What Segments Equity Markets?

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Abstract

We propose a (model free) measure of the degree of segmentation of world equity markets, analyze how it evolves through time, and characterize which factors determine its cross-sectional and time series variation. We consider measures of capital and equity market restrictions on foreigners, foreign direct investment, the degree of trade openness, financial development, political risk, regulatory and labor market frictions, and pull factors such as U.S. interest rate conditions. We also examine the evolution of the emerging market discount and its determinants, and characterize which industries appear the least and most integrated into global capital markets.

1 Introduction

The removal of capital controls in both developed countries (mostly during the eighties) and emerging markets (mostly at the end of the eighties and the early nineties) has led to unparalleled financial openness across the world. Multi-lateral trade GATT (WTO) rounds, regional trade arrangements, and unilateral trade reforms have led to increased trade openness. These important structural changes have had a profound effect on the pricing of stocks across the globe, and hence on important economic issues such as the cost of capital, international diversification benefits, and international risk sharing.

Our research has three goals. First, we propose a measure of the degree of segmentation of a country and examine its evolution over time addressing the question whether the globalization process has indeed led to a convergence of equity prices across countries. To do so, we are careful to control for the industry structure in particular countries. This is important for multiple reasons. Most obviously, different industries trade a very different multiples making country valuations difficult to compare without controlling for industry composition. In addition, trade openness may imply cash flow processes that are more highly correlated across countries, and it may also lead countries to specialize more, reducing the degree of price convergence towards the global average. Finally, different industries may exhibit different degrees of integration as they face different sets of regulations, or competitive advantages.

Second, we examine which factors effectively determine the degree of segmentation. While we would expect financial globalization to lead to the increased use of global discount rates and hence some degree of price convergence across countries, the globalization process is not complete and far from smooth. Factors such as political risk, liquidity risk, poor corporate governance or inefficient markets may keep out important institutional investors and lead to de facto segmentation (see, for example, Bekaert (1995) and Nishiotis (2004)). Product market regulations may shield local companies from foreign influences or competition. It is also possible that factors affecting investors in major markets (their preferences, the level of interest rates etc.) affect price convergence across the world. We use a panel regression framework to determine the contribution of various factors to the cross-sectional and time

series variation in the effective degree of segmentation.

Our final goal is to use our measure and framework to shed light on two related issues. In particular, we study the pricing of emerging markets relative to developed markets (the so-called emerging market discount) and what factors contribute to its time-series variation. We also characterize which industries are most integrated in the world's global capital market and how their identity has changed over time.

The remainder of the article is organized as follows. The second section introduces our measure of market segmentation and develops intuition on what drives its time and cross-sectional variation in a simple pricing framework. The third section discusses the data we use and presents some summary statistics. We also analyze the pure time-series variation in the degree of segmentation. Section 4 contains the main empirical results on what factors determine the variation in segmentation across countries and time. Section 5 focuses on pricing differentials in general and the emerging market discount in particular. The last section analyzes differences in the degree of segmentation across industries. In our conclusions, we also discuss some related literature.

2 Developing a measure of market segmentation

In this section, we develop a measure of the degree of segmentation for a particular stock market. Our measure encompasses simultaneously economic and financial market integration and does not differentiate between the two, but it makes minimal assumptions and is essentially model free. The main underlying assumption we make is that systematic risk and growth opportunities are largely industry specific and the base unit of our model is a country-industry portfolio.

2.1 A simple pricing model for industry portfolios

We begin by defining log earnings growth, $\Delta \ln(Earn_t)$, with $Earn_{i,j,t}$ the earnings level, in country i, industry j as:

$$\Delta \ln(Earn_{i,j,t}) = GO_{w,j,t-1} + GO_{i,j,t-1} + \epsilon_{i,j,t}. \tag{1}$$

$GO_{w,j,t}$ represents the world-wide stochastic growth opportunity for each industry j which does not depend on the country to which the industry belongs. In contrast, $GO_{i,j,t}$ is a country and industry specific growth opportunity. For example, an industry's growth opportunity may be curtailed by country-specific regulation or affected by country-specific factor endowments. Finally, $\epsilon_{i,j,t}$ is a country and industry specific earnings growth disturbance, which we assume to be $N(0, \sigma^2_{i,j})$. Because it has no persistence, it is not priced. Growth opportunities themselves follow persistent stochastic processes:

$$\begin{aligned} GO_{w,j,t} &= \mu_j + \varphi_j GO_{w,j,t-1} + \epsilon_{w,j,t} \\ GO_{i,j,t} &= \bar{\mu}_{i,j} + \bar{\varphi}_{ij} GO_{i,j,t-1} + \bar{\epsilon}_{i,j,t}. \end{aligned} \tag{2}$$

We assume $\epsilon_{w,j,t} \sim N(0, \sigma^2_{w,j})$ and $\bar{\epsilon}_{i,j,t} \sim N(0, \bar{\sigma}^2_{i,j})$.

The discount rate for each industry in each country is affected by two factors:

$$\delta_{i,j,t} = r_f(1 - \beta_{i,j} - \bar{\beta}_{i,j}) + \beta_{i,j}\delta_{w,t} + \bar{\beta}_{i,j}\delta_{i,t}. \tag{3}$$

The constant term, with r_f equal to the risk free rate, arises because the discount rates are *total* not *excess* discount rates. An equation like (3) would follow from a logarithmic version of the standard world CAPM. The world market discount rate process follows:

$$\delta_{w,t} = d_w + \phi_w \delta_{w,t-1} + \eta_{w,t}, \tag{4}$$

with $\eta_{w,t} \sim N(0, s^2_w)$. Likewise, the country-specific discount factor follows:

$$\delta_{i,t} = d_i + \phi_i \delta_{i,t-1} + \eta_{i,t}, \tag{5}$$

with $\eta_{i,t} \sim N(0, s^2_i)$.

Assuming that each industry pays out all earnings, $Earn_t$, each period, the valuation of the industry under (1)-(5) is:

$$V_{i,j,t} = E_t[\sum_{k=1}^{\infty} exp(-\sum_{\ell=0}^{k-1} \delta_{i,j,t+\ell}) Earn_{i,j,t+k}]. \tag{6}$$

Given that we model earnings growth as in equation (1), the earnings process is non-stationary. We must scale the current valuation by earnings, and impose a transversality condition to obtain a solution:

$$PE_{i,j,t} = \frac{V_{i,j,t}}{Earn_{i,j,t}} = E_t[\sum_{k=1}^{\infty} exp(\sum_{\ell=0}^{k-1} -\delta_{i,j,t+\ell} + \Delta \ln(Earn_{i,j,t+1+\ell}))] \tag{7}$$

Given the assumed dynamics for δ_w, δ_i, $GO_{w,j}$, and $GO_{i,j}$ and normally distributed shocks, the PE ratio can be shown to be an infinite sum of exponentiated affine functions of the current realizations of the growth opportunity factors (with a positive sign) and the discount rate factors (with a negative sign) (a detailed derivation is available upon request):

$$PE_{i,j,t} = \sum_{k=1}^{\infty} exp(a_{i,j,k} + b_{i,j,k}\delta_{w,t} + c_{i,j,k}GO_{w,j,t} + e_{i,j,k}\delta_{i,t} + f_{i,j,k}GO_{i,j,t}). \tag{8}$$

In this model, the cash flows and discount rate processes governing the pricing of various industries in particular countries may be affected by both local and global factors. Note that the constant in the expression for the PE ratio is affected positively by the volatility of the shocks to the discount rates and growth opportunities.

The model nests the two polar cases of full integration and full segmentation. Assume that the variance of the country-specific growth opportunity is zero and $\bar{\beta}_{i,j} = 0 \; \forall \; i, j$. Also, assume that industry systematic risk is the same across integrated countries; that is,

$$\beta_{i,j} = \beta_j. \tag{9}$$

This assumption also implies that financial risk through leverage is identical across countries. This may not literally hold, and we return to this in our empirical analysis below. Under this assumption, we can rewrite (8) as

$$PE_{i,j,t} = \sum_{k=1}^{\infty} exp(a_{i,j,k} + b_{j,k}\delta_{w,t} + c_{j,k}GO_{w,j,t}). \tag{10}$$

and linearize it around the mean values for $\delta_{w,t}$ and $GO_{w,j,t}$ leading to the simplified expression:

$$pe_{i,j,t} = \bar{a}_{i,j} + \bar{b}_j\delta_{w,t} + \bar{c}_j GO_{w,j,t}, \tag{11}$$

where pe is the log price earnings ratio. An improvement in growth opportunities increases price earnings ratios for the industry everywhere in the world, and the change in the PE ratio is larger when $GO_{w,j,t}$ is more persistent. Similarly, a reduction in the world discount rate increases the PE ratio with the magnitude of the response depending upon the persistence of the discount rate process and the beta of the industry.

Alternatively, if $\beta_{i,j} = 0 \; \forall \; i, j$, that is local investors determine discount rates and $GO_{w,j,t}$ has zero variance, country-specific persistent components will drive local industry

growth opportunities and discount rates. In that case, local industry PE ratios need not be equivalent to global ratios for the same industry and price earnings ratios for each local industry are determined as follows:

$$pe_{i,j,t} = \bar{a}_{i,j} + \bar{b}_{i,j}\delta_{i,t} + \bar{c}_{i,j}GO_{i,j,t}, \tag{12}$$

While local and global factors may be correlated, local industry PE ratios can now differ substantially from comparable global PE ratios.

2.2 A market segmentation measure

We propose to use the deviation between local and global price-earnings ratios as a measure of the degree of segmentation. Following Bekaert, Harvey, Lundblad, and Siegel (2007), we view each country as a portfolio of industries where an industry's portfolio weight corresponds to the relative (equity) market value of the industry. We calculate the country's actual market PE ratio as the inverse of the value weighted average of the country's actual industry earnings yields.[1] We also calculate a country's *global* market PE ratio, which represents the price-earnings ratio for its mix of industries at global prices.

Let EY_i denote the vector of industry earnings yields in country i and EY_w the corresponding vector of world industry earning yields. Similarly, define the country's industry weights by IW_i. Combining these vectors for country i, we define local PE ratios (LGO) and implied global PE ratios (GGO)[2], for the same portfolio composition of industries, as follows:

$$LGO_{i,t} = -ln[IW'_{i,t}EY_{i,t}] \tag{13}$$

$$GGO_{i,t} = -ln[IW'_{i,t}EY_{w,t}]. \tag{14}$$

Following the solution in equation (11), LGO and GGO largely reflect the same information in integrated markets. The driving factors are the global discount rate, $\delta_{w,t}$, and the global

[1] Alternatively, we could use earnings to derive industry weights and calculate an aggregate PE ratio as an weighted average of industry PE ratios. To avoid negative industry weights, we choose market value to determine industry weights and average industry earning yields instead of industry PE ratios.

[2] The GO stands for "growth opportunity" following Bekaert, Harvey, Lundblad and Siegel (2007), but of course the PE ratio reflects information about both growth opportunities and discount rates.

industry growth opportunity, $GO_{w,j,t}$.[3]

We further define the log price differential as

$$LEGO_{i,t} = LGO_{i,t} - GGO_{i,t}. \tag{15}$$

The larger the absolute value of $LEGO$, the more discount rates and growth opportunities of a given country differ from those of an identical portfolio of global industries, that is the more segmented is a country from the rest of the world. Similarly, large positive (negative) values of $LEGO$ indicate a smaller (larger) discount rate and/or better (worse) growth opportunities relative to the rest of the world.

In the next section, we explore the extent to which local and global prices differ for countries, holding industry composition fixed. We also explore whether these differences change through time as markets and economies open up to the world.

3 Data and segmentation over time

3.1 Data construction

We construct our measure of market segmentation, $LEGO$, for a sample of 51 countries. We obtain monthly data from Datastream as well as from Standard & Poors' Emerging Market Data Base (EMDB) between 1973 and 2005. While monthly $LEGO$ measures are constructed (and are presented in subsequent figures), we conduct our analysis on the annual frequency given the availability of our candidate explanatory variables described below.

For 23 mainly developed countries, we collect equity market value data at the industry level from Datastream. Datastream typically covers about 85% of a country's equity market. We use the industry market value to determine a country's industry composition in the form of 38 portfolio weights that reflect the Industry Classification Benchmark (ICB) framework employed by Datastream. For the same set of countries and industries, we also obtain

[3]The only avenue for country specific differences under these assumptions comes from $\bar{a}_{i,j}$, which arises only because of time-invariant Jensen's inequality effects. Hence, any difference in an industry's PE ratio across countries should be constant through time.

industry earnings yields from Datastream.[4]

We also obtain global industry earnings yields from Datastream. These global earnings yields reflect a value weighted average of earnings yields from around the world. For the remaining 28 countries, we use EMDB to obtain market value and trailing 12-month earnings data at the firm level. After setting negative earnings to zero, we aggregate the firm level data to be compatible with the industry classification employed by Datastream.[5] For each industry and country, we calculate local earnings yields and portfolio weights.

By combining industry portfolio weights and local earnings yields, obtained from Datastream and EMDB, we calculate LGO for each country and month for which data are available. Next, using the same industry portfolio weights, but global industry earnings yields obtained from Datastream, we calculate GGO. We finally calculate $LEGO = LGO - GGO$, yielding $|LEGO|$ as our segmentation measure. Appendix Table 1 contains details on the data source and availability for all 51 countries in our study.

Table 1 provides summary statistics for $LEGO$ as well as the absolute value of $LEGO$. In particular, we report the time series average and standard deviation for all countries in our sample. We also report the corresponding statistics when Japan (JPN) is excluded from the construction of these measures. Japanese log PE ratios are roughly 70% larger, on average, than their global counterparts over the entire sample. Using this metric, the Japanese market appears particularly segmented from global capital markets. However, French and Poterba (1991) provide a detailed discussion of the nature of Japanese earnings data showing price earnings ratios are artificially high. As Japan constitutes a large portion of the global equity market, we control for a possibly distorting effect by calculating global industry PE ($GGO(exJ)$) ratios that do not include Japanese data. Finally, at the bottom of the table, we report the cross-sectional averages of these statistics for the set of industrialized, emerging, and all countries. The last column of the table reflects the unbalanced nature of

[4]We calculate industry earnings yields as the inverse of an industry's PE ratio. Datastream calculates an industry PE ratio by dividing total market value by total (generally trailing) 12-month earnings where negative earnings have been set to zero.

[5]We first aggregate firm level data to sub-industry level in the Global Industry Classification Standard (GICS) used by EMDB. We then link GICS to ICB. The concordance between both classification systems that we have developed is available upon request.

our panel data set. While we have 33 years of data for most industrialized counties, the average number of years with data for emerging market countries is about 17.

The first column demonstrates the effect the unusually high Japanese PE ratios have when Japan is included in the construction of GGO. The average value of $LEGO$ is negative for 46 out of 51 countries. Only China, Indonesia, Japan, Malaysia, and Singapore have on average higher valuations than those implied by the global market. Once we exclude Japanese data in the construction of global PE ratio, we find positive averages of $LEGO$ for 17 countries.

Averaging the reported statistics across the set of industrialized as well as emerging market countries, we observe that emerging markets on average exhibit larger valuation discounts as well as larger fluctuations of $LEGO$ over time.

When focusing on the absolute value of $LEGO$ and of $LEGO(exJ)$, our measures of market segmentation, we notice that for both measures industrialized countries have lower time series averages. Probably not surprisingly, the US is the least segmented country by either of two segmentation measures.

3.2 Market segmentation through time

Figures 1a and 1b present our measure of market segmentation, the absolute log price differential ($|LEGO|$), for the developed and emerging markets, respectively. The developed markets sample covers the full 1973-2005 period, whereas the emerging markets sample covers the shorter 1984-2005 period (with countries included as data become available). Market segmentation for developed markets has fallen through time. The average absolute price differential is 29% during 1973-1977 in the early years of the sample, but only 19% during the 2001-2005 period. For emerging markets, the market segmentation measure falls from 74% during 1984-1988 to 40% during 2001-2005. Across both sub-samples, equity prices are converging, denoting a greater degree of market integration through time.

Figures 1a and 1b also present our measures of market segmentation excluding Japan from all calculations (both as a country in the developed sample and as an input into the construction of global PE ratios). The figures suggest this potential distortion may be

important. Despite some fluctuations, our ex-Japan measure of market segmentation declines throughout the full sample for developed markets, falling to 17% for the 2001-2005 period. The inclusion of the Japanese market somewhat masks this pattern, though the trend towards market integration appears across both cases. For the emerging markets, the ex-Japan and original measures of market integration are very similar, suggesting the level and variation of the price differential is driven primarily by locally-determined price earnings ratios.

We present the difference between local and global price-earnings ratios for Japan in Figure 2a. In Figures 2b and 2c, we present the log price discount/premium ($LEGO(exJ)$) for several countries among the developed and emerging samples, respectively, where Japanese data are excluded. Figure 2b presents the log price differential for the United States, the United Kingdom, and Germany, and Figure 2c presents the comparable data for Brazil, Mexico and South Korea. With the exception of the mid-1970's for the United Kingdom, the price differential for these selected developed markets is fairly small over the sample, generally ranging between -20 and 20%. The price differential for the United States is close to zero throughout our sample. In contrast, the comparable log price differentials for the emerging markets are much larger, showing fluctuations between -100 and 100%, implying that local valuations vary between 40 and 270% of global valuations. Typically though, these markets are priced at a discount. We explore the factors that determine the emerging market discount in a later section.

Finally, we explore the statistical significance of the apparent trend towards market integration in a regression framework that pools the available data across countries and time. Table 2 provides two sets of panel regressions of market segmentation ($|LEGO|$) on a constant and a time trend. For each, we also consider the cases where Japanese data are completely excluded from all calculations. The first set includes all 51 (50 excluding Japan) countries from 1980-2005, developed and emerging, where the regression is unbalanced, including the emerging markets as data become available. As our measure of market segmentation is persistent, the standard errors reflect a correction for serial correlation and cross-sectional SUR effects in the regression errors. For both cases, with and without Japanese data, the coefficients on the time trend are negative and statistically significant. Market segmentation declines across time for a broad set of developed and emerging countries. We also consider a

balanced sub-sample of 14 (13 excluding Japan) developed markets that extends from 1973 to 2005. For this balanced sample, the regression coefficients on the time trend are also negative and significant across both cases. Market segmentation is also declining over the longer period, even for a collection of developed markets. Despite the potential distortions associated with Japanese earnings data, the evidence is consistent across both cases with and without Japanese data.[6]

Economically, the trend coefficient represents the decline in the (logarithmic) absolute percentage differential between local and global PE ratios. Hence, from 2005 levels, the developed markets price differential should converge by 2029 (2030 under the full sample regression). In emerging markets, convergence is faster, but the total differential is much larger. The regression implies full convergence by 2033 (2078 under the full sample regression).

4 Market segmentation dynamics

In this section, we explore the determinants of time variation and cross-sectional variation in our measure of market segmentation, |LEGO|.

4.1 Exploratory regression and econometrics

We begin with an exploratory time-series fixed-effects regression:

$$|LEGO|_{i,t} = \alpha_i + \tau_t + \eta_{i,t} \tag{16}$$

where $|LEGO|_{i,t}$ is the year t absolute price differential for country i, our measure of market segmentation for that country and period.[7] Also, α_i and τ_t represent country and year effects, respectively. Figure 3 graphs the year effects together with the time trend estimated in Table 2. The convergence trend was notably interrupted following the 1997 South-East

[6]Given the potential distorting effects of inflated Japanese PE ratios, we proceed by excluding Japanese data for the remainder of the article. All evidence presented below is available with Japanese data upon request; the qualitative differences are minimal.

[7]Here, and throughout the remainder of the article, we employ the price differential measure that excludes data from Japan. However, as mentioned, the inclusion of the Japanese data does not materially affect our results.

Asian crisis and the market turbulence in 1998 (the Russian debt crisis and LTCM). The fixed effects are of interest as well. The five largest fixed effect are due to Kenya, Pakistan, Sri Lanka, Bangladesh, and Zimbabwe. The least integrated markets, on average, among industrialized countries are Finland, Norway, and Singapore. This exploratory regression explains 39% of the total variation in $|LEGO|$.

To examine whether variation in measured economic variables can account for part of $|LEGO|$'s variation, here we discuss eight different categories of potential determinants of $|LEGO|$ and report their univariate impact.[8] We estimate univariate and multivariate panel regressions for 50 countries on annual data from 1980-2003. Univariate estimates are presented in Table 3; we turn to the multivariate results in the following section. We employ all available data on all of our potential determinants so that the panel is unbalanced. The regression we consider is

$$|LEGO|_{i,t} = \alpha + \beta' x_{i,t} + \eta_{i,t} \tag{17}$$

where $|LEGO|_{i,t}$ is the year t absolute price differential for country i, and $x_{i,t}$ represents the various explanatory variables.[9] We use two estimation techniques. The first specification is pooled ordinary least squares (OLS). However, the standard errors incorporate a Newey-West (1987) correction (with two lags) and cross-sectional SUR effects. These corrections have the effect of increasing the standard errors relative to simple OLS.[10]

To addresses the serial correlation in the error term in an alternative fashion, we perform a Prais-Winsten (1954) regression assuming that the autocorrelation coefficient of the error term is the same for all countries. We follow Beck and Katz (1995) and report panel corrected standard errors that allow for heteroscedasticity across countries as well as contemporaneous correlation of the error term between countries.[11] Generally, the results from the Prais-

[8] See Appendix Table 2 for a detailed description of all relevant data items and their sources.

[9] We have also considered the GMM estimator developed by Blundell and Bond (1998) to control for time-invariant country effects. Unfortunately, the high persistence of the dependent variable often invalidates past lagged regressors as instruments.

[10] We find that these standard errors are very similar to the standard errors we obtain when controlling for errors that cluster by both country and year (Thompson(2006)).

[11] Given the unbalanced nature of our data set, we estimate the elements of the covariance matrix pairwise, that is using for each pair of countries all years for which both countries have non missing data.

Winsten regressions are in line with the OLS specifications.

4.2 Determinants of market segmentation and univariate results

4.2.1 Financial openness

The first category comprises measures of financial openness. We use the capital account openness measure compiled in Quinn (1997) and Quinn and Toyoda (2004), based on information from the IMF. A value of 1 indicates full capital account openness, a value of zero a closed capital account, and larger intermediate values indicate increasingly fewer regulations on international capital flows. The equity market openness measure uses data on foreign ownership restrictions to measure the degree of equity market openness. Following Bekaert (1995) and Edison and Warnock (2003), the measure is based upon the ratio of the market capitalization of the S&P investable to the S&P global indices in each country. The S&P's global stock index seeks to represent the local stock market whereas the investable index corrects the market capitalization for foreign ownership restrictions. Hence, a ratio of one means that all of the stocks in the local market are available to foreigners. Finally, we also use a measure of the importance of foreign direct investment (FDI), computed as the sum of the absolute values of inflows and outflows of FDI relative to GDP. As would be expected, increased financial openness significantly reduces market segmentation according to all three measures. Note that the effects are economically large: a country with a fully open equity market has a segmentation measure 30% lower than a fully closed country.

4.2.2 Trade openness

The second category of segmentation determinants relates to trade openness. We conjecture that trade openness induces common components in the cash flow processes across countries and will lower segmentation. We obtain the trade liberalization dates developed in Wacziarg and Welch (2003) (based on the earlier work of Sachs and Warner (1995)). Wacziarg and Welch look at five criteria: high tariff rates, extensive non-tariff barriers, large black market exchange rate premia, state monopolies on major exports, and socialist economic systems.

If a country meets any of these five criteria, it is classified with indicator variable equal to zero and deemed closed. We also employ a measure of the size of the trade sector, computed as the sum of exports and imports as a share of gross domestic product. Trade liberalization significantly reduces market segmentation, whereas trade openness, using the magnitude of the trade sector, does not appear useful in explaining market segmentation.

4.2.3 Political risk and institutions

There are many additional country characteristics that may effectively segment markets other than formal capital or trade restrictions. La Porta et al. (1997) emphasize the importance of investor protection and, more generally, the quality of institutions and the legal environment. Poor institutions and political instability may affect risk assessments of foreign investors effectively segmenting capital markets (see Bekaert (1995)), and financial openness might not attract foreign capital if the country is viewed as excessively risky. Poor corporate governance may adversely affect earnings prospects.

To explore these effects, we consider several variables that measure different aspects of the institutional environment. First, we consider the overall ICRG political risk rating - a composite of twelve sub-indices ranging from political conditions, the quality of institutions, socioeconomic conditions and conflict. Note that a high rating is associated with less risk. We also consider several sub-indices of the political risk index: 1) the quality of institutions, reflecting corruption, the strength and impartiality of the legal system, and bureaucratic quality, and 2) the investment profile, reflecting the risk of expropriation, contract viability, payment delays, and the ability to repatriate profits. This measure is closely associated with the attractiveness of a country for FDI. We also separately consider the sub-index for law and order, which measures both the quality of the legal system and whether laws are actually enforced. It is likely closely associated with investor protection. Following La Porta et al. (1998), we also consider their corporate governance measure of minority shareholder rights. This measure is only available in the cross-section. Last, Bhattacharya and Daouk (2002) document the enactment of insider trading laws and the first prosecution of these laws. We construct two indicator variables, where the first takes the value of one following

the introduction of an insider trading law and the second takes the value of one after the law's first prosecution.

The various measures of political risk and corporate governance extracted from the ICRG data are all statistically significant, and improved conditions are associated with lower degrees of market segmentation. However, the minority shareholder rights variable, which is purely cross-sectional, has no effect on market segmentation. The prosecution of an insider trading law violation is associated with a reduction in segmentation, but the simple existence of an insider trading law has no significant effect.

4.2.4 Financial development

Poorly developed financial systems may also be an important factor driving market segmentation. For example, in a 1992 survey by Chuhan, equity market illiquidity was mentioned as one of the main reasons that prevented foreign institutional investors from investing in emerging markets. When markets are closed, efficient capital allocation should depend on financial development (see Wurgler (2000) and Fisman and Love (2004)). We employ several measures to quantify stock and banking sector development. Our first equity market liquidity measure relies on the incidence of observed zero daily returns. Lesmond, Ogden and Trzcinka (1999) argue that if the value of an information signal is insufficient to outweigh the costs associated with transacting, then market participants will elect not to trade, resulting in an observed zero return. Lesmond (2005) provides a detailed analysis of emerging equity market trading costs, and confirms the usefulness of this measure which Bekaert, Harvey and Lundblad (2007) employ to document a significant role for priced liquidity risk in emerging markets. We also consider two additional measures of equity market trading and efficiency: 1) turnover as the value trade relative to GDP, a standard measure of stock market development (see Atje and Jovanovic (1989)), and 2) equity market return autocorrelation over the previous five years computed using monthly returns. Last, we proxy for the development of the banking system by the amount of private credit divided by GDP (see King and Levine (1993)). La Porta et al. (2002) and Dinc (2005) correct the standard measures of banking development for the state ownership of banks, viewing state control as synonymous with in-

efficient resource allocation. To explore this alternative, we interpolate the state ownership ratios provided by La Porta et al. (2002) for two years during our sample to the full period and create an adjusted measure of banking development as private credit to GDP times (1 − ratio of state ownership).

The equity market illiquidity (zero return) measure is significantly associated with market segmentation. Higher market turnover, although a standard measure of stock market development, has no relation with market segmentation. The market return autocorrelation measure yields no significant relation with the market segmentation measure. Banking sector development reduces market segmentation significantly, and the measure adjusted for state ownership has the strongest effects.

4.2.5 Accounting

Accounting standards that differ across countries may impact price differentials through two channels. First, the earnings levels employed in the price-earnings ratios may exhibit systematic differences due to country-specific accounting rules. Second, any perceived risks associated with lax accounting standards or the opacity of corporate records may affect the cost of capital across countries (see Hail and Leuz (2006)). To explore the effect of accounting standards on the price differential, we consider an index, constructed by La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998), of accounting standards (where larger numbers denote higher standards) created by examining and rating companies' annual reports on their inclusion or omission of certain accounting items. These items relate to general information, income statements, balance sheets, funds flow statements, accounting standards, stock data, and other special items. The variable is purely cross-sectional. Also, Leuz, Nanda and Wysocki (2003) develop a measure of corporate earnings management (where larger numbers may reflect greater levels of manipulation). This variable is also purely cross-sectional. Both variables are only available for a smaller set of countries in our study. Improved accounting standards are associated with significantly reduced market segmentation, whereas greater levels of earnings management do not.

4.2.6 Risk appetite and business cycles

We also consider a number of variables that capture potential "push factors" driving capital flows. Note, these variables are based on U.S. or global data, and hence exhibit only time-series variation. An established literature argues that market conditions in developed countries, such as the level of interest rates, drive capital flows, and hence may affect international price differentials (see e.g. Fernandez-Arias (1996)). That is, lower real rates would then increase valuations in emerging markets bringing them closer to developed market levels. While the evidence on this effect is mixed (see Bekaert, Harvey and Lumsdaine (2002)), we nonetheless try to capture it using the level of the real interest rate in the U.S. Such a relation may reflect a behavioral search for yield, but it is also possible that the level of interest rates is correlated with a change in risk appetite. The direction of the relation between interest rates and risk aversion is not entirely clear. Lower interest rates may increase wealth, and thus increase risk tolerance (see e.g. Sharpe (1990), Bekaert, Engstrom and Grenadier (2006)). In this case, it is conceivable that risk tolerant investors view foreign markets (erroneously) as attractive. Alternatively, real interest rates may be pro-cyclical where low interest rates are associated with recessions. A recession may cause an increase in societal risk aversion and change portfolio allocations. Recessions could therefore cause a retreat from risky equity investments, including a retreat from foreign markets that are (erroneously) viewed as riskier. These two effects are opposite from one another. We therefore also include a measure of U.S. risk aversion due to Bekaert and Engstrom (2007) computed based on the parameter estimates of the habit model in Campbell and Cochrane (1999).

Finally, low real rates may be an indicator of lax monetary policy and a surge in "global liquidity." Popular stories claim such global liquidity increases stock market valuations across the world. An alternative global liquidity measure we use is the growth rate of the U.S. money supply (M2). We also include world GDP growth, which may either act as a measure of global growth opportunities or more generally as an indicator of the world business cycle. The world business cycle may affect global discount rates, and consequently may affect the

pricing of all markets simultaneously.[12]

The U.S. or world measures of risk appetites or business cycles have a mixed effect on the degree of market segmentation. Increases in the U.S. real rate are significantly associated with larger degrees of segmentation, consistent with the view that in low interest rate environments markets move together more. U.S. money supply growth has a similar but insignificant effect. The U.S. risk aversion measure has a negative effect on the degree of market segmentation. This is perhaps surprising, as the popular story would argue that when risk averse U.S. investors retreat from international capital markets, local factors may become more important. World GDP growth is not significantly associated with market segmentation.

4.2.7 Regulatory conditions

Finally, imperfections in a country's labor and goods markets can lead to effective segmentation if these imperfections affect discount rates and/or growth opportunities. Using US industry data, Chen, Kacperzyk, and Ortiz-Molina (2006) find that the presence of labor unions is associated with higher expected industry return. To examine whether differences in the degree of unionization across countries explain differences in integration, our analysis includes an annual measure of union density that is available for 23 countries in our sample. Given that certain sectors of the economy such as the telecommunications sector have long been subject to regulation with often significant effects on the industry's and the country's development and competitiveness, we also include a measure that captures regulatory conditions with respect to market entry, ownership, and price controls in the following seven sectors: airlines, telecommunications, electricity, gas, post, rail, and road freight. The measure is available for 20 countries in our sample (see Conway and Nicoletti (2006) for details on this measure).

We report the effect of the two measures that affect labor market conditions and competitiveness of local industries. Both union density and a higher degree of product market

[12]We are in the process of collection additional risk and "global liquidity" variables, including the VIX index, corporate default spreads, and IPO issuance.

regulation are significantly associated with greater levels of segmentation. Note, that the number of countries is significantly reduced for these two variables due to limited data availability.

4.2.8 Other

The model suggests including measures of earnings growth and discount rate volatility as potential determinants. We include a measure of country-level earnings growth volatility by taking the five-year rolling variance of the country-level quarterly log earnings growth rate. Similarly, we also include a measure of the variance of the world market portfolio return.

Given the potential effect of leverage on price-earnings ratios, we construct an annual financial leverage ratio for 46 countries in our sample. We obtain annual accounting data for all public industrial firms contained in Bureau van Dijk's OSIRIS data base. For each firm and year, we calculate the ratio of long term interest bearing debt and current long term debt to the sum of long term interest bearing debt, current long term debt, and book equity. Weighting each observation by the sum of long term interest bearing debt, current long term debt, and book equity, we aggregate this ratio across all firms in a given country and year at the industry as well as country level. The average leverage ratio is 0.36 across all countries, with 0.32 for emerging markets and 0.37 for developed markets. These data are available from 1985 to 2003 in our sample. Finally, we include the lagged country portfolio return to potentially proxy of local momentum or expectations.

Country-level earnings growth volatility is significantly associated with larger price differentials. This effect is consistent with the price earnings ratio intercept in the valuation model. We do not find a significant relationship between the price differentials and either lagged returns on the country market portfolio or the volatility of the world market portfolio return. Last, we do not find a significant relationship between the level of country-specific financial leverage and its degree of market segmentation (note, in table 5, we do find that country-level financial leverage negatively affects the country-level price-earnings ratio, i.e. larger levels of leverage depress valuations; however, the effect does not translate to the absolute price differentials).

4.3 Multivariate analysis

To determine which of the variables previously examined are the most important, we conduct a multivariate regressions analysis. Unfortunately, we have too many variables to include in one regression. Moreover, many of the variables are highly correlated. Therefore we conduct a preliminary analysis before grouping variables from different categories in one regression. Specifically, we run a joint multivariate regression using the different variables that have a univariate t-statistic above one. We exclude the variables that have limited time or country coverage such as our measures of accounting standards and regulation. When a variable has a t-statistic below one in the joint regression, it is eliminated from the analysis, and the pared-down reduced regression is re-run. However, the trade openness variable is always maintained, as is either equity market openness or capital account openness. Table 4 shows the regressors used in the final multivariate regression.

The multivariate regression contains 10 independent variables. All variables have the expected sign, except for turnover, where a more developed stock market increases segmentation. It is possible that this result is driven by a few market where high turnover reflects speculative excess. When we interact the turnover measure with equity market openness, we find that its effect is significantly negative for open equity markets.[13]. While many coefficients are borderline significant, equity market openness, banking sector development, and the real interest rate have the most significant effect on market segmentation. Capital account openness does not have a significant effect on market segmentation. Perhaps this is caused by its close relation with other variables in the regression, such as trade liberalization and investment profile. In fact, when you replace capital account openness with equity market openness, the trade liberalization effect becomes statistically significant at the 10% level (using the OLS specification).

With a multivariate regression, we can examine how much of the variation in the segmentation variable is explained by the right-hand side explanatory variables. We use a simple R^2 concept computed as $\frac{Var(|\hat{LEGO}|_{i,t})}{Var(|LEGO|_{i,t})}$ where $|\hat{LEGO}|_{i,t} = \hat{\alpha} + \hat{\beta} x_{i,t}$. The denominator is defined

[13]The next version of the article with examine interaction effects more thoroughly

as

$$Var(|LEGO|_{i,t}) = \frac{1}{N}\sum_{i=1}^{N}\frac{1}{T_i}\sum_{t=1}^{T_i}(|LEGO|_{i,t} - |\bar{LEGO}|)^2 \tag{18}$$

where $|\bar{LEGO}| = \frac{1}{N}\sum_{i=1}^{N}\frac{1}{T_i}\sum_{t=1}^{T_i}|LEGO|_{i,t}$. The numerator is defined analogously as

$$Var(|\hat{LEGO}|_{i,t}) = \frac{1}{N}\sum_{i=1}^{N}\frac{1}{T_i}\sum_{t=1}^{T_i}(|\hat{LEGO}|_{i,t} - |\bar{\hat{LEGO}}|)^2 \tag{19}$$

where $|\bar{\hat{LEGO}}| = \frac{1}{N}\sum_{i=1}^{N}\frac{1}{T_i}\sum_{t=1}^{T_i}|\hat{LEGO}|_{i,t}$. These quantities are reported in Table 4. We find that across the regression specifications provided, the predicted market segmentation explains about 15 to 20% of the variation of the observed market segmentation in the data.

We also examine the contributions of each of the independent variables to the overall variation of the predicted market segmentation. We decompose the variance of the predicted market segmentation for explanatory variable j as follows:

$$Cov(|\hat{LEGO}|_{i,t}, \hat{\beta}_j x_{i,j,t}) = \frac{1}{N}\sum_{i=1}^{N}\frac{1}{T_i}\sum_{t=1}^{T_i}\hat{\beta}_j(|\hat{LEGO}|_{i,t} - |\bar{\hat{LEGO}}|)(x_{i,j,t} - \bar{x}_j) \tag{20}$$

where $\bar{x}_j$ is defined analogously as above. Across all individual explanatory variables, these covariance terms must exactly equal the variance of the predicted market segmentation. In Table 4, we report the ratio of each covariance term to the overall predicted market segmentation variance, $\frac{Cov(|\hat{LEGO}|_{i,t}, \hat{\beta}_j x_{i,j,t})}{Var(|\hat{LEGO}|_{i,t})}$, where each column must necessarily sum to 1. We report this variance decomposition for each of the two regression specifications considered.

Across the various specifications considered, the explanatory variables that contribute the largest to overall variation in the predicted market segmentation are equity market openness (around 30%) and banking sector development adjusted for state ownership (around 15 to 20%). There are also particular specifications for which trade liberalization, the quality of the institutional environment, market illiquidity, and country earnings growth volatility contribute around 10% to the overall variation. The roles for the other variables are limited.

It is important to note that this measure of predicted segmentation variation captures both time-series and cross-sectional effects. We further perform two decompositions of these covariance terms into separate effects that capture each of these features. The first decomposition splits the total covariation for each explanatory variable into a within-country

component and a pure cross-sectional between-country component:

$$\begin{aligned} Cov(|\hat{LEGO}|_{i,t}, \hat{\beta}_j x_{i,j,t}) &= \frac{1}{N}\sum_{i=1}^{N}\frac{1}{T_i}\sum_{t=1}^{T_i}\hat{\beta}_j(|\hat{LEGO}|_{i,t} - |\bar{\hat{LEGO}}|_i)(x_{i,j,t} - \bar{x}_{i,j}) \\ &+ \frac{1}{N}\sum_{i=1}^{N}\hat{\beta}_j(|\bar{\hat{LEGO}}|_i - |\bar{\hat{LEGO}}|)(\bar{x}_{i,j} - \bar{x}_j) \end{aligned} \tag{21}$$

where $|\bar{\hat{LEGO}}|_i = \frac{1}{T_i}\sum_{t=1}^{T_i}|\hat{LEGO}|_{i,t}$ and $\bar{x}_{i,j} = \frac{1}{T_i}\sum_{t=1}^{T_i}x_{i,j,t}$ denote the within-country means of the relevant variables.

The second decomposition splits the total covariation into a within-year component and a pure time-series between-year component:

$$\begin{aligned} Cov(|\hat{LEGO}|_{i,t}, \hat{\beta}_j x_{i,j,t}) &= \frac{1}{N}\sum_{i=1}^{N}\frac{1}{T_i}\sum_{t=1}^{T_i}\hat{\beta}_j(|\hat{LEGO}|_{i,t} - |\bar{\hat{LEGO}}|_t)(x_{i,j,t} - \bar{x}_{j,t}) \\ &+ \frac{1}{T_i}\sum_{t=1}^{T_i}\hat{\beta}_j(|\bar{\hat{LEGO}}|_t - |\bar{\hat{LEGO}}|)(\bar{x}_{j,t} - \bar{x}_j) \end{aligned} \tag{22}$$

where $|\bar{\hat{LEGO}}|_t = \frac{1}{N}\sum_{i=1}^{N}|\hat{LEGO}|_{i,t}$ and $\bar{x}_{j,t} = \frac{1}{N}\sum_{i=1}^{N}x_{i,j,t}$ denote the within-year means of the relevant variables.

Table 4 reports both decompositions for both multivariate specifications. All covariance terms are again scaled by the variance of the predicted degree of segmentation, $Var(|\hat{LEGO}|_{i,t})$. Both decompositions suggest in both cases that the largest contribution to the variation in predicted market segmentation is, by far, the cross-sectional component, the between-country component in the case of the first decomposition (accounting for 91 and 88% of the explained variation) and the within-year component in the case of the second decomposition (accounting for 90 and 91%). While this is the case, it is interesting to note that our explanatory variables capture the slow trend towards integration. When we re-estimate the regression including a trend term (not reported), it has a small, insignificant effect.

5 What drives pricing differentials?

So far, we have characterized market segmentation using the absolute difference between a local and global PE ratio, corrected for industry structure. Mostly market segmentation is associated with lower prices, because the absence of foreign investors and the inability to

invest abroad implies that local risks cannot be diversified away. In standard rational models,discount rates are higher as a result, causing lower valuations. Likewise, even if corporate governance problems (managers stealing part of the cash flows) and political risk only affect cash flows, their presence would normally cause lower valuations. Yet, segmentation need not have such asymmetric effects. For example, in markets with irrational agents, segmentation could cause over-pricing (see Mei, Scheinkman and Xiong (2006) for an argument how excessive speculation caused Chinese A shares, traded by locals, to be over-priced relative to B-shares, traded by foreigners). Likewise, regulations may protect local industries against foreign competition and improve cash flow prospects.

In section 5.1, we examine the effect of our various determinants of the degree of segmentation on LEGO, including its sign. Our results here are related to the analysis in a recent paper by Hail and Leuz (2006), in which they study differences in expected returns across 40 countries, highlighting the effect of legal institutions and securities market regulation. They mainly use accounting-based valuation models to back out expected returns, and acknowledge that long-term differences in growth opportunities may still matter for their results. We argue that segmentation can work through either channel, so that we focus on the extent to which the combined effect of locally priced discount rates and growth opportunities generates differences from that which would be implied in a fully integrated world. In Section 5.2, we examine the pricing differentials specifically for emerging markets. For emerging markets, it is well known that various direct and indirect barriers to investment still exist, causing an "emerging market discount." We study the "emerging market discount" over time and analyze its determinants.

5.1 General analysis

Table 5a reports the univariate coefficients of LEGO onto the various market segmentation determinants, using the same specifications employed in Section 4. We focus our discussion again on the pooled OLS results. Not surprisingly, financial openness causes local price-earnings ratios to increase relative to their (industry-adjusted) global counterparts. For capital account and equity market openness, a move from closed to open is associated roughly

with a 20 to 30% change in the price earnings ratio differential. These results are related to a large literature that has traced the effects of equity market liberalizations on the cost of capital (see e.g. Bekaert and Harvey (2000) and Henry (2000) for early papers), typically finding that liberalizations reduce the cost of capital. Trade openness also increases local prices relative to global prices

Political risk has a very large pricing effect. Measured between 0 and 1, a typical emerging market has a rating of 0.59 and a developed country a rating of 0.85. Consequently, achieving political risk index levels similar to a typical developed country would cause a 20% increase in local relative to global prices for a typical emerging market. The effects for the three sub-indices are smaller and not significant for the minority shareholder rights. They also go in the wrong direction for the latter variable, with improved corporate governance leading to lower prices. The effects are also not significant for the insider trading law variables.

Improved liquidity, when measured using the zero returns, increases local price earnings ratios. The effects are not significant when liquidity is measured using equity market turnover. It is hard to see why increased market return autocorrelations (a market inefficiency indicator) would cause higher prices. However, the estimated coefficients are positive but not statistically significant. Countries with better developed banking sectors also have higher local PE ratios.

Higher levels of accounting standards are associated with larger local price earnings ratios relative to the world, but the effect is only statistically significant at the 10% level. Higher levels of earnings management are associated with larger local price earnings differentials; this is not the sign one would necessarily expect.

Increases in the U.S. real rate lower LEGO across the world, consistent with a "push" or "searching for yield" story, but the effect is not significant. An increase in the U.S. money supply reduces local prices (significantly so when fixed effects are included), rather than indicating that global macroeconomic liquidity drives up stock markets across the world. Higher U.S. risk aversion leads to increased local prices relative to global prices, and the effect is actually statistically significant. It is conceivable that all three effects simply stem from the opposite effect occurring for the global price component, GGO, in the price differential, LEGO, which has a large weighting in the U.S. equity market. To explore this

further, we run an additional specification where global log PE ratios for each country, GGO, are regressed on U.S. risk aversion. These are the price earnings ratios for each country as implied collectively by global equity markets at their industry compositions. This regression (not reported) uncovers a negative effect, so that global market prices are indeed moving in the opposite direction from U.S. risk aversion. Global prices are significantly affected by risk aversion levels, whereas individual country prices (particularly emerging markets) are less affected – this channel dominates the price differential regression, explaining the positive overall effect in the price differential regressions. Finally, world GDP growth has no significant effect on relative prices, and regulatory conditions also do not generate significant effects.

Last, neither country earnings growth rate volatility nor world market portfolio return volatilty are significantly associated with local price earnings differentials. However, larger country market portfolio returns last year are associated with larger price-earnings ratio differentials. Also, increased levels of country-level financial leverage are associated with lower price earnings ratio differentials.

Taken together, the most important determinants of the pricing differential across countries appear to be financial openness, trade liberalization, overall political risk, and local equity market liquidity.

5.2 The emerging market discount

It is also not uncommon for the emerging markets to be priced at a discount, where local PE ratios are lower than those implied by global equity markets for comparable industries. Figure 4 presents the cross-country average of the price discount for the emerging markets from 1984-2005. Emerging market industries are, on average, priced at a discount relative to global equity markets for almost the entire period with the exception of a few years.

Panel B of Table 5 presents evidence from the exact same regressions on the price differential, but for a sample restricted to 31 emerging markets. This regression framework allows us to explore the determinants of the "emerging market discount." While the effects are very similar to what we find for the full sample shown in Panel A, there are some differences.

First, general capital account openness is no longer statistically significant. In the other direction, the ICRG indices that describe political risk and institutional quality are all associated with coefficients that are much larger. As described above, political instability may effectively segment capital markets, keeping foreign capital away if the country is viewed as excessively risky. Political conditions indeed separate emerging markets from one another. The magnitudes of the equity market liquidity (zero returns) and private credit to GDP (banking sector development) are also substantially larger. While of similar signs to the general results presented in Panel A, the accounting variables are not statistically significant for the emerging markets.

Perhaps of most interest is that the U.S. real rate and U.S. money supply growth now generate large and significantly negative coefficients. U.S. risk aversion also has a much stronger effect on LEGO than in the full sample. The interpretation is that increases in the U.S. real rate or money supply lead to a very significant reduction of local prices relative to their global counterparts. This is potentially consistent with the popular story that in times of relatively low real interest rates in developed countries, investors aggressively look for yield in "riskier" emerging markets. Increases in U.S. risk aversion lead to a large decrease of global prices relative to local prices in emerging markets, consistent with the evidence discussed above. This appears surprising, and may stem from correlation between the risk aversion measure and the business cycle.

6 Industries and Market Integration

We add another dimension to our analysis by considering a variant of our segmentation measure at the industry level. Remember from the construction of our country-specific segmentation measure, $|LEGO|$, that for each country and year we have available local earnings yield ($EY_{i,j,t}$) data for up to 38 industries. Instead of aggregating these into a country-level measure, we now calculate the absolute difference between the local earnings yield and the corresponding global earnings yield ($EY_{w,j,t}$). Notice that in contrast to the country-specific measure, this measure at the industry level is expressed as the difference in earnings yields as opposed to the difference in PE ratios. This allows us to deal with cases

where local earnings yields are zero.[14]

Table 6a contains a list of all 38 industries that can be part of a country's equity market. For each industry, we report the simple mean of our industry segmentation measure across countries and time for the first five years of our sample period (1980-1984) as well as for the last five years (2001-2005). For the majority of industries, the absolute value of the yield differential has decreased over the last two decades. Consistent with the decrease in dispersion of yield differentials across industries, we observe significant reductions in the segmentation measure for those industries that appear least integrated in the earlier period between 1980 and 1984. For the top four industries, Life Insurance, Banks, General Retailers, and Nonlife Insurance, we also observe a relative increase in integration by their rank among all industries.

Focusing on the bottom of list, we notice that Software and Computer Services, Electronic & Electrical Equipment, and Technology Hardware and Equipment were and still are among the most integrated industries. On the other hand, our results suggest that segmentation has increased for Household and Personal Goods.

The last two columns of the table report results from a regression of annual average industry yield differentials onto a linear time trend. These results confirm the overall decrease in segmentation as well as the more pronounced effect for the previously less integrated industries. Interestingly, several of the industries for which we observe a significantly negative trend, such as Insurance, Banking, Electricity, and Telecommunication, have experienced substantial deregulation and privatization in many countries over the last two decades.

To examine whether the variables that we have found to determine integration at the country level have possibly different impacts on different industries, we repeat our analysis from Table 3 at the industry level. For each industry j, we consider univariate regressions of the form:

$$|EY_{i,j,t} - EY_{w,j,t}| = \alpha + \beta x_{i,t} + \eta_{i,j,t}. \tag{23}$$

It is important to point out that all of our explanatory variables continue to be measured at

[14]Note that the industry earnings yield data we obtain from Datastream is always nonnegative, as negative earnings are set to zero in Datastream's construction of industry earnings measures. We therefore apply the same rule to the data we obtain from Standard & Poors' EMDB.

the country-level. For each variable and industry, we report the coefficient estimates from a pooled OLS regression in Table 6b. Standard errors are robust to arbitrary heteroscedasticity and clustering by country and year.[15] Coefficient estimates that are significant at the 5% level appear in bold.

Consistent with our findings so far, equity market openness, trade liberalization, the quality of institutions, illiquidity, the ratio of private credit to GDP, and product market regulation appear to significantly affect most industries in the expected way. While the coefficients on investment profile, turnover, and union density generally have the expected sign, only about half of them are statistically significant. The US real interest rate appears to have a significantly positive effect on a few industries. US risk aversion is significantly positively associated with segmentation in the case of Retailers, Industrial Engineering, Life Insurance, and Media, but negatively in the case of Personal Goods and Tobacco.

7 Conclusion

This article proposes a new measure of market integration. We view each country as a basket of industries, which we price using local and global prices. The differential between these local and global PE ratios will go to zero when discount rates and growth opportunities are global in nature. Consequently, it is a measure of market segmentation. Focusing on the absolute value of this measure, we find that it has significantly trended downward from the early 1980s onwards for both developed and emerging markets. We then examine the determinants of the measure's variation, finding that we can explain about 20% of its variation using measures of financial openness, trade openness, political risk, local banking sector and stock market development, and "push" factors. We find equity market openness to be the most important explanatory variable, accounting for almost 30% of the explained variance. The remaining variation is primarily accounted for by a measure of the quality of institutions of each country, and local banking sector development. We also examine the determinants of the magnitude of the price differential, with special emphasis on the emerging market discount. Finally, we explore market segmentation at the industry level.

[15] See Thompson (2006) for details.

Our most interesting finding is that historically heavily regulated industries, such as the banking, insurance, and electricity sectors, were among the least integrated in 1980-1984 and are now among the most integrated.

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Table 1

Summary Statistics

Log Price Differential: LEGO

		LGO-GGO		**|LGO-GGO|**		**LGO-GGO**		**|LGO-GGO|**		
						Excluding Japan				
Country	Sample	Average	Stdev	Average	Stdev	Average	Stdev	Average	Stdev	Observations
ARG	EM	-0.379	0.618	0.520	0.498	-0.309	0.531	0.465	0.394	20
AUS	IND	-0.098	0.175	0.161	0.117	0.013	0.155	0.122	0.094	33
AUT	IND	-0.078	0.195	0.165	0.126	0.228	0.273	0.280	0.218	33
BEL	IND	-0.250	0.226	0.272	0.198	-0.081	0.197	0.162	0.136	33
BRA	EM	-0.705	0.427	0.705	0.427	-0.599	0.411	0.599	0.411	20
CAN	IND	-0.066	0.214	0.176	0.136	0.049	0.206	0.138	0.159	33
CHL	EM	-0.307	0.463	0.358	0.423	-0.151	0.430	0.314	0.324	20
CHN	EM	0.322	0.249	0.333	0.233	0.458	0.287	0.480	0.244	13
COL	EM	-0.461	0.515	0.544	0.423	-0.278	0.468	0.446	0.302	22
DNK	IND	-0.200	0.372	0.310	0.284	0.072	0.338	0.249	0.236	33
FRA	IND	-0.251	0.221	0.290	0.163	-0.140	0.165	0.180	0.118	33
FIN	IND	-0.510	0.468	0.583	0.367	-0.287	0.435	0.415	0.306	18
DEU	IND	-0.113	0.161	0.159	0.115	0.099	0.200	0.191	0.112	33
GRC	EM	-0.289	0.424	0.409	0.301	-0.054	0.349	0.277	0.208	17
IND	EM	-0.113	0.367	0.323	0.195	0.039	0.445	0.374	0.229	20
IRL	IND	-0.442	0.281	0.446	0.273	-0.183	0.206	0.208	0.180	33
JOR	EM	-0.173	0.455	0.384	0.288	0.088	0.371	0.242	0.290	20
JPN	IND	**0.704**	**0.235**	**0.706**	**0.228**					**33**
ITA	IND	-0.087	0.196	0.178	0.115	0.104	0.172	0.161	0.117	20
KOR	EM	-0.196	0.640	0.400	0.530	0.158	0.485	0.425	0.267	20
MYS	EM	0.162	0.318	0.309	0.170	0.351	0.412	0.471	0.258	22
MEX	EM	-0.511	0.406	0.514	0.402	-0.310	0.356	0.355	0.309	20
NLD	IND	-0.334	0.198	0.342	0.183	-0.179	0.190	0.217	0.144	33
NGA	EM	-0.670	0.558	0.789	0.360	-0.549	0.460	0.643	0.307	22
PAK	EM	-0.560	0.538	0.607	0.482	-0.471	0.543	0.562	0.442	20
NZL	IND	-0.324	0.171	0.324	0.171	-0.165	0.155	0.174	0.144	18
NOR	IND	-0.479	0.417	0.517	0.368	-0.406	0.375	0.435	0.341	26
PHL	EM	-0.322	0.426	0.399	0.351	-0.254	0.477	0.382	0.378	21
SGP	IND	0.091	0.352	0.293	0.210	0.326	0.382	0.409	0.288	33
ZAF	EM	-0.255	0.187	0.268	0.167	-0.216	0.239	0.265	0.181	33
ESP	IND	-0.236	0.325	0.306	0.256	-0.023	0.221	0.162	0.148	19
SWE	IND	-0.139	0.333	0.270	0.234	0.111	0.361	0.307	0.212	24
CHE	IND	-0.251	0.236	0.266	0.219	-0.100	0.213	0.175	0.155	33
THA	EM	-0.348	0.350	0.412	0.267	-0.089	0.361	0.293	0.219	20
GBR	IND	-0.269	0.188	0.269	0.188	-0.184	0.203	0.187	0.199	33
USA	IND	-0.084	0.142	0.128	0.103	0.029	0.085	0.074	0.048	33
VEN	EM	-0.523	0.559	0.630	0.428	-0.263	0.610	0.498	0.428	20
ZWE	EM	-0.849	0.667	0.972	0.457	-0.684	0.661	0.817	0.476	20
IDN	EM	0.045	0.425	0.344	0.239	0.221	0.499	0.436	0.315	17
PRT	EM	-0.076	0.329	0.263	0.204	0.180	0.351	0.275	0.278	18
TUR	EM	-0.327	0.741	0.558	0.578	-0.072	0.681	0.531	0.416	20
BGD	EM	-0.444	0.626	0.664	0.347	-0.334	0.620	0.591	0.346	10
CIV	EM	-0.856	0.337	0.856	0.337	-0.785	0.297	0.785	0.297	10
EGY	EM	-0.470	0.573	0.648	0.326	-0.292	0.547	0.538	0.268	10
ISR	EM	-0.052	0.388	0.319	0.198	-0.001	0.390	0.312	0.206	9
JAM	EM	-0.889	0.487	0.889	0.487	-0.834	0.447	0.834	0.447	10
KEN	EM	-0.497	0.513	0.574	0.415	-0.402	0.481	0.506	0.355	10
MAR	EM	-0.052	0.271	0.236	0.122	0.012	0.253	0.198	0.142	10
LKA	EM	-0.523	0.530	0.578	0.463	-0.379	0.546	0.530	0.387	13
TTO	EM	-0.129	0.187	0.184	0.125	-0.033	0.151	0.137	0.056	10
TUN	EM	-0.354	0.362	0.442	0.232	-0.302	0.413	0.437	0.244	10
IND	20	-0.171	0.255	0.308	0.203	-0.038	0.238	0.223	0.177	29
EM	31	-0.348	0.450	0.498	0.338	-0.199	0.438	0.452	0.304	17
ALL	51	-0.279	0.373	0.423	0.285	-0.137	0.362	0.365	0.256	22

Table 2

Log Price Differentials

A Declining Trend in |LEGO|?

All countries 1980-2005			Developed Markets 1973-2005			Emerging Markets 1980-2005		
Trend Estimate	Standard Error	Number of Countries	Trend Estimate	Standard Error	Number of Countries	Trend Estimate	Standard Error	Number of Countries
-0.0098	0.0028	51	-0.0043	0.0021	14	-0.0188	0.0046	31
Ex Japan			Ex Japan			Ex Japan		
-0.0051	0.0025	50	-0.0053	0.0016	13	-0.0135	0.0039	31

Table 3
Market Integration Determinants
Dependent Variable: |LEGO|
50 countries
1980-2003

	OLS		Prais-Winsten		
	Estimate	Standard Error	Estimate	Standard Error	Countries
Financial Openness					
Capital Account Openness	-0.442	0.070	-0.410	0.085	48
Equity Market Openness	-0.323	0.045	-0.298	0.049	50
Gross FDI/GDP	-0.764	0.273	-0.383	0.192	50
Trade Openness					
Trade Liberalization	-0.315	0.058	-0.286	0.069	50
Trade/GDP	-0.100	0.068	-0.116	0.052	50
Political Risk/Institutions					
Political Risk	-0.847	0.127	-0.816	0.150	50
Quality of Institutions	-0.562	0.078	-0.539	0.096	50
Investment Profile	-0.431	0.088	-0.370	0.109	50
Law and Order	-0.464	0.070	-0.420	0.087	50
Minority Shareholder Rights	0.004	0.118	0.005	0.062	40
Insider Trading Law	-0.037	0.050	-0.039	0.038	50
Insider Trading Prosecution	-0.117	0.043	-0.102	0.033	50
Financial Development					
Illiquidity	0.362	0.097	0.391	0.082	43
Turnover	-0.039	0.036	-0.047	0.027	50
Market Return Autocorrelation	0.179	0.154	0.163	0.125	50
Private Credit/GDP	-0.271	0.051	-0.267	0.063	50
Private Credit/GDP (adj.)	-0.297	0.048	-0.299	0.054	49
Accounting					
Accounting Standards	-0.487	0.187	-0.502	0.216	36
Earnings Management	0.117	0.090	0.117	0.067	28
Risk Appetite/Business Cycles					
US Real Rate	1.814	0.665	1.967	1.087	50
US Money Supply Growth	0.325	0.353	0.018	0.442	50
US Risk Aversion	-0.084	0.039	-0.087	0.047	50
World GDP Growth	0.473	0.906	-0.740	1.174	50
Regulatory Conditions					
Union Density	0.202	0.106	0.202	0.083	23
Product Market Regulation	0.230	0.073	0.227	0.054	20
Other					
Country Earnings Growth Volatility	0.426	0.128	0.404	0.156	50
Country Market Lag Return	0.026	0.019	0.002	0.024	50
World Market Return Volatility	-0.658	1.347	-0.533	2.924	50
Corporate Leverage Ratio	-0.072	0.115	0.005	0.109	46

Table 4

Market Integration Determinants

Dependent Variable: |LEGO|

1980-2003

	Prais-Winsten		OLS		Variance Decomposition				
		Standard		Standard	Overall	Decomposition I		Decomposition II	
	Estimate	Error	Estimate	Error	Contribution	y_it - y_i	y_i - y	y_it - y_t	y_t - y
Capital Account Openness	-0.134	0.094	-0.127	0.086	0.225	0.023	0.202	0.216	0.010
Trade Liberalization	0.036	0.118	-0.003	0.072	0.002	0.000	0.002	0.002	0.000
Quality of Institutions	-0.189	0.111	-0.175	0.104	0.282	0.000	0.282	0.259	0.022
Investment Profile	-0.033	0.078	-0.061	0.076	0.050	0.011	0.038	0.044	0.005
Illiquidity	0.067	0.062	0.094	0.083	0.061	0.004	0.057	0.059	0.002
Turnover	0.021	0.026	0.044	0.024	0.047	0.012	0.036	0.034	0.013
Private Credit/GDP (adj.)	-0.082	0.048	-0.082	0.044	0.224	0.022	0.201	0.223	0.001
Country Earnings Growth Volatility	0.116	0.142	0.097	0.094	0.070	0.015	0.055	0.066	0.004
US Real Rate	1.567	0.830	1.695	0.734	0.038	0.000	0.038	0.000	0.038
Number of Countries	41		41		1.00	0.09	0.91	0.90	0.10
R-square			0.153						

	Prais-Winsten		OLS		Variance Decomposition				
		Standard		Standard	Overall	Decomposition I		Decomposition II	
	Estimate	Error	Estimate	Error	Contribution	y_it - y_i	y_i - y	y_it - y_t	y_t - y
Equity Market Openness	-0.164	0.098	-0.165	0.062	0.288	0.017	0.272	0.268	0.020
Trade Liberalization	-0.066	0.116	-0.101	0.060	0.113	0.005	0.108	0.106	0.007
Quality of Institutions	-0.127	0.103	-0.118	0.099	0.158	0.000	0.158	0.141	0.017
Investment Profile	-0.064	0.083	-0.076	0.079	0.060	0.012	0.048	0.053	0.007
Illiquidity	0.121	0.070	0.137	0.081	0.089	0.013	0.076	0.085	0.004
Turnover	0.020	0.027	0.040	0.023	0.015	-0.002	0.017	0.005	0.010
Private Credit/GDP (adj.)	-0.081	0.046	-0.082	0.043	0.173	0.015	0.158	0.172	0.002
Country Earnings Growth Volatility	0.197	0.138	0.168	0.111	0.092	0.019	0.073	0.083	0.009
US Real Rate	1.554	0.816	1.736	0.781	0.010	0.044	-0.035	0.000	0.010
Number of Countries	43		43		1.00	0.12	0.88	0.91	0.09
R-square			0.198						

Table 5a
Price Discounts (All Countries)
Dependent Variable: LEGO
50 countries
1980-2003

	OLS		Prais-Winsten		
	Estimate	Standard Error	Estimate	Standard Error	Countries
Financial Openness					
Capital Account Openness	0.286	0.123	0.236	0.133	48
Equity Market Openness	0.302	0.075	0.288	0.075	50
Gross FDI/GDP	0.590	0.410	0.448	0.244	50
Trade Openness					
Trade Liberalization	0.328	0.092	0.345	0.097	50
Trade/GDP	0.045	0.099	0.044	0.072	50
Political Risk/Institutions					
Political Risk	0.796	0.219	0.794	0.238	50
Quality of Institutions	0.517	0.140	0.430	0.162	50
Investment Profile	0.460	0.139	0.395	0.151	50
Law and Order	0.320	0.078	0.367	0.130	50
Minority Shareholder Rights	-0.088	0.137	-0.091	0.085	40
Insider Trading Law	0.044	0.075	0.043	0.056	50
Insider Trading Prosecution	0.078	0.064	0.067	0.055	50
Financial Development					
Illiquidity	-0.271	0.153	-0.335	0.108	43
Turnover	0.112	0.051	0.098	0.041	50
Market Return Autocorrelation	0.164	0.226	0.179	0.175	50
Private Credit/GDP	0.339	0.077	0.294	0.097	50
Private Credit/GDP (adj.)	0.244	0.082	0.213	0.091	49
Accounting					
Accounting Standards	0.519	0.289	0.574	0.287	36
Earnings Management	0.311	0.129	0.323	0.118	28
Risk Appetite/Business Cycles					
US Real Rate	-0.867	1.073	-1.859	1.971	50
US Money Supply Growth	-0.762	0.535	-0.361	0.784	50
US Risk Aversion	0.120	0.056	0.093	0.058	50
World GDP Growth	-0.189	1.222	1.659	1.792	50
Regulatory Conditions					
Union Density	-0.082	0.152	-0.038	0.124	23
Product Market Regulation	0.015	0.123	0.045	0.118	20
Other					
Volatility	-0.065	0.202	0.034	0.247	50
Country Market Lag Return	0.071	0.028	0.016	0.036	50
World Market Return Volatility	1.871	2.339	3.414	4.912	50
Corporate Leverage Ratio	-0.360	0.151	-0.301	0.160	46

Table 5b
Price Discounts (Emerging Only)
Dependent Variable: LEGO
31 countries
1980-2003

	OLS		Prais-Winsten		
	Estimate	Standard Error	Estimate	Standard Error	Countries
Financial Openness					
Capital Account Openness	0.155	0.233	0.113	0.222	29
Equity Market Openness	0.282	0.107	0.270	0.109	31
Gross FDI/GDP	1.613	1.091	0.988	0.548	31
Trade Openness					
Trade Liberalization	0.264	0.114	0.296	0.105	31
Trade/GDP	0.260	0.147	0.255	0.127	31
Political Risk/Institutions					
Political Risk	1.029	0.399	1.047	0.346	31
Quality of Institutions	0.866	0.274	0.573	0.278	31
Investment Profile	0.556	0.231	0.519	0.222	31
Law and Order	0.408	0.126	0.361	0.197	31
Minority Shareholder Rights	-0.051	0.256	-0.047	0.184	22
Insider Trading Law	0.140	0.128	0.138	0.095	31
Insider Trading Prosecution	0.090	0.112	0.091	0.128	31
Financial Development					
Illiquidity	-0.530	0.255	-0.635	0.210	24
Turnover	0.116	0.069	0.108	0.054	31
Market Return Autocorrelation	0.160	0.351	0.194	0.270	31
Private Credit/GDP	0.492	0.121	0.435	0.126	31
Private Credit/GDP (adj.)	0.328	0.147	0.289	0.133	30
Accounting					
Accounting Standards	0.591	0.489	0.586	0.366	18
Earnings Management	0.413	0.293	0.465	0.232	10
Risk Appetite/Business Cycles					
US Real Rate	-4.951	1.408	-5.027	3.310	31
US Money Supply Growth	-2.918	0.743	-1.505	1.250	31
US Risk Aversion	0.368	0.202	0.357	0.199	31
World GDP Growth	-4.292	2.825	0.596	4.568	31
Other					
Country Earnings Growth Volatility	0.251	0.273	0.280	0.218	31
Country Market Lag Return	0.088	0.036	0.027	0.041	31
World Market Return Volatility	9.456	3.271	11.025	7.993	31
Corporate Leverage Ratio	-0.391	0.157	-0.320	0.225	27

Table 6a

$|EY_{ij} - EY_{iw}|$ per industry

Industry	Code	Equally Weighted Mean of $\|EY_{ij} - EY_{iw}\|$ 1980 - 1984	2001-2005	Change	Segmentation Rank 1980 - 1984	2001 - 2005	Trend Regression: 1980 - 2005 Trend Estimate	Standard Error
Life Insurance	LFINS	0.1421	0.0316	-0.1105	1	31	**-0.0048**	0.0015
Banks	BANKS	0.0906	0.0301	-0.0606	2	33	**-0.0026**	0.0003
General Retailers	GNRET	0.0823	0.0401	-0.0422	3	18	-0.0010	0.0008
Nonlife Insurance	NLINS	0.0761	0.0409	-0.0352	4	16	**-0.0016**	0.0004
Chemicals	CHMCL	0.0720	0.0704	-0.0016	5	2	-0.0008	0.0005
Electricity	ELECT	0.0658	0.0351	-0.0307	6	25	**-0.0017**	0.0003
Industrial Metals	INDMT	0.0650	0.0634	-0.0016	7	4	**-0.0008**	0.0004
Automobiles & Parts	AUTMB	0.0643	0.0497	-0.0146	8	7	-0.0005	0.0003
Industrial Engineering	INDEN	0.0631	0.0381	-0.0250	9	21	**-0.0010**	0.0004
Fixed Line Telecommunications	TELFL	0.0584	0.0379	-0.0205	10	22	**-0.0017**	0.0004
Mobile Telecommunications	TELMB	0.0562	0.0280	-0.0282	11	36	**-0.0014**	0.0005
General Industrials	GNIND	0.0550	0.0456	-0.0094	12	11	-0.0002	0.0005
Oil & Gas Producers	OILGP	0.0540	0.0436	-0.0103	13	14	**-0.0011**	0.0003
Industrial Transportation	INDTR	0.0523	0.0440	-0.0083	14	13	-0.0002	0.0005
Forestry & Paper	FSTPA	0.0514	0.0953	0.0439	15	1	-0.0002	0.0005
Beverages	BEVES	0.0505	0.0340	-0.0164	16	27	-0.0005	0.0004
Construction & Materials	CNSTM	0.0500	0.0446	-0.0054	17	12	**-0.0006**	0.0003
Media	MEDIA	0.0482	0.0306	-0.0177	18	32	-0.0005	0.0005
Equity Investment Instruments	EQINV	0.0446	0.0509	0.0063	19	6	0.0005	0.0004
Leisure Goods	LEISG	0.0444	0.0401	-0.0043	20	17	0.0000	0.0006
Food & Drug Retailers	FDRGR	0.0426	0.0291	-0.0135	21	34	-0.0003	0.0004
Mining	MNING	0.0405	0.0653	0.0248	22	3	0.0000	0.0007
Real Estate	RLEST	0.0403	0.0369	-0.0034	23	23	0.0002	0.0003
Food Producers	FOODS	0.0401	0.0496	0.0095	24	8	-0.0002	0.0003
Tobacco	TOBAC	0.0385	0.0335	-0.0050	25	28	-0.0003	0.0004
Oil Equipment & Services	OILES	0.0379	0.0396	0.0017	26	19	0.0003	0.0003
Healthcare Equipment & Services	HCEQS	0.0343	0.0383	0.0040	27	20	0.0006	0.0005
Aerospace & Defense	AERSP	0.0340	0.0255	-0.0085	28	37	0.0001	0.0004
Pharmaceuticals & Biotechnology	PHARM	0.0325	0.0345	0.0020	29	26	0.0002	0.0004
General Financial	GENFI	0.0320	0.0428	0.0108	30	15	0.0009	0.0004
Support Services	SUPSV	0.0305	0.0287	-0.0018	31	35	0.0001	0.0003
Travel & Leisure	TRLES	0.0290	0.0465	0.0174	32	10	**0.0010**	0.0005
Gas, Water & Multiutilities	GWMUT	0.0287	0.0356	0.0069	33	24	0.0002	0.0003
Software & Computer Services	SFTCS	0.0283	0.0199	-0.0084	34	38	-0.0005	0.0003
Household Goods	HHOLD	0.0278	0.0616	0.0339	35	5	0.0003	0.0005
Electronic & Electrical Equipment	ELTNC	0.0272	0.0328	0.0056	36	30	0.0000	0.0003
Personal Goods	PERSG	0.0241	0.0473	0.0232	37	9	0.0007	0.0006
Technology Hardware & Equipment	TECHD	0.0175	0.0332	0.0157	38	29	0.0006	0.0004
Mean		0.0493	0.0420	-0.0073				
Dispersion		0.0230	0.0143					

Table 6b

Industry Integration Determinants

Dependent Variable: $|EY_{ij} - EY_{iw}|$

1980-2003

	Financial Openness	**Trade Openness**	**Political Risk/Institutions**		**Financial Development**			**Risk Appetite / Business Cycles**		**Regulatory Conditions**	
Industry	Equity Market Openness	Trade Liberalization	Quality of Institutions	Investment Profile	Illiquidity	Turnover	Private Credit/GDP (adj.)	US Real Rate	US Risk Aversion	Union Density	Product Market Regulation
Aerospace & Defense	0.018		**-0.039**	-0.049	0.026	-0.008	**-0.046**	0.139	0.004	**0.058**	**0.069**
Automobiles & Parts	**-0.029**	**-0.033**	**-0.053**	**-0.055**	**0.076**	**-0.009**	**-0.025**	**0.396**	0.003	-0.006	**0.032**
Banks	**-0.032**	**-0.033**	**-0.036**	**-0.063**	**0.033**	**-0.013**	**-0.039**	**0.497**	0.012	**0.096**	**0.063**
Beverages	**-0.017**	**-0.025**	**-0.045**	-0.009	**0.088**	-0.006	-0.002	0.246	0.007	0.001	**0.023**
Chemicals	**-0.026**	**-0.027**	**-0.065**	**-0.045**	**0.053**	-0.007	**-0.033**	0.236	-0.003	0.013	**0.050**
Construction & Materials	**-0.031**	**-0.044**	**-0.049**	**-0.029**	**0.050**	**-0.010**	**-0.020**	0.039	-0.001	**0.017**	**0.018**
Electricity	**-0.034**	**-0.049**	**-0.064**	**-0.046**	**0.031**	-0.003	**-0.035**	0.257	-0.005	**0.033**	**0.053**
Electronic & Electrical Equipment	**-0.024**	**-0.064**	**-0.072**	-0.034	**0.076**	**-0.007**	**-0.026**	0.073	-0.009	-0.010	0.004
Equity Investment Instruments	**-0.046**	-0.079	**-0.070**	0.015	**0.105**	0.009	-0.020	-0.124	0.001	0.021	0.005
Food & Drug Retailers	**-0.046**	**-0.071**	**-0.055**	**-0.044**	**0.029**	**-0.014**	**-0.020**	0.190	**0.015**	**0.039**	**0.020**
Food Producers	**-0.032**	**-0.020**	**-0.070**	-0.012	**0.058**	**-0.013**	**-0.031**	-0.151	0.000	**0.016**	**0.022**
Forestry & Paper	**-0.031**	**-0.051**	**-0.066**	**-0.063**	**0.064**	-0.004	**-0.033**	0.080	-0.007	-0.006	**0.040**
General Financial	**-0.033**	**-0.053**	**-0.058**	**-0.046**	**0.110**	-0.007	**-0.028**	0.279	-0.010	0.025	0.022
General Industrials	**-0.029**	-0.013	**-0.066**	-0.007	**0.074**	**-0.014**	**-0.018**	0.126	0.002	0.007	**0.027**
General Retailers	**-0.067**	**-0.054**	**-0.059**	-0.011	**0.077**	**-0.018**	**-0.020**	**0.522**	**0.033**	0.007	**0.062**
Gas, Water & Multiutilities	**-0.039**	-0.006	**-0.065**	**-0.025**	**0.042**	0.000	**-0.028**	-0.166	-0.001	0.010	**0.011**
Healthcare Equipment & Services	**-0.113**	0.008	**-0.139**	-0.012	0.052	0.005	-0.005	0.033	0.004	-0.004	**0.023**
Household Goods	**-0.033**	**-0.030**	**-0.081**	**-0.046**	**0.075**	**-0.014**	-0.014	**0.348**	-0.013	-0.003	**0.021**
Industrial Engineering	-0.007	-0.003	**-0.043**	-0.002	0.044	-0.005	**-0.019**	0.172	**0.020**	0.007	**0.050**
Industrial Metals	-0.005	-0.025	-0.033	-0.031	0.039	-0.009	-0.002	**0.558**	-0.004	0.018	**0.049**
Industrial Transportation	**-0.071**	-0.045	**-0.097**	**-0.041**	0.007	0.001	**-0.043**	0.057	0.010	0.025	**0.049**
Leisure Goods	**-0.084**	-0.023	**-0.131**	**-0.057**	0.037	0.008	**-0.044**	0.091	0.008	0.005	**0.032**
Life Insurance	0.010	0.011	**0.066**	-0.028	0.008	**-0.031**	**-0.063**	0.158	**0.083**	**0.132**	**0.132**
Media	**-0.045**	-0.021	**-0.038**	-0.002	**0.024**	0.000	**-0.016**	0.097	**0.021**	0.028	**0.021**
Mining	**-0.059**	**-0.072**	**-0.115**	**-0.084**	**0.130**	-0.013	**-0.054**	0.291	-0.010	-0.037	**0.042**
Nonlife Insurance	**-0.042**	-0.039	-0.032	-0.008	**0.037**	**-0.014**	**-0.030**	**0.432**	0.011	**0.088**	**0.038**
Oil Equipment & Services	0.001	**0.029**	-0.028	-0.018	**0.065**	**-0.014**	**-0.025**	-0.155	0.004	0.059	**0.028**
Oil & Gas Producers	**-0.025**	**-0.032**	**-0.036**	**-0.040**	**0.069**	**-0.009**	**-0.034**	0.183	-0.008	**0.056**	**0.057**
Personal Goods	**-0.069**	**-0.052**	**-0.121**	**-0.088**	**0.115**	-0.007	**-0.043**	0.360	**-0.031**	**0.031**	0.002
Pharmaceuticals & Biotechnology	**-0.030**	**-0.020**	**-0.059**	-0.023	**0.104**	**-0.010**	**-0.015**	-0.078	0.004	0.009	0.011
Real Estate	-0.010	0.004	**-0.054**	-0.024	**0.026**	0.005	**-0.034**	0.093	0.006	**0.028**	**0.034**
Software & Computer Services	-0.007	**0.018**	-0.012	**-0.046**	**0.063**	**-0.015**	**-0.024**	-0.152	0.014	**0.055**	**0.054**
Support Services	**-0.017**	0.006	**-0.043**	-0.008	**0.064**	**-0.011**	**-0.041**	0.170	0.001	**0.084**	0.031
Technology Hardware & Equipment	**-0.031**	0.002	**-0.067**	**-0.040**	**0.066**	-0.005	**-0.019**	-0.138	-0.001	0.018	**0.028**
Fixed Line Telecommunications	**-0.082**	**-0.112**	**-0.083**	**-0.051**	0.032	0.000	**-0.037**	-0.018	-0.007	**0.033**	**0.026**
Mobile Telecommunications	-0.033	-0.046	-0.031	-0.037	**0.041**	**-0.010**	**-0.018**	0.002	0.004	**0.027**	0.020
Tobacco	**-0.032**	**-0.032**	**-0.068**	**-0.043**	**0.052**	**-0.022**	**-0.039**	**0.391**	**-0.019**	**0.041**	**0.039**
Travel & Leisure	**-0.051**	-0.037	**-0.095**	-0.022	**0.048**	-0.007	**-0.031**	0.257	-0.008	**0.063**	-0.003
Mean Coefficient	-0.035	-0.031	-0.060	-0.034	0.058	-0.008	-0.028	0.152	0.003	0.029	0.034
Absolute Value of Coefficient of Variation	0.749	0.962	0.596	0.677	0.508	1.011	0.477	1.311	5.084	1.169	0.707

Appendix Table 1

Data Availability

Industrialized				Emerging			
Source	**Code**	**Name**	**LGO data start**	**Source**	**Code**	**Name**	**LGO data start**
DS	AUS	Australia	197301	EMDB	ARG	Argentina	198604
DS	AUT	Austria	197301	EMDB	BGD	Bangladesh	199601
DS	BEL	Belgium	197301	EMDB	BRA	Brazil	198604
DS	CAN	Canada	197301	EMDB	CHL	Chile	198601
DS	DNK	Denmark	197301	EMDB	CHN	China	199301
DS	FIN	Finland	198803	EMDB	COL	Colombia	198412
DS	FRA	France	197301	EMDB	CIV	Cote d'Ivoire	199601
DS	DEU	Germany	197301	EMDB	EGY	Egypt	199601
DS	IRL	Ireland	197301	DS	GRC	Greece	198903
DS	ITA	Italy	198601	EMDB	IND	India	198604
DS	**JPN**	**Japan**	**197301**	EMDB	IDN	Indonesia	198912
DS	NLD	Netherlands	197301	EMDB	ISR	Israel	199701
DS	NZL	New Zealand	198801	EMDB	JAM	Jamaica	199601
DS	NOR	Norway	198001	EMDB	JOR	Jordan	198607
DS	SGP	Singapore	197301	EMDB	KEN	Kenya	199601
DS	ESP	Spain	198703	EMDB	KOR	Korea	198601
DS	SWE	Sweden	198201	EMDB	MYS	Malaysia	198412
DS	CHE	Switzerland	197301	EMDB	MEX	Mexico	198604
DS	GBR	United Kingdom	197301	EMDB	MAR	Morocco	199601
DS	USA	United States	197301	EMDB	NGA	Nigeria	198412
				EMDB	PAK	Pakistan	198601
				EMDB	PHL	Philippines	198412
				DS	PRT	Portugal	198809
				DS	ZAF	South Africa	197301
				EMDB	LKA	Sri Lanka	199301
				EMDB	THA	Thailand	198601
				EMDB	TTO	Trin. & Tobago	199601
				EMDB	TUN	Tunisia	199601
				EMDB	TUR	Turkey	198612
				EMDB	VEN	Venezuela	198601
				EMDB	ZWE	Zimbabwe	198601

Appendix Table 2

Description of the Variables

All data are employed at the annual frequency.

Variable	Description
LEGO and |LEGO|	LEGO measures the difference between a country's local market PE ratio and the corresponding global PE ratio, adjusted for the country's industry composition. |LEGO| is the absolute value of LEGO. Both variables a available for 51 countries. For details, see Section 2. Sources: Datastream and Standard & Poors' Emerging Market Data Base.
LEGO(exJ) and |LEGO(exJ)|	In the construction of LEGO(exJ) and |LEGO(exJ)|, we have excluded Japanese data from the global PE ratios. For details, see Section 2. Sources: Datastream and Standard & Poors' Emerging Market Data Base.
Capital account openness	Quinn's capital account openness measure is also created from the text of the annual volume published by the International Monetary Fund (IMF),*Exchange Arrangements and Exchange Restrictions.* Rather than the indicator constructed by the IMF that takes a 1 if any restriction is in place, Quinn's openness measure is scored 0-4, in half integer units, with 4 representing a fully open economy. The measure hence facilitates a more nuanced view of capital account openness than the usual 0/1 indicator, and is available for 48 countries in our study. We transform the measure into a 0 to 1 scale.
Equity market openness	Following Bekaert (1995) and Edison and Warnock (2003), the equity market openness measure is based on the ratio of the market capitalization of the constituent firms comprising the IFC Investable index to those that comprise the IFC Global index for each country. The IFC Global index, subject to some exclusion restrictions, is designed to represent the overall market portfolio for each country, whereas the IFC Investable index is designed to represent a portfolio of domestic equities that are available to foreign investors. A ratio of one means that all of the stocks are available to foreign investors. Fully segmented countries have an intensity measure of zero, and fully liberalized countries have an intensity measure of one.
Gross FDI/GDP	Gross foreign direct investment is the sum of the absolute values of inflows and outflows of foreign direct investment recorded in the balance of payments financial account. It includes equity capital, reinvestment of earnings, other long-term capital, and short-term capital. The indicator is calculated as a ratio to GDP. Source: *World Bank Development Indicators*.
Trade Liberalization	We obtain the trade liberalization dates developed in Wacziarg and Welch (2003). Wacziarg and Welch look five factors: average tariff rates or 40% of more; nontariff barriers covering 40% or more of trade; a black market exchange rate that is depreciated by 20% or more relative to the official exchange rate, on average, during the 1970s or 1980s; a state monopoly on major exports; and a socialist economic system. If a country meets any of these five criteria, it is classified with indicator variable equal to zero and deemed closed.
Trade/GDP	The sum of exports and imports of goods and services measured as a share of gross domestic product. Source: *World Bank Development Indicators*.
Political risk rating	The value of the the Political Risk Service (PRS) Group's political risk indicator (which ranges between 0 and 100). The risk rating is a combination of 12 subcomponents. Overall, a political risk rating of 0.0% to 49.9% indicates a Very High Risk; 50.0% to 59.9% High Risk; 60.0% to 69.9% Moderate Risk; 70.0% to 79.9% Lov Risk; and 80.0% or more Very Low Risk. The data are available from 1984 through 1997. For each country, we backfill the 1984 value to 1980. Source: Various issues of the*International Country Risk Guide.*
Quality of Institutions	The sum of ICRG subcomponents: Corruption, Law and Order, and Bureaucratic Quality.
Corruption	ICRG political risk sub-component. This is a measure of corruption within the political system. Such corruption distorts the economic and financial environment, reduces the efficiency of government and business by enabling people to assume positions of power through patronage rather than ability, and introduces an inherent instability into the political process. The most common form of corruption met directly by business is financial corruption in the form of demands for special payments and bribes connected with import and export licenses, exchange controls, tax assessments, police protection, or loans. Although the PRS measure takes suc corruption into account, it is more concerned with actual or potential corruption in the form of excessive patronage, nepotism, job reservations, "favor-for-favors," secret party funding, and suspiciously close ties between politics and business. In PRS's view these sorts of corruption pose risk to foreign business, potentially leading to popular discontent, unrealistic and inefficient controls on the state economy, and encourage the development of the black market.
Law and Order	ICRG political risk sub-component. PRS assesses Law and Order separately, with each sub-component comprising zero to three points. The Law sub-component is an assessment of the strength and impartiality of the legal system, while the Order sub-component is an assessment of popular observance of the law. Thus, a country can enjoy a high rating (3.0) in terms of its judicial system, but a low rating (1.0) if the law is ignored for a political aim.

Table 2
(Continued)

Variable	Description
Bureaucratic Quality	ICRG political risk sub-component. The institutional strength and quality of the bureaucracy can act as a shock absorber that tends to minimize revisions of policy when governments change. Therefore, high points are giv to countries where the bureaucracy has the strength and expertise to govern without drastic changes in policy interruptions in government services. In these low-risk countries, the bureaucracy tends to be somewhat autonomous from political pressure and to have an established mechanism for recruitment and training. Countries that lack the cushioning effect of a strong bureaucracy receive low points because a change in government tends to be traumatic in terms of policy formulation and day-to-day administrative functions.
Minority Shareholder Rights	An index aggregating different shareholder rights. The index is formed by adding 1 when: (1) the country allows shareholders to mail their proxy vote to the firm; (2) shareholders are not required to deposit their shares prior to the General Shareholders' Meeting; (3) cumulative voting or proportional representation of minorities in the board of directors is allowed; (4) an oppressed minorities mechanism is in place; (5) the minimum percentage of share capital that entitles a shareholder to call for an Extraordinary Shareholders' Meeting is less than or equal to 10 percent (the sample median); or (6) shareholders have preemptive rights that can only be waved by a shareholders' vote. The index ranges from 0 to 6. This variable is purely cross-sectional, and available for 47 countries. Source: La Porta et al. (1998).
Insider Trading Law	Bhattacharya and Daouk (2002) document the enactment of insider trading laws and the first prosecution of these laws. We construct two indicator variables. The first takes the value of one following the introduction of an insider trading law. The second takes the value of one after the law's first prosecution.
Illiquidity	Following Lesmond, Ogden and Trzcinka (1999), Lesmond (2005), and Bekaert, Harvey, and Lundblad (2005), we construct the illiquidity measure as the proportion of zero daily returns observed over the relevant year for each equity market. We obtain daily returns data in local currency at the firm level from the Datastream research files. For each country, we observe daily returns (using closing prices) for a large collection of firms. The total number of firms available from the Datastream research files accounts for about 90%, on average, of the number of domestically listed firms reported by the World Bank's World Development Indicators. For each country, we calculate the capitalization-weighted proportion of zero daily returns across firms, and average this proportion over the year.
Equity market turnover	The ratio of equity market value traded to the market capitalization. The data are available for 50 countries. Source: Standard and Poor's/International Finance Corporation's *Emerging Stock Markets Factbook.*
Market Return Autocorrleation	For each country and year t, we estimate the autocorrelation of monthly equity market returns over the period between January of year $t-4$ and December of year t.
Private credit/GDP	Private credit divided by gross domestic product. Credit to private sector refers to financial resources provided to the private sector, such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable that establish a claim for repayment. Available for all countries. Source: *World Bank Development Indicators* CD-ROM. We also construct an *adjusted* private credit measure controlling for state ownership of the banking system. We interpolate the state ownership ratios provided by La Porta, Lopez de Silanes and Shleifer (2002) for two years during our sample to the full sample, and create a new measure of banking development as official private credit to GDP times (1- the ratio of state ownership).
Accounting Standards	Index created by examining and rating companies' 1990 annual reports on their inclusion or omission of 90 items. These items fall into seven categories (general information, income statements, balance sheets, funds flow statements, accounting standards, stock data, and special items). A minimum of three companies in each country was studied. The companies represent a cross-section of various industry groups; industrial companies represented 70%, and financial companies represented the remaining 30%. This variable is purely cross-sectional and available for 39 countries. The source is La Porta, Lopez-di- Silanes, Shleifer, and Vishny (1998).
Earnings Management	Leuz, Nanda and Wysocki (2003) develop a measure of corporate earnings management (where larger numbers reflect greater levels of management). The earnings management index reflects four subcomponents: the country's median ratio of the firm-level standard deviations of operating income and operating cash flow; the country's Spearman correlation of the change in accruals and the change in cash flow from operations; the country's median ratio of the absolute value of accruals and the absolute value of the cash flow from operatio and the number of "small profits" divided by the number of "small losses" for each country. This variable is purely cross-sectional.
U.S. Real Rate	United States real interest rate: the prime lending interest rate adjusted for inflation as measured by the GDP deflator. Source: *World Bank Development Indicators*.
U.S. Money Supply Growth	Annual growth in money supply (M2) for the United States. Source: *World Bank Development Indicators*.
U.S. Risk Aversion	We measure U.S. risk aversion based on the parameter estimates of the habit-persistence model from Campbe and Cochrane (1999). Source: Bekaert and Engstrom (2007).
World GDP Growth	Growth of real world per capita gross domestic product. Source: *World Bank Development Indicators*.
Union Density	We calculate union density as the ratio of union members over total employees as reported by the OECD. Source: OECD.

Table 2
(Continued)

Variable	Description
Product Market Regulation	The indicator variable summarizes regulatory conditions in the following seven non-manufacturing sectors: airlines, telecommunication, electricity, gas, post, rail, and road freight. The indicator has been estimated from 1975 to 2003 and is available from the OECD. Source: Conway, P. and G. Nicoletti (2006).
Country Earnings Growth Volatility	We measure country-level earnings growth volatility by taking the five-year rolling variance of the country-le quarterly earnings growth rate.
Country Market Lag Return	The lagged annual return, from December to December, on the country-level market portfolio.
World Market Return Volatility	The variance of the world market portfolio return, measured as the five-year rolling variance of the monthly return on the world market portfolio.
Corporate Leverage Ratio	We obtain annual accounting data for all public industrial firms contained in Bureau van Dijk's OSIRIS data base. For each firm and year, we calculate the ratio of long term interest bearing debt and current long term debt to the sum of long term interest bearing debt, current long term debt, and book equity. Long term interest bearing debt is data item 14016, current long term debt is data item 14004 and book equity is data item 14041. We drop all observations with non positive total assets or book equity as well as observations with negative total, long term or interest bearing liabilities. We also exclude data from unconsolidated statements if consolidated statements are also included in the data base. Weighting each observation by the sum of long term interest bearing debt, current long term debt, and book equity, we aggregate this ratio across all firms in a give country and year at the industry as well as country level. These data are available from 1985 to 2003 for 46 countries in our sample

Figure 1a

Market Segmentation: Developed Markets

Absolute Log Price Differential (|LEGO|)

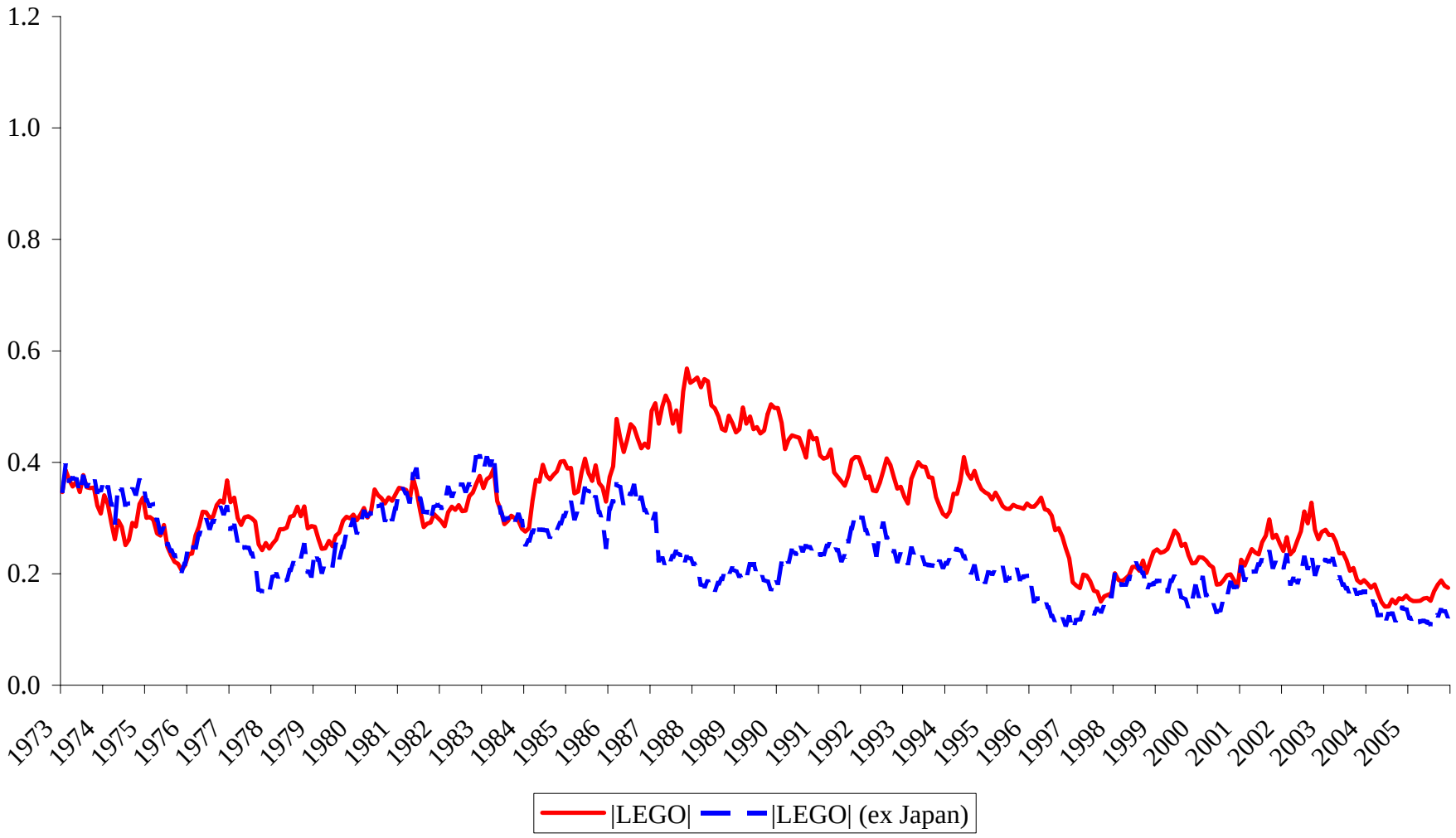

Figure 1a

Market Segmentation: Developed Markets

Absolute Log Price Differential (|LEGO|)

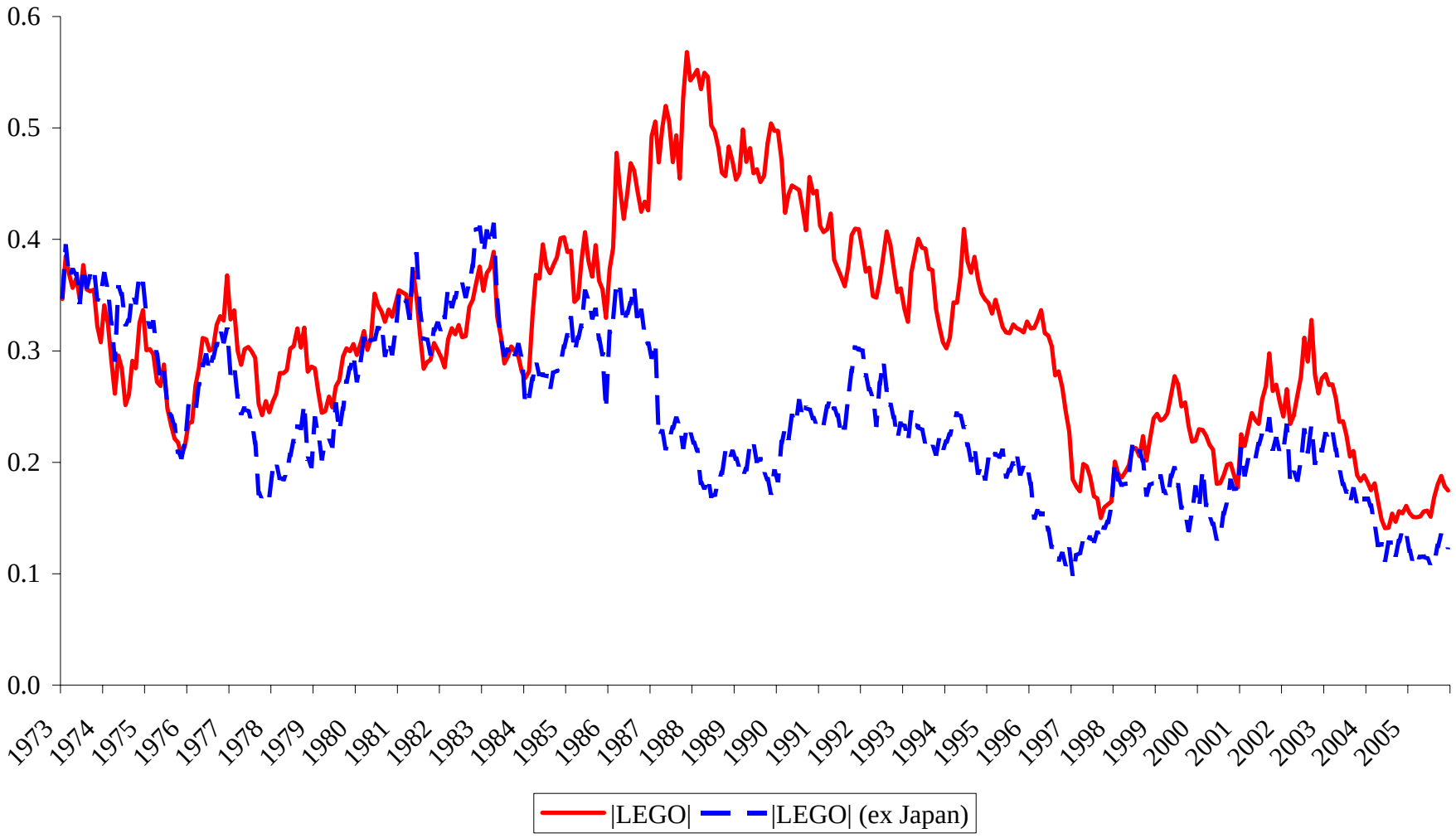

Figure 1b

Market Segmentation: Emerging Markets

Absolute Log Price Differential (|LEGO|)

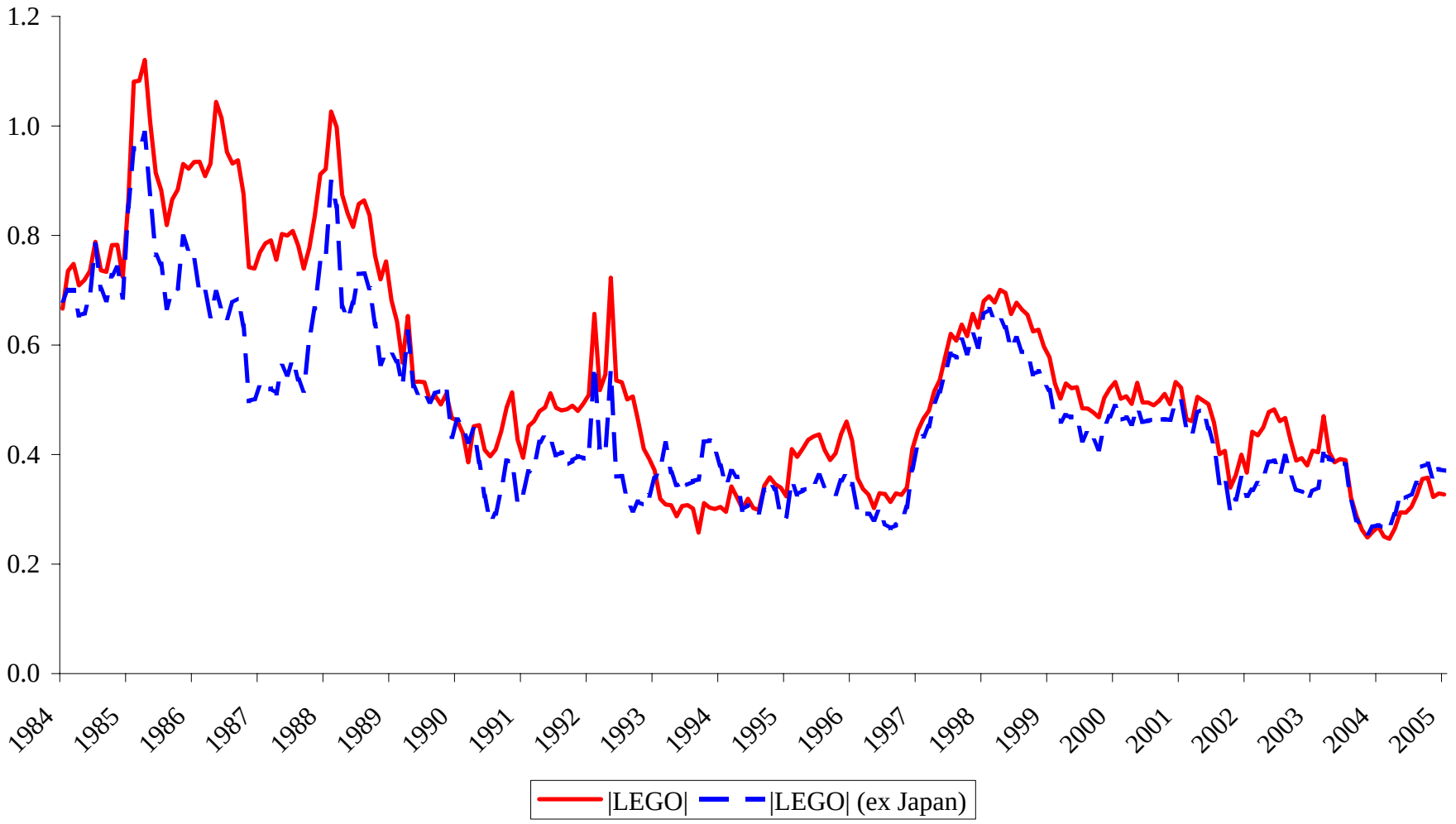

Figure 1b

Market Segmentation: Emerging Markets

Absolute Log Price Differential (|LEGO|)

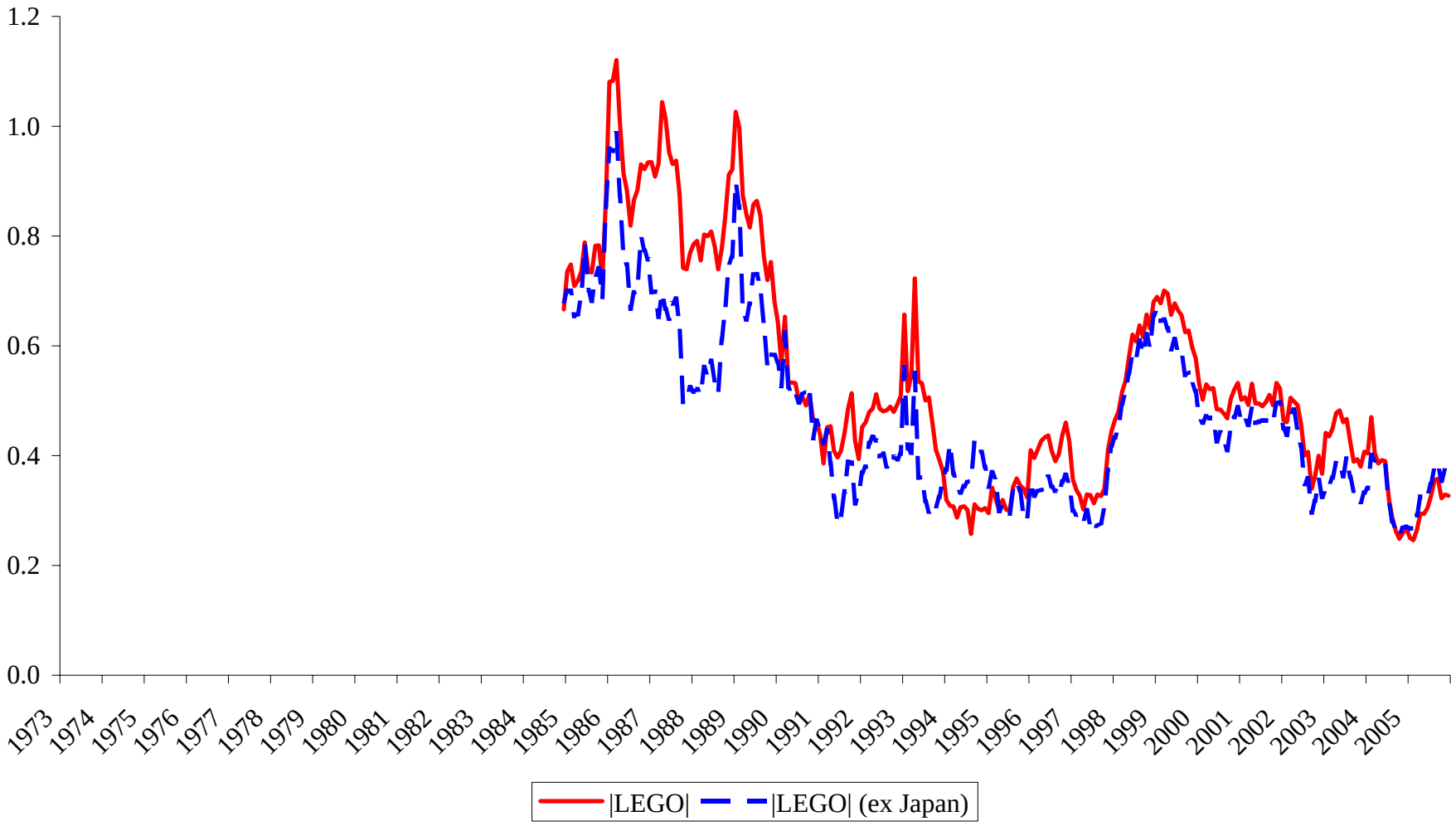

Figure 2a

Log Price Differential (LEGO)
Japan

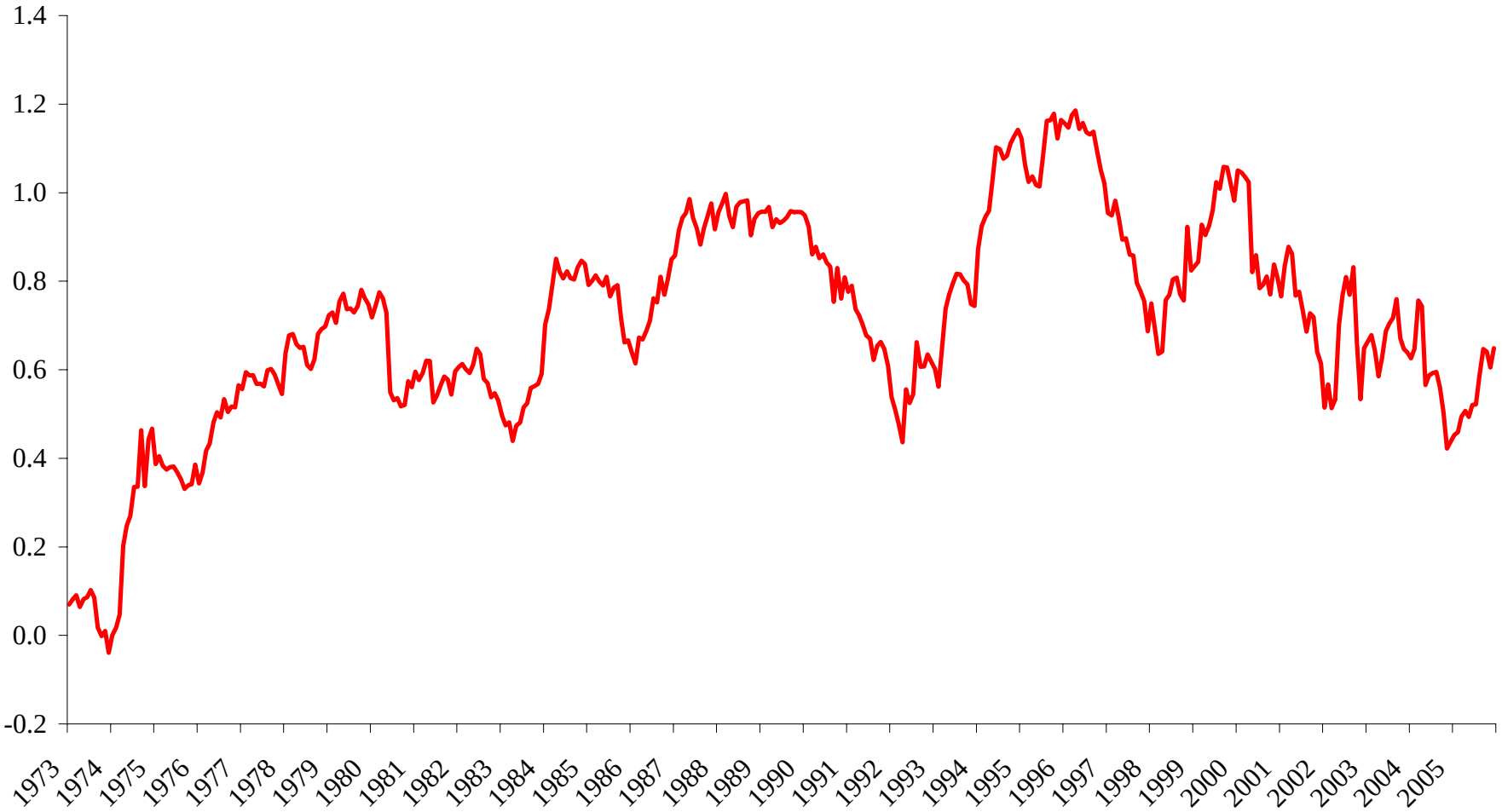

Figure 2b

Log Price Differential (LEGO)
Selected Developed Markets (ex Japan)

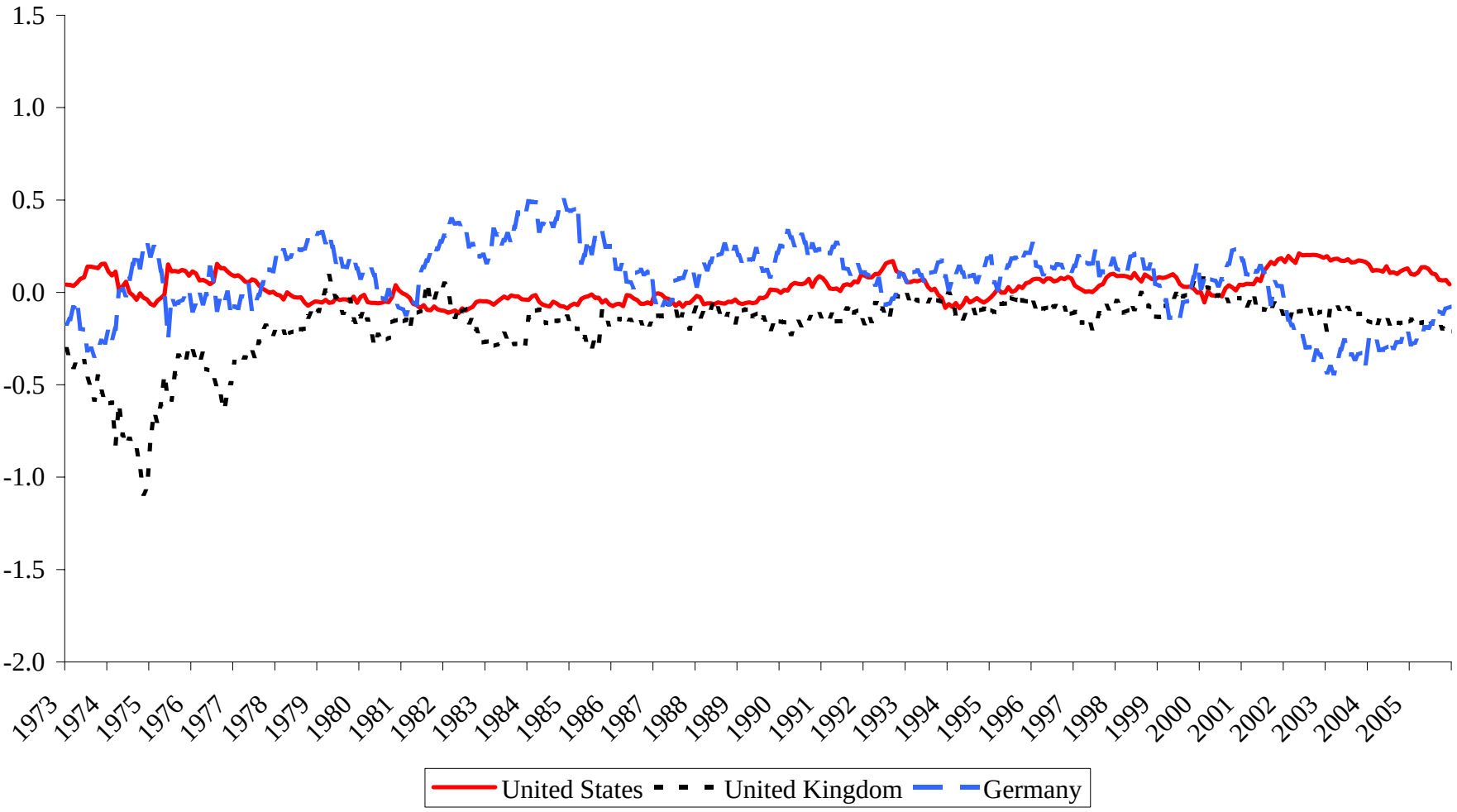

Figure 2c

Log Price Differential (LEGO)
Selected Emerging Markets (ex Japan)

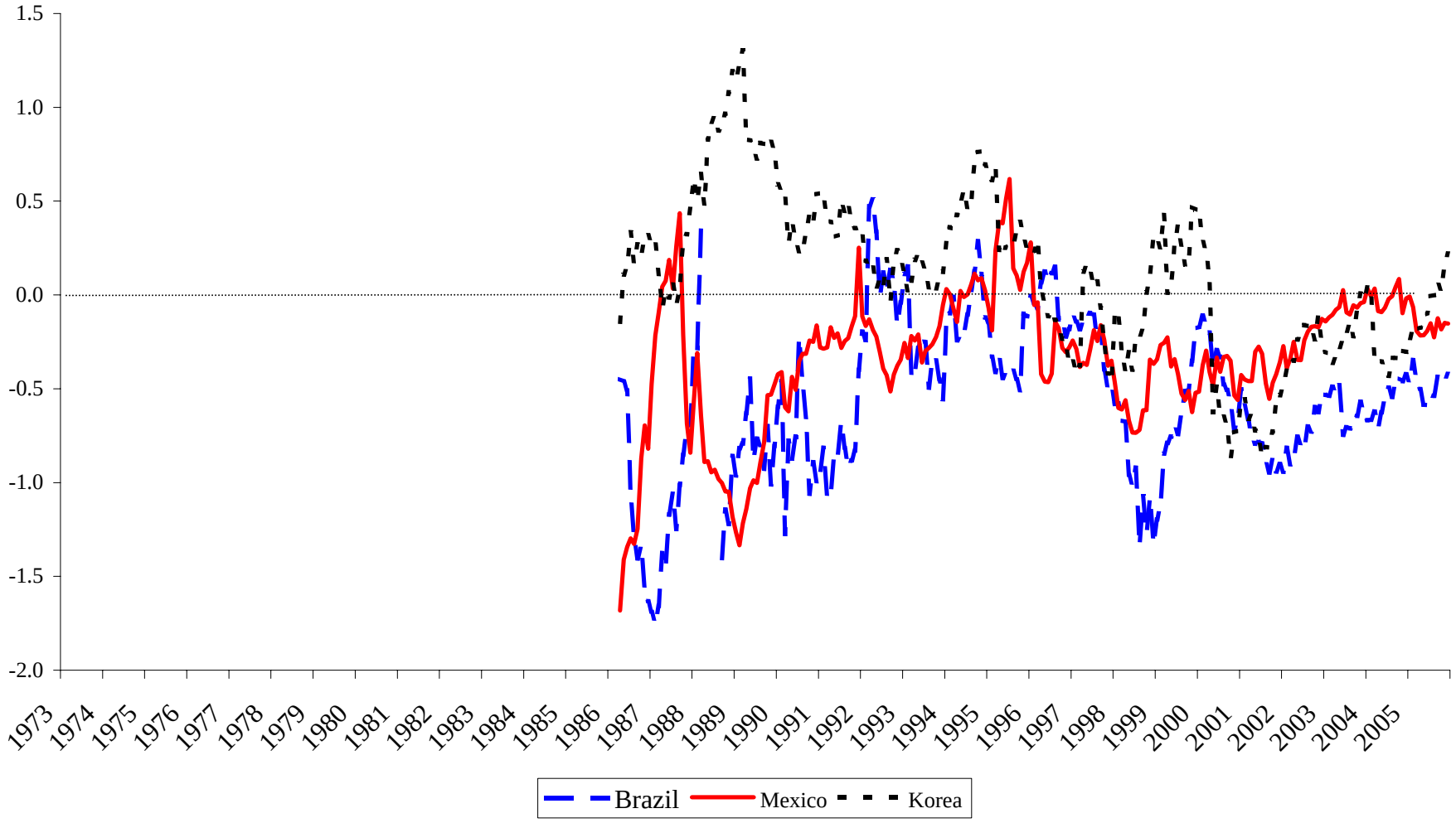

Figure 3
Absolute Log Price Differential (|LEGO| (exJ)),
Year Effects, Time Trend

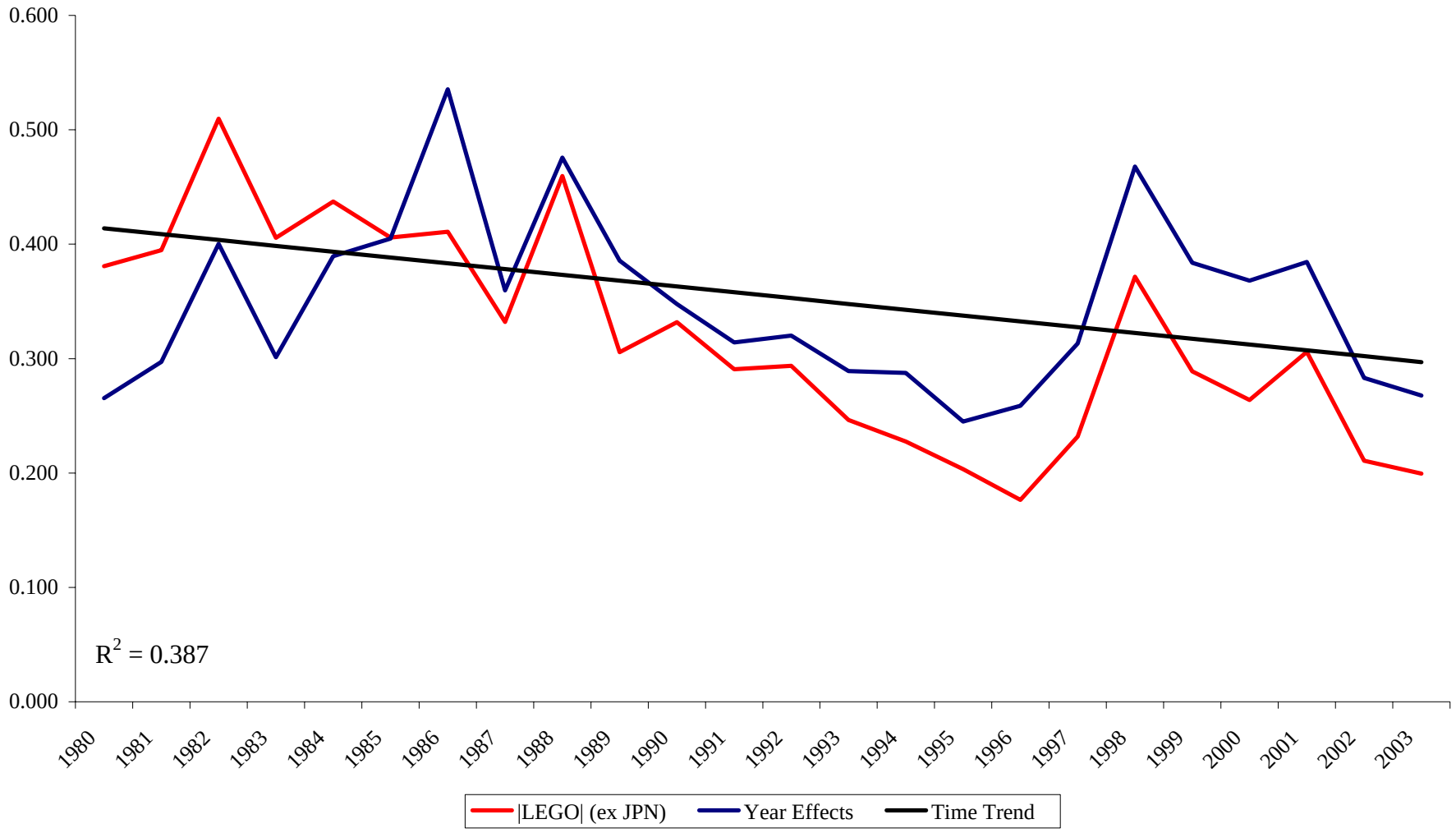

Figure 4

Emerging Market Discount (LEGO) (ex Japan)