Average*	*Firm: World Rank*	*Firm: Domestic Rank*	*IFCG Indices*	*Firm: Average*	*Firm: World Rank*	*Firm: Domestic Rank*
γ	**0.0106** (1.94)	**0.0031** (1.84)	**0.0234** (5.36)	**0.0137** (3.07)	**0.0169** (3.09)	**0.0112** (6.76)	**0.0290** (6.67)	**0.0221** (4.91)
δ			**-0.0349** (-5.56)	**-0.0178** (-2.78)			**-0.0305** (-4.88)	**-0.0182** (-2.81)
λ					**0.4298** (4.50)	**0.4923** (23.17)	**0.4892** (23.03)	**0.4924** (23.19)
Adj. R-squares	0.0169	0.0203	0.0213	0.0205	0.0523	0.0415	0.0421	0.0418
No. of cross sections	12	305	305	305	12	305	305	305
No. of observations	543	12611	12611	12611	543	12611	12611	12611

Appendix F (continued)

Changes in the Cost of Capital (4Y window)

M1 (IFCG indices): $R_{it}=\alpha_i+\gamma PostLib_{it}+[\lambda WRet_t]+\varepsilon_{it}$

M2 (Individual Firms): $R_{sit}=\alpha_{si}+\gamma PostLib_{it}+[\lambda WRet_t]+\varepsilon_{sit}$

M3 (Individual Firms with World Rank in Size): $R_{sit}=\alpha_{si}+\gamma PostLib_{it}+\delta(WRank(size_{st})*PostLib_{it})+[\lambda WRet_t]+\varepsilon_{sit}$

M4 (Individual Firms with Domestic Rank in Size): $R_{sit}=\alpha_{si}+\gamma PostLib_{it}+\delta(DRank(size_{st})*PostLib_{it})+[\lambda WRet_t]+\varepsilon_{sit}$

The panel regressions are performed using monthly logarithmic returns of both IFCG indices and individual firms in 12 emerging markets. The data covers 48 months before and 48 months after market liberalization, excluding the 8-month *DurLib* period. Liberalization dates are from Henry (2000). $R_{(s)it}$ is the logarithmic return for country *i* (for asset *s* in country *i*) at time *t*. $PostLib_{it}$ is a dummy variable that takes on the value one in each of the 48 *PostLib* months in country i. $\alpha_{(s)i}$ measures the average monthly return for country *i* (for firm *s* in country *i*) before market liberalization and γ measures the average monthly abnormal return after liberalization across all the countries. $WRet_t$ is the logarithmic World market return (MSCI World Index). $WRank(size_{st})$ is a worldwide rank measure in firm size {= (firm's rank in the World/total number of firms in 12 markets)}. $DRank(size_{st})$ is a firm's rank in the local market *i* {= (firm's rank in the country /total number of firms in that market)}. The change in the cost of capital for M3 and M4 are measured by $\gamma+\delta WRank(size_{st})$ in the case of World rank size measure, and $\gamma+\delta DRank(size_{st})$ in the case of domestic rank size measure. t-statistics based on heteroskedasticity-consistent (White) standard errors are reported in parentheses.

	Before Controlling for World Market Return				*After Controlling for World Market Return*			
	IFCG Indices	*Firm: Average*	*Firm: World Rank*	*Firm: Domestic Rank*	*IFCG Indices*	*Firm: Average*	*Firm: World Rank*	*Firm: Domestic Rank*
γ	0.0032 (0.76)	-0.0011 (-0.74)	**0.0105** (2.69)	**0.0104** (2.64)	**0.0084** (2.06)	**0.0046** (3.35)	**0.0155** (4.01)	**0.0165** (4.23)
δ			**-0.0196** (-3.46)	**-0.0187** (-3.37)			**-0.0182** (-3.30)	**-0.0193** (-3.53)
λ					**0.4197** (6.93)	**0.4164** (27.33)	**0.4158** (27.27)	**0.4165** (27.33)
Adj. R-squares	-0.0047	0.0066	0.0069	0.0068	0.0343	0.0230	0.0231	0.0232
No. of cross sections	12	305	305	305	12	305	305	305
No. of observations	1047	22673	22673	22673	1047	22673	22673	22673

Appendix F (concluded)

Changes in the Cost of Capital (5Y window)

M1 (IFCG indices): $R_{it}=\alpha_i+\gamma PostLib_{it}+[\lambda WRet_t]+\varepsilon_{it}$

M2 (Individual Firms): $R_{sit}=\alpha_{si}+\gamma PostLib_{it}+[\lambda WRet_t]+\varepsilon_{sit}$

M3 (Individual Firms with World Rank in Size): $R_{sit}=\alpha_{si}+\gamma PostLib_{it}+\delta(WRank(size_{st})*PostLib_{it})+[\lambda WRet_t]+\varepsilon_{sit}$

M4 (Individual Firms with Domestic Rank in Size): $R_{sit}=\alpha_{si}+\gamma PostLib_{it}+\delta(DRank(size_{st})*PostLib_{it})+[\lambda WRet_t]+\varepsilon_{sit}$

The panel regressions are performed using monthly logarithmic returns of both IFCG indices and individual firms in 12 emerging markets. The data covers 60 months before and 60 months after market liberalization, excluding the 8-month *DurLib* period. Liberalization dates are from Henry (2000). $R_{(s)it}$ is the logarithmic return for country *i* (for asset *s* in country *i*) at time *t*. $PostLib_{it}$ is a dummy variable that takes on the value one in each of the 60 *PostLib* months in country i. $\alpha_{(s)i}$ measures the average monthly return for country *i* (for firm *s* in country *i*) before market liberalization and γ measures the average monthly abnormal return after liberalization across all the countries. $WRet_t$ is the logarithmic World market return (MSCI World Index). $WRank(size_{st})$ is a worldwide rank measure in firm size {= (firm's rank in the World/total number of firms in 12 markets)}. $DRank(size_{st})$ is a firm's rank in the local market *i* {= (firm's rank in the country /total number of firms in that market)}. The change in the cost of capital for M3 and M4 are measured by $\gamma+\delta WRank(size_{st})$ in the case of World rank size measure, and $\gamma+\delta DRank(size_{st})$ in the case of domestic rank size measure. t-statistics based on heteroskedasticity-consistent (White) standard errors are reported in parentheses.

	Before Controlling for World Market Return				*After Controlling for World Market Return*			
	IFCG Indices	*Firm: Average*	*Firm: World Rank*	*Firm: Domestic Rank*	*IFCG Indices*	*Firm: Average*	*Firm: World Rank*	*Firm: Domestic Rank*
γ	0.0029 (0.74)	**-0.00243** (-1.77)	**0.0065** (1.67)	**0.0075** (1.92)	**0.0083** (2.16)	**0.0037** (2.70)	**0.0118** (3.06)	**0.0139** (3.59)
δ			**-0.0150** (-2.68)	**-0.0161** (-2.94)			**-0.0135** (-2.46)	**-0.0166** (-3.05)
λ					**0.4130** (7.28)	**0.4391** (29.62)	**0.4385** (29.56)	**0.4391** (29.62)
Adj. R-squares	-0.0012	0.0057	0.0059	0.0059	0.0352	0.0237	0.0238	0.0239
No. of cross sections	12	305	305	305	12	305	305	305
No. of observations	1292	27053	27053	27053	1292	27053	27053	27053

Appendix G

Changes in Volatility (3Y windows)

M1 (IFCG indices): $V_{it}=\alpha_i+\gamma PostLib_{it}+[\lambda WVol_t]+\varepsilon_{it}$

M2 (Individual Firms): $V_{sit}=\alpha_{si}+\gamma PostLib_{it}+[\lambda WVol_t]+\varepsilon_{sit}$

M3 (Individual Firms with World Rank in Size): $V_{sit}=\alpha_{si}+\gamma PostLib_{it}+\delta(WRank(size_{st})*PostLib_{it})+[\lambda WVol_t]+\varepsilon_{sit}$

M4 (Individual Firms with Domestic Rank in Size): $V_{sit}=\alpha_{si}+\gamma PostLib_{it}+\delta(DRank(size_{st})*PostLib_{it})+[\lambda WVol_t]+\varepsilon_{sit}$

The panel regressions are performed using the log of annually realized volatility (standard deviation) of both IFCG indices and individual firms in 12 emerging markets. The data covers 36 months before and 36 months after market liberalization, excluding the 8-month *DurLib* period. Liberalization dates are from Henry (2000). $V_{(s)it}$ is the log of realized volatility for country i (for asset s in country i) at time t. $PostLib_{it}$ is a dummy variable that takes on the value one in each of the 36 *PostLib* months in country i. $\alpha_{(s)i}$ measures the average yearly volatility for country i (for firm s in country i) before market liberalization and γ measures the average change in the volatility after liberalization across all the countries for IFCG indices and across all the firms for individual firms data. $WVol_t$ is the log of realized volatility of World market return (MSCI World index) that is used to control for world market volatility. $WRank(size_{st})$ is a worldwide rank measure in firm size {= (firm's rank/total number of firms in 12 markets)}. $DRank(size_{st})$ is a firm's rank in the local market i {= (firm's rank/total number of firms in each market)}. The changes in the volatility for M3 and M4 are measured by $\gamma+\delta WRank(size_{st})$ in the case of World rank size measure, and $\gamma+\delta DRank(size_{st})$ in the case of domestic rank size measure. t-statistics based on heteroskedasticity-consistent (White) standard errors are reported in parentheses.

	Before Controlling for World Market Volatility				*After Controlling for World Market Volatility*			
	IFCG Indices	*Firm: Average*	*Firm: World Rank*	*Firm: Domestic Rank*	*IFCG Indices*	*Firm: Average*	*Firm: World Rank*	*Firm: Domestic Rank*
γ	**0.3205** (6.19)	**0.1806** (19.10)	**0.2165** (13.30)	**0.1928** (10.43)	**0.2444** (4.21)	**0.1035** (10.30)	**0.1195** (7.58)	**0.1060** (6.17)
δ			**-0.0684** (-2.10)	-0.0215 (-0.70)			-0.0300 (-0.99)	-0.0053 (-0.19)
λ					**0.33474** (3.75)	**0.2573** (21.55)	**0.2595** (21.15)	**0.2578** (21.37)
Adj. R-squares	0.6340	0.8135	0.8228	0.8156	0.7129	0.8431	0.8400	0.8433
No. of cross sections	12	305	305	305	12	305	305	305
No. of observations	67	1540	1540	1540	67	1540	1540	1540

Appendix G (continued)

Changes in Volatility (4Y window)

M1 (IFCG indices): $V_{it}=\alpha_i+\gamma PostLib_{it}+[\lambda WVol_t]+\varepsilon_{it}$

M2 (Individual Firms): $V_{sit}=\alpha_{si}+\gamma PostLib_{it}+[\lambda WVol_t]+\varepsilon_{sit}$

M3 (Individual Firms with World Rank in Size): $V_{sit}=\alpha_{si}+\gamma PostLib_{it}+\delta(WRank(size_{st})*PostLib_{it})+[\lambda WVol_t]+\varepsilon_{sit}$

M4 (Individual Firms with Domestic Rank in Size): $V_{sit}=\alpha_{si}+\gamma PostLib_{it}+\delta(DRank(size_{st})*PostLib_{it})+[\lambda WVol_t]+\varepsilon_{sit}$

The panel regressions are performed using the log of annually realized volatility (standard deviation) of both IFCG indices and individual firms in 12 emerging markets. The data covers 48 months before and 48 months after market liberalization, excluding the 8-month *DurLib* period. Liberalization dates are from Henry (2000). $V_{(s)it}$ is the log of realized volatility for country i (for asset s in country i) at time t. $PostLib_{it}$ is a dummy variable that takes on the value one in each of the 48 *PostLib* months in country i. $\alpha_{(s)i}$ measures the average yearly volatility for country i (for firm s in country i) before market liberalization and γ measures the average change in the volatility after liberalization across all the countries for IFCG indices and across all the firms for individual firms data. $WVol_t$ is the log of realized volatility of World market return (MSCI World index) that is used to control for world market volatility. $WRank(size_{st})$ is a worldwide rank measure in firm size {= (firm's rank/total number of firms in 12 markets)}. $DRank(size_{st})$ is a firm's rank in the local market i {= (firm's rank/total number of firms in each market)}. The changes in the volatility for M3 and M4 are measured by $\gamma+\delta WRank(size_{st})$ in the case of World rank size measure, and $\gamma+\delta DRank(size_{st})$ in the case of domestic rank size measure. t-statistics based on heteroskedasticity-consistent (White) standard errors are reported in parentheses.

	Before Controlling for World Market Volatility				*After Controlling for World Market Volatility*			
	IFCG Indices	*Firm: Average*	*Firm: World Rank*	*Firm: Domestic Rank*	*IFCG Indices*	*Firm: Average*	*Firm: World Rank*	*Firm: Domestic Rank*
γ	**0.2888** (4.94)	**0.1217** (11.16)	**0.1546** (7.76)	**0.1579** (7.28)	**0.1789** (2.78)	**0.0496** (4.41)	**0.0579** (3.10)	**0.0649** (3.30)
δ			**-0.0647** (-1.70)	**-0.0663** (-1.81)			-0.0157 (-0.47)	-0.0280 (-0.89)
λ					**0.3471** (3.81)	**0.2484** (20.22)	**0.2471** (19.78)	**0.2466** (19.90)
Adj. R-squares	0.6483	0.7613	0.7644	0.7626	0.7200	0.8048	0.8075	0.8075
No. of cross sections	12	305	305	305	12	305	305	305
No. of observations	88	1956	1956	1956	88	1956	1956	1956

Appendix G (concluded)

Changes in Volatility (5Y window)

M1 (IFCG indices): $V_{it}=\alpha_i+\gamma PostLib_{it}+[\lambda WVol_t]+\varepsilon_{it}$

M2 (Individual Firms): $V_{sit}=\alpha_{si}+\gamma PostLib_{it}+[\lambda WVol_t]+\varepsilon_{sit}$

M3 (Individual Firms with World Rank in Size): $V_{sit}=\alpha_{si}+\gamma PostLib_{it}+\delta(WRank(size_{st})*PostLib_{it})+[\lambda WVol_t]+\varepsilon_{sit}$

M4 (Individual Firms with Domestic Rank in Size): $V_{sit}=\alpha_{si}+\gamma PostLib_{it}+\delta(DRank(size_{st})*PostLib_{it})+[\lambda WVol_t]+\varepsilon_{sit}$

The panel regressions are performed using the log of annually realized volatility (standard deviation) of both IFCG indices and individual firms in 12 emerging markets. The data covers 60 months before and 60 months after market liberalization, excluding the 8-month *DurLib* period. Liberalization dates are from Henry (2000). $V_{(s)it}$ is the log of realized volatility for country i (for asset s in country i) at time t. $PostLib_{it}$ is a dummy variable that takes on the value one in each of the 60 *PostLib* months in country i. $\alpha_{(s)i}$ measures the average yearly volatility for country i (for firm s in country i) before market liberalization and γ measures the average change in the volatility after liberalization across all the countries for IFCG indices and across all the firms for individual firms data. $WVol_t$ is the log of realized volatility of World market return (MSCI World index) that is used to control for world market volatility. $WRank(size_{st})$ is a worldwide rank measure in firm size {= (firm's rank/total number of firms in 12 markets)}. $DRank(size_{st})$ is a firm's rank in the local market i {= (firm's rank/total number of firms in each market)}. The changes in the volatility for M3 and M4 are measured by $\gamma+\delta WRank(size_{st})$ in the case of World rank size measure, and $\gamma+\delta DRank(size_{st})$ in the case of domestic rank size measure. t-statistics based on heteroskedasticity-consistent (White) standard errors are reported in parentheses.

	Before Controlling for World Market Volatility				*After Controlling for World Market Volatility*			
	IFCG Indices	*Firm: Average*	*Firm: World Rank*	*Firm: Domestic Rank*	*IFCG Indices*	*Firm: Average*	*Firm: World Rank*	*Firm: Domestic Rank*
γ	**0.2718** (5.58)	**0.0901** (8.03)	**0.1303** (5.97)	**0.1221** (5.07)	**0.1731** (3.97)	0.0141 (1.24)	0.0188 (0.90)	0.0204 (0.92)
δ			**-0.0783** (-1.96)	-0.0573 (-1.47)			-0.0100 (-0.28)	-0.0118 (-0.34)
λ					**0.4283** (6.44)	**0.3168** (24.39)	**0.3178** (23.74)	**0.3164** (23.98)
Adj. R-squares	0.6837	0.6926	0.6942	0.6923	0.7256	0.7664	0.7645	0.7667
No. of cross sections	12	305	305	305	12	305	305	305
No. of observations	109	2340	2340	2340	109	2340	2340	2340

Appendix H

Changes in Correlation Coefficient with World Market Return(3Y windows)

$$M1\ (IFCG\ indices):\ CR_{it}=\alpha_i+\gamma PostLib_{it}+[\lambda WVol_t]+\varepsilon_{it}$$
$$M2\ (Individual\ Firms):\ CR_{sit}=\alpha_{si}+\gamma PostLib_{it}+[\lambda WVol_t]+\varepsilon_{sit}$$
$$M3\ (Individual\ Firms\ with\ World\ Rank\ in\ Size):CR_{sit}=\alpha_{si}+\gamma PostLib_{it}+\delta(WRank(size_{si})*PostLib_{it})+[\lambda WVol_t]+\varepsilon_{sit}$$
$$M4\ (Individual\ Firms\ with\ Domestic\ Rank\ in\ Size):CR_{sit}=\alpha_{si}+\gamma PostLib_{it}+\delta(DRank(size_{si})*PostLib_{it})+[\lambda WVol_t]+\varepsilon_{sit}$$

The panel regressions are performed using the annually realized correlation coefficient of both IFCG indices and individual firms in 12 emerging markets. The data covers 36 months before and 36 months after market liberalization, excluding the 8-month *DurLib* period. Liberalization dates are from Henry (2000). $CR_{(s)it}$ is the correlation coefficient with World market (MSCI World index) return for country i (for asset s in country i) at time t. $PostLib_{it}$ is a dummy variable that takes on the value one in each of the 36 *PostLib* months in country i. $\alpha_{(s)i}$ measures the average yearly correlation with World market return for country i (for firm s in country i) before market liberalization and γ measures the average change in the correlation after liberalization across all the countries for IFCG indices and across all the firms for individual firms data. $WVol_t$ is the realized volatility of World market return (MSCI World index) that is used to control for World market volatility. $WRank(size_{si})$ is a worldwide rank measure in firm size {= (firm's rank/total number of firms in 12 markets)}. $DRank(size_{si})$ is a firm's rank in the local market i {= (firm's rank/total number of firms in each market)}. The change in the correlation coefficient for M3 and M4 are measured by $\gamma+\delta WRank(size_{si})$ in the case of World rank size measure, and $\gamma+\delta DRank(size_{si})$ in the case of domestic rank size measure. t-statistics based on heteroskedasticity-consistent (White) standard errors are reported in parentheses.

	Before Controlling for World Market Volatility				*After Controlling for World Market Volatility*			
	IFCG Indices	*Firm: Average*	*Firm: World Rank*	*Firm: Domestic Rank*	*IFCG Indices*	*Firm: Average*	*Firm: World Rank*	*Firm: Domestic Rank*
γ	**0.1255** (2.25)	**0.0830** (8.22)	0.0026 (0.14)	**0.0772** (3.93)	**0.0982** (1.75)	**0.0299** (2.87)	**-0.0488** (-2.53)	0.0225 (1.12)
δ			**0.1621** (5.42)	0.0110 (0.32)			**0.1542** (4.95)	0.0137 (0.41)
λ					**1.1890** (1.84)	**1.7216** (16.66)	**1.7083** (16.53)	**1.7218** (16.52)
Adj. R-squares	0.1271	0.3472	0.4127	0.3471	0.1465	0.3993	0.4049	0.3974
No. of cross sections	12	305	305	305	12	305	305	305
No. of observations	67	1540	1540	1540	67	1540	1540	1540

Appendix H (continued)

Changes in Correlation Coefficient with World Market Return (4Y window)

M1 (IFCG indices): $CR_{it}=\alpha_i+\gamma PostLib_{it}+[\lambda WVol_t]+\varepsilon_{it}$

M2 (Individual Firms): $CR_{sit}=\alpha_{si}+\gamma PostLib_{it}+[\lambda WVol_t]+\varepsilon_{sit}$

M3 (Individual Firms with World Rank in Size): $CR_{sit}=\alpha_{si}+\gamma PostLib_{it}+\delta(WRank(size_{st})*PostLib_{it})+[\lambda WVol_t]+\varepsilon_{sit}$

M4 (Individual Firms with Domestic Rank in Size): $CR_{sit}=\alpha_{si}+\gamma PostLib_{it}+\delta(DRank(size_{st})*PostLib_{it})+[\lambda WVol_t]+\varepsilon_{sit}$

The panel regressions are performed using the annually realized correlation coefficient of both IFCG indices and individual firms in 12 emerging markets. The data covers 48 months before and 48 months after market liberalization, excluding the 8-month *DurLib* period. Liberalization dates are from Henry (2000). $CR_{(s)it}$ is the correlation coefficient with World market (MSCI World index) return for country i (for asset s in country i) at time t. $PostLib_{it}$ is a dummy variable that takes on the value one in each of the 48 *PostLib* months in country i. $\alpha_{(s)i}$ measures the average yearly correlation with World market return for country i (for firm s in country i) before market liberalization and γ measures the average change in the correlation after liberalization across all the countries for IFCG indices and across all the firms for individual firms data. $WVol_t$ is the realized volatility of World market return (MSCI World index) that is used to control for World market volatility. $WRank(size_{st})$ is a worldwide rank measure in firm size {= (firm's rank/total number of firms in 12 markets)}. $DRank(size_{st})$ is a firm's rank in the local market i {= (firm's rank/total number of firms in each market)}. The change in the correlation coefficient for M3 and M4 are measured by $\gamma+\delta WRank(size_{st})$ in the case of World rank size measure, and $\gamma+\delta DRank(size_{st})$ in the case of domestic rank size measure. t-statistics based on heteroskedasticity-consistent (White) standard errors are reported in parentheses.

	Before Controlling for World Market Volatility				*After Controlling for World Market Volatility*			
	IFCG Indices	*Firm: Average*	*Firm: World Rank*	*Firm: Domestic Rank*	*IFCG Indices*	*Firm: Average*	*Firm: World Rank*	*Firm: Domestic Rank*
γ	**0.1338** (2.59)	**0.0958** (9.44)	0.0255 (1.28)	**0.0876** (4.33)	**0.1079** (2.10)	**0.0527** (5.21)	-0.0159 (-0.81)	**0.0412** (2.09)
δ			**0.1379** (3.95)	0.0147 (0.42)			**0.1320** (3.95)	0.0206 (0.62)
λ					**1.4485** (2.60)	**1.6202** (17.43)	**1.6251** (16.99)	**1.6191** (17.17)
Adj. R-squares	0.2410	0.3438	0.3111	0.3353	0.2841	0.4126	0.3789	0.4025
No. of cross sections	12	305	305	305	12	305	305	305
No. of observations	88	1956	1956	1956	88	1956	1956	1956

Appendix H (concluded)

Changes in Correlation Coefficient with World Market Return (5Y window)

$$M1\ (IFCG\ indices):\ CR_{it}=\alpha_i+\gamma PostLib_{it}+[\lambda WVol_t]+\varepsilon_{it}$$
$$M2\ (Individual\ Firms):\ CR_{sit}=\alpha_{si}+\gamma PostLib_{it}+[\lambda WVol_t]+\varepsilon_{sit}$$
$$M3\ (Individual\ Firms\ with\ World\ Rank\ in\ Size):CR_{sit}=\alpha_{si}+\gamma PostLib_{it}+\delta(WRank(size_{st})*PostLib_{it})+[\lambda WVol_t]+\varepsilon_{sit}$$
$$M4\ (Individual\ Firms\ with\ Domestic\ Rank\ in\ Size):CR_{sit}=\alpha_{si}+\gamma PostLib_{it}+\delta(DRank(size_{st})*PostLib_{it})+[\lambda WVol_t]+\varepsilon_{sit}$$

The panel regressions are performed using the annually realized correlation coefficient of both IFCG indices and individual firms in 12 emerging markets. The data covers 60 months before and 60 months after market liberalization, excluding the 8-month *DurLib* period. Liberalization dates are from Henry (2000). $CR_{(s)it}$ is the correlation coefficient with World market (MSCI World index) return for country i (for asset s in country i) at time t. $PostLib_{it}$ is a dummy variable that takes on the value one in each of the 60 *PostLib* months in country i. $\alpha_{(s)i}$ measures the average yearly correlation with World market return for country i (for firm s in country i) before market liberalization and γ measures the average change in the correlation after liberalization across all the countries for IFCG indices and across all the firms for individual firms data. $WVol_t$ is the realized volatility of World market return (MSCI World index) that is used to control for World market volatility. $WRank(size_{st})$ is a worldwide rank measure in firm size {= (firm's rank/total number of firms in 12 markets)}. $DRank(size_{st})$ is a firm's rank in the local market i {= (firm's rank/total number of firms in each market)}. The change in the correlation coefficient for M3 and M4 are measured by $\gamma+\delta WRank(size_{st})$ in the case of World rank size measure, and $\gamma+\delta DRank(size_{st})$ in the case of domestic rank size measure. t-statistics based on heteroskedasticity-consistent (White) standard errors are reported in parentheses.

	Before Controlling for World Market Volatility				*After Controlling for World Market Volatility*			
	IFCG Indices	*Firm: Average*	*Firm: World Rank*	*Firm: Domestic Rank*	*IFCG Indices*	*Firm: Average*	*Firm: World Rank*	*Firm: Domestic Rank*
γ	**0.1168** (2.53)	**0.0902** (8.49)	0.0103 (0.51)	**0.0540** (2.59)	**0.1131** (2.47)	**0.0609** (5.65)	-0.0246 (-1.22)	0.0134 (0.64)
δ			**0.1536** (4.32)	**0.0664** (1.85)			**0.1641** (4.67)	**0.0875** (2.50)
λ					**1.2469** (2.27)	**1.5153** (15.16)	**1.5260** (15.09)	**1.5275** (15.06)
Adj. R-squares	0.1350	0.1695	0.1704	0.1684	0.1748	0.2504	0.2490	0.2488
No. of cross sections	12	305	305	305	12	305	305	305
No. of observations	109	2340	2340	2340	109	2340	2340	2340