NBER WORKING PAPER SERIES

WHAT SEGMENTS EQUITY MARKETS?

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Working Paper 14802
http://www.nber.org/papers/w14802

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
March 2009

This paper has benefited from discussions with and comments from Peter Bossaerts, John Campbell, Ines Chaieb, Anusha Chari, Yu-Chin Chen, Josh Coval, John Driffill, Gunter Franke, John Heaton, Andrew Karolyi, Aline Muller, Ruy Ribeiro, Ed Rice, Mark Spiegel, Mehmet Deniz Yavuz, and participants at the 2007 American Economic Association Meetings, 2007 Washington University Asset Pricing Conference, New York University, Harvard University, Cass Business School, McGill University, Queen's University, Rutgers University, University of Kansas, University of Leuven, University of Michigan, University of Minnesota, University of North Carolina at Chapel Hill, 2007 University of Amsterdam Asset Pricing Retreat, 2007 Brazilian Finance Association Meeting, University of Washington, 2007 International Research Conference on Corporate Governance in Emerging Markets, 2007 European Finance Association Meetings, 2007 German Finance Association Meetings, the 2008 Darden Emerging Markets Conference, the 2008 Global Investment Conference, the 9th ECB-CFS Research Network Meeting, NBER's Universities Research Conference "Micro and Macroeconomic Effects of Financial Globalization", and the 2009 American Finance Association Meetings. The views expressed herein are those of the author(s) and do not necessarily reflect the views of the National Bureau of Economic Research.

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NBER Working Paper No. 14802
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JEL No. F00,F15,F21,F3,F43,F55,G1,G15,P45,P48

ABSTRACT

We propose a new, valuation-based measure of world equity market segmentation. While we observe decreased levels of segmentation in many developing countries, the level of segmentation is still significant. In contrast to previous research, we characterize the factors that account for variation in market segmentation both through time as well as across countries. While a country's regulation with respect to foreign capital flows is important in determining its level of segmentation, we find that non-regulatory factors are also related to the cross-sectional and time-series variation in the level of segmentation. We identify a country's political risk profile and its stock market development as two additional local segmentation factors as well as the U.S. corporate credit spread as a global segmentation factor.

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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. The trade sector is also more open. These important structural changes should have had a profound effect on the valuation of stocks across the globe, and hence on important economic issues such as the cost of capital, international diversification benefits, and international risk sharing. In particular, globalization may have served to integrate equity markets across the world.

Our research has three goals. First, we propose a new measure of the degree of effective or *de facto* equity market segmentation. The country-level measure is based on industry-level earnings yield differentials, aggregated across all industries in a given country. We show that under the null hypothesis of full financial and economic integration, industry earnings yield differentials between a country and the world market should be (i) relatively small and fairly constant over time and (ii) explained entirely by differences in financial leverage and earnings volatility. Using data from within the U.S., an effectively integrated economy, we confirm that segmentation measured by randomly splitting U.S. data into pseudo-countries is small (with a mean of 1.4%) and fairly constant (with a time-series standard deviation of 0.25%) relative to the level of measured segmentation for developed countries (with a mean of 2.7% and an average time series standard deviation of 1.5%) and for emerging market economies (with a mean of 4.4% and an average time series standard deviation of 2.6%). Importantly and in contrast to many existing studies, our framework does not depend on a specific asset pricing model. Finally, measuring the degree of segmentation within the U.S. equity market provides us with a meaningful empirical benchmark to distinguish between effectively segmented and integrated markets.

Second, we apply our segmentation measure to a large set of fifty countries over a sample period of more than 20 years. We document the extent to which market segmentation has decreased over time. Using our empirical benchmark, we observe that the group of developed countries has been effectively integrated since 1993, while emerging markets continue to

display levels of segmentation above our benchmark.

Third, we estimate the contribution of both financial and trade openness to the marked reduction in measured segmentation. In addition to the effects of these regulatory or *de jure* globalization factors, we examine the degree to which other (country) factors effectively determine the degree of observed market segmentation. It is important to note that under the alternative hypothesis (i.e. some degree of market segmentation), any country characteristic correlated with local growth opportunities or local discount rates may influence prices. Moreover, factors such as political risk, liquidity risk, poor corporate governance, or inefficient markets may generate implicit barriers to important institutional investors and lead to de facto segmentation. 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. Instead of imposing a particular view about which factors matter the most, we employ an empirical model reduction technique proposed by Hendry (1995) to select the statistically relevant factors. We judge their economic importance by using a novel covariance decomposition. Overall, our approach suggests that in addition to financial and trade openness, a country's political risk profile, its stock market development and the the U.S. corporate credit spread, are statistically and economicly significant in explaining the variation in segmentation.

Our empirical results provide useful guidance for theoretical research. While formal international pricing models can lead to subtle empirical predictions, they tend to focus on only a few key determinants of international pricing differences. For example, much of the recent literature (see, for example, Shleifer and Wolfenzon (2002), Hail and Leuz (2006), and Albuquerque and Wang (2008)) focuses on cross-country differences in corporate governance, setting aside other potentially important factors, such as financial openness and stock market development. While our methodology allows us to empirically distinguish the relative importance of these factors, it should also be helpful for research in other areas where empirical complexity hinders the development of more comprehensive models.

The remainder of the paper is organized as follows. The second section introduces our measure of market segmentation. In section 3, we characterize the degree of market segmentation across countries and industries. We apply our measure to the U.S. equity market in order to develop a benchmark for an effectively integrated market. In section 4, we explore

the pure time-series variation in the degree of segmentation and the role for *de jure* globalization. While *de jure* openness has a significant effect on *de facto* segmentation, it cannot fully account for the downward trend we observe in segmentation levels. Section 5 contains the main results on what factors determine the variation in observed market segmentation across countries and time. Section 6 presents several robustness checks. In the final section, we offer some conclusions and discuss some related literature.

2 A new measure of market segmentation

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 in the country portfolio. Define the weight of industry j in country i by $IW_{i,j,t}$. Let $EY_{i,j,t}$ denote industry j's earnings yield, the inverse of the price earnings ratio, as determined locally in country i and $EY_{w,j,t}$ the corresponding earnings yield as determined in global capital markets. Our main variable of analysis is the absolute value of the difference between industry valuation ratios, $|EY_{i,j,t} - EY_{w,j,t}|$. We propose the weighted sum of these local-global industry valuation differentials as a measure of the degree of effective or *de facto* equity market segmentation for a country:

$$SEG_{i,t} = \sum_{j=1}^{N} IW_{i,j,t} |EY_{i,j,t} - EY_{w,j,t}|, \tag{1}$$

for N industries.

Note that our measure requires nothing more than industry-level valuation ratios which are observed at every point in time and are not estimated. This contrasts with the standard international finance literature that employs *estimated* measures of segmentation based on, for example, the evolution of equity return correlations or systematic risk exposures (e.g., world market portfolio betas); see Bekaert, Hodrick and Zhang (2007) and the references therein. However, the construction of these measures requires both historical data and a particular estimation methodology. Further, as their interpretation requires a formal international asset pricing model (about which there is little consensus), estimation error is likely compounded by model mis-specification.

In Appendix A, we present a pricing model with stochastic growth opportunities and

discount rates that links the measure to the concepts of market integration and segmentation. Most importantly, under a strong notion of integration, encompassing both financial and economic integration, the time-varying components comprising the industry price-earnings ratios are identical, being driven entirely by variation in the world discount rate and world growth opportunities.

Note that the model describes the determinants of price-earnings ratios; however, we use their inverse, earnings yields, in our empirical work. We do so for a number of reasons. First, the distribution of price-earnings ratios is highly positively skewed, increasing the risk that outliers may affect the analysis. Second, and most importantly, price earnings ratios are not defined when earnings are zero. Third, earnings yield differentials are easier to interpret given that they are expressed in percentage terms.[1]

We now review the model assumptions that deliver the equalization of valuation differentials across countries. The model we provide helps to develop our understanding of where country-specific effects may arise, but the usefulness of our measure does not hinge in any way on a particular parameterization of this model.[2] First, we assume a constant world interest rate. Later, we add the world real interest rate as one of the potential determinants of SEG. However, it is not likely that real rates account for much of the variation in earnings yield ratios.

Second, we assume that systematic risk for a given industry is identical across countries. This is the key assumption rendering the SEG measure independent of local discount rate variation under the null of integration. While this is the typical textbook assumption, the industry classification may not be homogenous enough to make this an acceptable assumption. We deal with this in two ways. We use an industry classification that is quite granular compared to other work, involving (N=) 38 different industries (see below). In addition,

[1] In an earlier version, we obtained qualitatively similar results, using the following segmentation measure:

$$SEG_{i,t} = |ln \sum_{j=1}^{N} IW_{i,j,t} EY_{i,j,t} - ln \sum_{j=1}^{N} IW_{i,j,t} EY_{w,j,t}|$$

[2] The model also implies other restrictions on the nature of local earnings yields in relation to their global counterparts, for instance, their degree of comovement across time should become more pronounced. However, investigating such implications again relinquishes the estimation-free nature of our measure.

in section 3.2, we use this industry classification on a large integrated market (the U.S.) to verify that portfolios within industries have comparable multiples and to uncover any biases that may arise in our measure.

Third, we assume that the same industry in different countries has identical financial risk. Because country specific circumstances may induce different leverage ratios across countries, we verify that our results are robust to the inclusion of country-specific leverage ratios. Note that other valuation measures, such as for example Tobin's q, would not require assumptions about financial risk. At the same time, the time series of available accounting data for a large set of countries is very limited and would not allow us to examine the long sample period we are interested in.[3]

Fourth, we assume that the earnings growth process for each industry-country portfolio depends on an *persistent* industry-specific, but country-independent growth opportunity process and a country and industry-specific shock that is not persistent. Consequently, only worldwide growth opportunities are priced.[4] The assumption that only world factors drive growth opportunities is common. For example, research by Rajan and Zingales (1998) and Fisman and Love (2004), makes this assumption quite explicitly, arguing that growth opportunities primarily arise through technological shocks. Bekaert, Harvey, Lundblad, and Siegel (BHLS) (2007) show that, in fact, global growth opportunities (measured using industry valuation ratios) predict real economic growth for both developed and emerging markets.

Under these assumptions, the weighted sum of these industry level absolute valuation differences should be small and relatively constant over time. The equalization of industry valuations is consistent with factor price equalization as implied by classical trade models (see for example Samuelson (1948)). But even under the more recent trade literature that explicitly allows for geography and differences in the level of productivity across countries (see for example Eaton and Kortum (2002)), we expect industry valuations to be the same across countries unless entry or exit barriers exist, as factor prices for the immobile factors

[3]For example, Chua, Eun, and Lai (2007) study market level Tobin's q for 49 countries between 1999 and 2004.

[4]Even under the null of integration, our formulation implies that the constant term in the price-earnings ratios still depends on local earnings growth volatility. In our empirical work, we are careful to add a measure of earnings growth volatility differentials to deal with this dependence.

will adjust to the spatial variation in productivity such that capital is indifferent between different locations (see Venables (2006)).

Of course, most countries will be segmented to some degree according to this definition. Our approach then tests the degree to which local and global factors matter for valuation once we have controlled for a country's global growth opportunities present in its industry mix. We conjecture that a main driver of such segmentation is *de jure* access: some markets are simply legally closed for foreign investment. But even when a country is formally open to foreign capital, international investors may shun markets with weak corporate governance, keeping discount rates local and likely higher. There may also be interesting interaction effects between openness and weak corporate governance, which partially undo this effect. While one might want to associate segmentation with "low" prices, segmentation need not be asymmetric. For example, in markets with irrational agents, segmentation could cause over-pricing (see Mei, Scheinkman and Xiong (2006) for an argument as to 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.

3 Characterizing segmentation in countries and industries

In this section, we first describe the construction of the segmentation measure, SEG, and report summary statistics. We then measure the relative importance of country and industry effects in the SEG measures at the country-industry level. Finally, we establish an easily interpretable benchmark for the remainder of the analysis by examining the SEG measure within one large country, the U.S.

3.1 Segmentation in countries and industries

We construct our measure of segmentation, SEG, for a sample of 50 countries, using monthly data from Datastream as well as from the Standard & Poors' Emerging Market Data Base (EMDB) between 1973 and 2005. While monthly SEG measures are constructed (and are presented in subsequent figures), we conduct most of our subsequent analysis at the annual

frequency from 1980-2005 given the availability of other variables.

For 22 mainly developed countries, we collect equity market value data at the industry level from Datastream, which 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, $IW_{i,j,t}$, that reflect the Industry Classification Benchmark (ICB) framework employed by Datastream.[5] For the same set of countries and industries, we also obtain industry earnings yields from Datastream. Datastream calculates these earnings yields by adding (generally trailing) 12-month non-negative firm-level earnings across firms in a given industry and country and then dividing aggregated earnings by the aggregated market value of the firms in the industries.

For the remaining 28 emerging market countries, we use EMDB to obtain market values and trailing 12-month earnings data at the firm level. To be consistent with the Datastream data, we set negative firm level earnings to zero. We then aggregate the firm level data according to the industry classification employed by Datastream.[6] For each industry and country, we calculate local earnings yields and portfolio weights. Appendix Table 1 lists all 50 countries and the data source used for each country.

For the construction of our segmentation measure as defined in (1), we also require global industry earnings yields. We obtain these from Datastream's global industry portfolios that represent a weighted average of local industries. We adjust these global industry earnings yields to exclude Japanese data as previous research (see for example French and Poterba (1991)) has shown that Japanese accounting standards lead to an artificial depression of Japanese earnings yields. Japanese earnings yields are roughly 70% smaller, on average, than their global counterparts. While these known accounting differences could impact our findings in an important way, the qualitative differences in the results are in fact minimal. Results that include Japan are available upon request.

[5]Note that in addition to the 38 industries used in our study (see Table 2 for a list of these industries), Datastream also employs a "Nonequity Investment Instruments" category which we exclude.

[6]EMDB classifies firms according to the Global Industry Classification Standard (GICS). We construct a concordance table between the 150 GICS categories used by EMDB and the 38 ICB categories used in this study and assign each firm an ICB industry code. The concordance between both classification systems is available upon request.

Table 1 first reports the time series average and standard deviation of our country segmentation measure, SEG, for all countries in our sample. Our sample is unbalanced: we have 26 years of data for most developed counties, but the average number of years with data for emerging market countries is only about 17.[7] At the bottom of the table, we report the cross-sectional averages of these statistics for the set of developed, emerging, and all countries. We observe that emerging markets on average exhibit larger earnings yields differentials as well as larger fluctuations of SEG over time than do developed countries. The "Rank" column shows that over the last five years, the U.S. is the least segmented country, whereas Venezuela is the most segmented.

The columns in the middle produce some preliminary information about how the segmentation measures evolve over time. Segmentation for developed markets has fallen considerably. The absolute earnings yield differential is 4.5%, on average, during 1980-1984, but less than 2%, on average, during the 2001-2005 period. For emerging markets, the average market segmentation measure falls from 5.8% in the first five years to 3.9% during 2001-2005. While both developed and emerging markets exhibit yield convergence over time, industrialized countries experience the largest drop in percentage terms. It should be pointed out that segmentation also increases for a few emerging markets, such as Venezuela, a country which experienced a significantly deteriorating political risk profile. Figure 1 presents, separately for developed and emerging markets, a cross-country average for SEG along with a time trend. Consistent with the results in Table 1, emerging markets appear more segmented relative to developed but SEG exhibits a strong downward trend for both sets of countries. It is this variation of segmentation over time as well as across countries that we seek to explain in this paper.

While most of our focus is on country segmentation, Table 2 also reports the main statistics from Table 1 for industry-specific segmentation. We observe that the absolute value of the yield differential has decreased for 23, but increased for 15 industries over the last two decades. The most integrated industry in recent years is the Software and Computer Services industry; indeed, it is the only one with a segmentation measure less than 2%.

[7]Coverage for most developed countries actually starts in 1973. But our empirical analysis focuses on 1980 to 2005. See Appendix Table 1 for details.

The five industries that appeared to be the most segmented in 1980-1984, namely Banks, Life Insurance, General Retailers, Non-life Insurance, and Industrial Metals all exhibit a significant reduction in their degree of measured segmentation. Interestingly, several of these industries have experienced substantial deregulation and privatization in many countries over the last two decades. This raises the question whether some of the country effects we document later may be influenced by the industry mix of the country. For example, imagine most countries protect their banking sectors, even after official liberalization, until worldwide technological (i.e., in telecommunication and web services) and regulatory changes (i.e., changing BIS standards) force global deregulation. In this case, countries will appear more or less segmented depending on the relative importance of the banking sector in the industry mix. Finally, notice that the four most segmented industries during the more recent period (2001 - 2005), Forestry & Paper, Industrial Metals, Travel & Leisure, and Mining are largely endowment-based industries, the value of which depends to some extent on the price of the immobile factor land.

To gauge the relative importance of industry versus country effects in our yield differentials, we regress the annual industry-country level segmentation measures onto a constant, 38 industry indicators, and up to 50 country indicators. This methodology was introduced by Heston and Rouwenhorst (1994) to distinguish between country and industry effects in firm return data.[8] To identify the parameters, we require the sum of all industry dummies as well as the sum of all country dummies to add up to zero. We then calculate the equally-weighted average absolute value of all industry dummies in a given year as well as of all country dummies. These numbers are commonly known as Mean Absolute Deviations (MAD), the relative magnitudes of which essentially show which effects are largest: country or industry. We find (in results available upon request) that country effects are dominant, but industry effects are important too. Both decline over time. However, the country effects are most prominent starting in the mid 1980s, and are therefore likely associated with the introduction of the emerging markets into the sample around that time.

[8]Bhoraj and Ng (2007) apply the methodology to valuation ratios.

3.2 Developing a benchmark: segmentation in the U.S.

Over the last five years, the average segmentation measure in the industrialized countries was 1.9%. Given differences in leverage, earnings volatility across countries, imperfect homogeneity within industry classes, and/or just plain measurement error, is this a large number, a small number, or what we would expect in relatively integrated countries? In this section, we benchmark our measure of segmentation by examining its value within one country, the U.S. Given that we sample firms within one country, any measured segmentation cannot be ascribed to international market segmentation.

We obtain earnings and equity market value data from Datastream and annual leverage data from Compustat between 1973 and 2006 for the 4,594 firms that are covered by both data vendors. We classify each firm into one of the 38 Datastream ICB industries

We use the U.S. sample of firms to construct 100 random samples, each of which resembles our actual data set of 50 countries, with the aggregate U.S. market playing the role of the world market. As Appendix B describes in detail, the random data sets approximately replicate both the cross-sectional and temporal variation in the number of firms in our sample. This is important as an increase in the number of firms within each portfolio may increase the accuracy of the measured earnings yield. For each random data set and each pseudo-"country" within such a set, we then compute the segmentation measure exactly as we do for the actual countries. Figure 2 shows the average, as well as the 5th and 95th percentile, of the degree of measured segmentation across the 100 random replications over time. The U.S. segmentation measure does not exhibit an obvious trend. The degree of segmentation for developed countries has declined through time to the average segmentation level in our U.S. benchmark case, which is about 2%. Since about 1993, segmentation in developed markets has moved within the 90% percentile confidence bound of the U.S. random measure, but the measured segmentation for emerging markets is still well above it.[9]

To understand better what may cause the apparent segmentation found in the U.S. data, we relate the annual segmentation measures for U.S. "countries" to four factors: a time

[9]We also conduct the more precise exercise of randomizing twice to be consistent with the separate groups of developed and emerging countries, respectively. This exercise yields very similar results.

trend, the log of the number of firms in a given "country" and year, the weighted average of the absolute difference between industry leverage in a given "country" and in the U.S. as a whole, and the weighted average of the absolute difference between industry log earnings growth volatility in a given "country" and the U.S.[10]

The earnings volatility and leverage variables have obvious implications for valuation detailed earlier in Section 2, even under full market integration. Importantly, their temporal variation may induce a downward trend in our segmentation measure. For example, the general decline in macro-economic volatility since 1985 may have narrowed earnings volatility differentials between firms. Likewise, general financial development may make it easier for firms to hit their target debt levels, narrowing leverage differentials between firms. Finally, if the number of firms increased over time, this alone may create a lower segmentation level; whereas cross-sectionally, "countries" with more firms may on average show lower segmentation levels.

Table 3 reports the results from running the regression on the 100 replications of our data set. We report the distribution of coefficient estimates and t-statistics. The signs of the coefficients are as expected, with the trend and number of firms coefficients being negative and the earnings growth volatility and leverage differential coefficients being positive. Focusing on the 95th (5th) percentile of the t-statistic distribution for the negative (positive) coefficients, only the number of firms coefficient is significantly different from zero. The trend and earnings growth volatility differential coefficients would be significant at lower critical levels.[11]

[10] The data sources and computations are described in Appendix Table 2. We clarify how we compute standard errors in Section 4.

[11] We also conducted a similar exercise with U.S. states serving as "countries," using Compustat to associate a firm's principle location with a U.S. state. Whereas the results (available upon request) are broadly similar to our reported findings, there is a concern that U.S. states may actually display genuine valuation differentials due to differential branching restrictions in the local banking system. Deregulation in the banking system could then lead to a trend in the segmentation measure.

4 Market segmentation dynamics

Our empirical results rely on unbalanced panel regressions for 50 countries using annual data from 1980 to 2005 of the form:

$$SEG_{i,t} = \alpha + \beta' x_{i,t} + \eta_{i,t}, \tag{2}$$

where $SEG_{i,t}$ is the year t measure of segmentation for country i, and $x_{i,t}$ represents the various candidate explanatory variables. We use two estimation techniques. The first specification is pooled ordinary least squares (OLS). However, the standard errors are corrected for unspecified serial correlation within a given country and for cross-sectional correlation across countries in a given year (see Thompson (2006)). These corrections have the effect of increasing the standard errors relative to simple OLS.

To address the serial correlation in the error term in an alternative fashion, our second approach uses 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 calculate panel corrected standard errors that allow for heteroskedasticity across countries as well as contemporaneous correlation of the error term between countries.[12] To conserve space, we only report coefficient estimates and standard errors from the pooled OLS estimation. Bold coefficients denote statistical significance at the 5% level under the panel OLS specifications. However, we indicate statistical significance at the 5% level under the Prais-Winsten specifications using underlined coefficients. Generally, the results from the Prais-Winsten regressions are broadly similar to the OLS specification results.

4.1 Establishing a trend

Table 4 provides three sets of unbalanced panel regressions of market segmentation (SEG) on a time trend (labeled "I" for each). The first set, in Panel A, includes all 50 countries from 1980-2005. The coefficient on the time trend is negative and statistically significant reflecting declines in market segmentation across time for a broad set of developed and emerging

[12] 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.

countries. The same message is evident in Panel B where we consider a sub-sample of 19 developed markets. When we consider the 31 emerging markets in Panel C (with data starting in 1988), the downward trend is also negative, but no longer statistically significant. In the full country sample case which will reflect our main empirical focus henceforth, the regression R^2 is not particularly large, suggesting that much of the variation in observed market segmentation is not described by a simple time trend, despite the statistical significance of the effect.

To evaluate the robustness of the time trend effect, we add the three control variables also examined in the U.S. benchmark regression in Section 3.2 as additional explanatory factors in column II. For all three samples, the time trend retains the same general sign and significance. Also, the regression R^2's increase significantly, reflecting the importance of the additional regression controls. Earnings growth volatility differentials are significantly associated with larger earnings yield spreads across all three samples. This is consistent with the theoretical prediction in the valuation model as well as the empirical results of the U.S. study. While the leverage differential has the expected sign for all samples, it is not statistically significant. Finally, we find a significant role for the number of firms across all three samples, corroborating the importance of that control highlighted in the U.S. study. We conclude that there is a significant downward trend in segmentation of at least 7 basis points per year.

4.2 Globalization and convergence

Globalization, particularly *de jure* financial and goods trade openness, has increased at a tremendous pace over the last thirty years. Accordingly, the *de jure* globalization process is the most obvious candidate determinant for the downward trend in SEG that we observe. In Table 5, we investigate the role of *de jure* financial and trade openness on market segmentation.

We use two different measures of financial openness, one focusing on the entire capital account and the other based exclusively on equity markets. Given that the two measures are highly correlated (0.74), we use them separately (Panel A and Panel B in Table 5) in our

regressions. The capital account openness measure compiled in Quinn (1997) and Quinn and Toyoda (2008) is based on information from the IMF. A value of one 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 is based upon the ratio of the market capitalization of the S&P investable to the S&P global indices in each country, following Bekaert (1995) and Edison and Warnock (2003). 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. To measure regulatory trade openness, we use 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 an indicator variable equal to zero and deemed closed.

In columns I, II, and III across two panels, Table 5 reports the effect of capital account, equity market and trade openness on market segmentation (intercepts are not reported). While all coefficients are negative, as expected, only the two financial openness effects are consistently significant. Note also that capital account openness as well as equity market openness have each higher explanatory power (in terms of R^2), than trade openness. Countries with completely open capital accounts or equity markets feature yield differentials that are about 250 to 300 basis points smaller than those with completely closed financial systems. Given that trade and financial openness are positively correlated, these coefficients decrease in joint regressions, but they remain statistically and economically significant.

In column IV, we add a trend term to the regression to explore the extent to which *de jure* openness subsumes the pure time effect documented above. Only in the capital account regressions is the coefficient on the time trend reduced in magnitude indicating that some of the time variation can be accounted for by trends in openness, but the magnitude is largely unaffected by the inclusion of equity market openness. In both sets of regressions, the time trend remains significantly different from zero. The time trend's inclusion adds only 2% to

the regression R^2, whereas the inclusion of the openness variables generates a significant increase in the regression R^2 over the time trend in isolation. The openness variables clearly also explain cross-sectional differences in segmentation.

Finally, in column V, we also include our three control variables. As in Table 4, this generates a sizeable increase in the regression R^2, and the number of listed firms and earnings growth volatility differentials remain important. The inclusion of these control variables does slightly reduce the estimated financial openness effects, but they remain statistically and economically significant. A closed to open difference still implies a 200 to 210 basis point differential in earnings yields. While retaining the expected sign, the trade openness effect is now statistically insignificant.

4.3 Baseline market segmentation

The *de jure* globalization measures jointly explain 9 to 13% of the variation in the *de facto* market segmentation measure. To set a benchmark for our capacity to explain this variation, we conduct a time-series fixed-effects regression:

$$SEG_{i,t} = \alpha_i + \tau_t + \eta_{i,t} \tag{3}$$

where $SEG_{i,t}$ is the year t measure of segmentation for country i, and α_i and τ_t represent country and year effects, respectively. This baseline regression explains 42% of the total variation in SEG.

Most of the R^2 (31%) comes from the fixed effects, reported in Table 1, corroborating the evidence that country factors are dominant and that valuation differentials are very persistent. The individual country fixed effects are of interest as well. The three largest fixed effects are due to Zimbabwe, Jamaica, and Côte d'Ivoire. The least integrated markets, on average, among industrialized countries are Finland, Norway, and New Zealand. The smallest country fixed effects are due to the United States (not surprisingly), the United Kingdom, and Australia. Finally, the pure year effects exhibit a significant downward trend over the sample, consistent with the previous evidence on significant time trends. Unlike a pure time-trend, however, valuation convergence was notably interrupted following the

1997 South-East Asian crisis and the market turbulence in 1998 (the Russian debt crisis and LTCM) (see Figure 1).

5 Determinants of market segmentation

De jure globalization measures together with controls for earnings volatility, leverage differentials, and the number of firms explain about 25% of the total panel variation in SEG, whereas a simple country and time effects regression explains 42%. Here we consider a host of other factors potentially associated with segmentation. Appendix Table 3 provides a list of all the variables we consider and Section 5.1 provides the economic rationale for why they are considered. We relegate a detailed description of the sources and data construction to Appendix Table 2. Our goal is to find a parsimonious set of factors that maximizes the explanatory power for the segmentation variable. To this end, we employ statistical model reduction techniques, detailed in Section 5.2. Section 5.3 conducts a variance decomposition analysis on the selected models.

5.1 Other segmentation factors

We consider five categories of variables.

Measures of de facto openness

In addition to the *de jure* measures of financial and trade openness provided above, we also consider two *de facto* measures of openness. First, we 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. Second, we employ a traditional *de facto* measure of trade openness, computed as the sum of exports and imports as a share of gross domestic product.

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 suffice to attract foreign capital if the country is viewed as excessively risky.

To explore these effects, we consider several variables that measure different aspects of the institutional environment. First, we consider several sub-indices of the ICRG political risk index: 1) the quality of institutions, reflecting corruption, the strength and impartiality of the legal system (law and order), 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. Note that high ratings are associated with less risk. Using Bhattacharya and Daouk's (2002) data regarding insider trading laws, we construct two indicator variables. 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. Finally, we consider the country's legal origin (Anglo-Saxon, French, and other), an often used instrument for corporate governance and a "good" legal system.

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. Moreover, poor liquidity as a priced local factor may lead to valuation differentials. When markets are closed, efficient capital allocation should depend on financial development (see Wurgler (2000) and Fisman and Love (2004)). Because banks are still the dominant financing source in many countries, poor banking sector development may severely hamper growth prospects and lower valuations. 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, following the work of Lesmond, Ogden and Trzcinka (1999), Lesmond (2005), and

Bekaert, Harvey, and Lundblad (2007). Our other measures of equity market trading and efficiency include: (i) turnover as the value traded relative to GDP, a standard measure of stock market development (see Atje and Jovanovic (1989)); (ii) the size of the equity market as measured by total market capitalization relative to GDP; and (iii) equity market synchronicity (see Morck, Yeung, and Yu (MYY henceforth) (2000)), computed as an annual value-weighted local market model R^2 obtained from each firm's returns regressed on the local market portfolio return for that year. Last, we proxy for the development of the banking system by the amount of private credit divided by GDP (see King and Levine (1993)).[13]

Risk appetite and business cycles

We also consider a number of variables that capture potential push factors driving capital flows. Given that all these variables are based on U.S. or global data, they exhibit only time-series variation. An established literature argues that market conditions in developed countries, such as the level of interest rates, may drive capital flows, and thus affect international valuation differentials (see e.g. Fernandez-Arias (1996)). In particular, low real rates in developed markets would cause capital to flow into emerging markets bringing their valuations 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 across G-7 countries.

While the real rate effect may reflect a behavioral search for yield, it is also possible that the level of interest rates is correlated with a change in risk appetite. Risk averse investors may view foreign markets (erroneously) as risky. However, real interest rates have an ambiguous effect on risk aversion. Lower interest rates may increase wealth, and thus increase risk tolerance (see e.g. Sharpe (1990)). Alternatively, if pro-cyclical, low interest rates may be associated with recessions, and therefore with an increase in societal risk

[13]Unfortunately, we lack sufficient data for accounting standards: the earnings levels employed in the price-earnings ratios may exhibit systematic differences due to country-specific accounting rules and 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)). However, it is likely that the development measures we do have are highly correlated with accounting quality measures.

aversion. We consequently also include a more direct measure of U.S. risk aversion due to Bekaert and Engstrom (2008) computed based on the parameter estimates of the habit model in Campbell and Cochrane (1999). This measure tends to behave counter-cyclically.

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. As an alternative global liquidity measure, we use the growth rate of the U.S. money supply (M2). We also include world GDP growth, which may act as an indicator of the world business cycle. To the extent the world business cycle affects global discount rates and growth opportunities, it may not affect segmentation levels under the null of integration, but it would cause variation in segmentation levels for these markets that are segmented. Moreover, if correlated with global risk appetites, international business cycle indicators may be associated with changes in international capital flows and affect overall segmentation.

Other measures more directly correlated with the risk appetite or sentiments of world investors are the U.S. corporate bond spread and the VIX option volatility index. The latter is generally viewed as an indicator of market uncertainty and sudden increases in its level with a flight to safety. Increases in these measures may lead to a retreat of U.S. capital from foreign markets, leading to divergence in valuations. Alternatively, the VIX index is simply a measure of the U.S. stock market's volatility, which may proxy for U.S. earnings growth and discount rate volatility. We also investigate one country-specific factor, the level of the lagged country portfolio return over the last year to potentially proxy for return chasing effects by international investors. Finally, we include a measure of world equity market volatility.

Growth determinants

Under the null of integration, a country's growth opportunities should be reflected in the global valuation measure of its industry basket. However, it is conceivable, especially for developing countries, that growth prospects are more local in nature. Following the extensive work on growth determinants (see, e.g., Barro (1997)), we therefore include several measures related to cross-country expected growth differentials: the initial level of per capita GDP, the percentage of secondary school enrollment as a measure of human capital, the log of life

expectancy, and population growth.

5.2 Multivariate analysis: Model selection and results

Our goal is to find a parsimonious set of factors that best explain the variation in SEG. With a large number of highly correlated explanatory variables, this is no easy task. The procedure we employ is the general-to-specific search algorithm (see Hendry (1995) and Hendry and Krolzig (2001)) implemented, for example, in PcGets to automatically select the "optimal" model. The algorithm constitutes a "testing down" process that eliminates variables with coefficient estimates that are not statistically significant leading to a parsimonious undominated model. In particular, in a first step we estimate a general unrestricted model that contains all available variables by OLS. We then eliminate variables that are statistically insignificant. The new model is then re-estimated, and a multiple reduction path search is used to find all terminal models, that is models in which all variables have statistically significant coefficient estimates. Finally, if more than one terminal model exists, the different terminal models are compared to each other and one is chosen as the unique final model.

We initially consider the various candidate variables mentioned above for which we have data over the full sample of 50 countries. In addition, we augment the candidate factors with the three control variables, leverage, earnings volatility, and the number of listed firms suggested by our U.S. case study, and with a time trend. In all specifications, we impose the inclusion of a constant as well as equity market and trade sector openness given their documented primacy and theoretical justification.[14] Appendix Table 3 lists the candidate variables that enter into the algorithm as well as those that survive.

We employ two main specifications differentiated by the inclusion of either the equity market or capital account openness variables. In the first case, we eliminate 19 variables, leaving us with a final model that contains 9 variables. When we apply the procedure replacing equity market openness with capital account openness, we retain 10 variables which overlap greatly with the equity market openness specification. Note that we lose some obser-

[14] If we do not impose their inclusion, equity market openness survives the specification reduction, whereas trade sector openness does not.

vations to do so as Quinn's capital account openness data are limited. While the algorithm is entirely statistical in nature and not guided by theory (other than our inclusion of *de jure* globalization), we view a model that has roughly 10 variables to be quite reasonable given the large number of plausible determinants at the outset.

Statistical Significance

Table 6 provides the final regression specifications for the retained models. We first focus on the main equity market openness specification presented in column 1. While equity market openness has a robustly significant effect on segmentation, the trade openness variable is not significant. Other surviving variables include the ICRG's Investment Profile, for which improvements are associated with significant reductions in market segmentation, the size of the equity market, which has the expected sign, but is only borderline statistically significant, global economic growth, and two additional "global risk" variables, the U.S. corporate bond spread and the VIX volatility index (with the expected positive signs and significance). Earnings growth volatility and the number of firms also survive the selection, and both retain the signs and statistical significance documented above. Note that the pure time trend does not survive the model selection methodology, suggesting that our explanatory factors are rich enough to capture the pure time trend in observed market segmentation.

It is possible that the documented effects for each variable change dramatically in the presence of alternative explanatory variables sets. To address this criticism, we provide a confidence interval for each entry beneath the estimates in brackets recognizing the potential mis-specification of our preferred multivariate regression using the model reduction techniques discussed above. The confidence intervals are constructed using a jackknife experiment where, for each surviving variable separately, we randomly sample from the 27 other possible variables (see Appendix Table 3) for which we have full sample data. The number of additional variables and their identities are completely random, but we force the selection to have between 8 and 27 additional variables. For each set of randomly selected explanatory variables, we perform a regression with SEG as the dependent variable, throw out variables with t-statistics below 1, and perform a second regression on the remaining set. We retain the regression coefficient and the overall contribution that the particular variable makes for

predicted segmentation. We iterate this procedure 1,000 times for each variable separately to construct a confidence interval. The 5 and 95% percentiles are presented. Most of the main variables highlighted above, including *de jure* openness, continue to be significant with the exceptions of world GDP growth and the VIX option volatility index. Interestingly, the regression analysis seems to understate the role for MCAP/GDP and the number of firms, where the estimated coefficient is near the upper bound of the confidence interval.

Overall, it appears that *de facto* segmentation is driven by three types of factors: *de jure* globalization (with Investment Profile being correlated with a regulatory climate conducive to FDI), financial market development (market capitalization to GDP), and measures correlated with global risk premia and appetites. The specification using capital account openness, presented in column 3, confirms this general picture. The significant variables include capital account openness, investment profile, local market capitalization to GDP, and again the corporate bond spread and the VIX index. The only puzzling result is the significantly positive association between SEG and U.S. money supply growth. The latter is often viewed, as an indicator of global liquidity, so we would expect it to be negatively associated with segmentation but the coefficient is positive. It is of course conceivable that monetary policy reacts to tight conditions in financial markets (as proxied by high corporate bond spread and VIX index levels) by providing liquidity to the markets. The jackknife analysis confirms that trade openness is not a significant determinant, and suggests that the importance of the VIX index may be exaggerated by the final specification.

In the remaining columns (columns 2 and 4) of Table 6 we consider slightly shorter samples which allow the inclusion of explanatory variables focusing on stock market efficiency and liquidity. In the equity market specification (column 2), the illiquidity measure survives but is not significant at conventional levels; the MYY measure of stock market inefficiency also survives and is significant under the Prais Winsten standard errors. Both variables have the expected signs. The role for *de jure* equity market openness is somewhat reduced; however, Bekaert, Harvey, and Lundblad (2007) document that the process towards equity market openness itself directly affects the local trading environment, so we may in fact be capturing a channel through which financial openness operates. That said, neither stock market variable survives in the capital account openness specification (column 4), and general capital

account openness retains the same magnitude and significance. It is also conceivable that the effects of stock market development and efficiency are well captured by the MCAP/GDP and number of firms variables.

Economic Significance

The signs and significance of the preferred multivariate specifications are fairly straightforward to interpret, but the results do not provide clear guidance on which factors are relatively more important in explaining market segmentation. For our two main multivariate regressions from Table 6, we conduct two experiments to reveal the economic importance of the factors, both reported in Table 7. For both panels (equity market and capital account openness), we report the change in the segmentation level when the independent variable moves from the average value of an emerging to the average value of a developed market. For the time series variables, we simply consider the response to a one standard deviation change in the independent variable. The most important determinants for the equity openness regression are equity openness and the U.S. Corporate Bond Spread. Trade openness, MCAP/GDP and the number of firms are least important. For the capital account regression, the story is virtually identical, with Legal Origin, in addition to the three variables mentioned above, being relatively less important.

In a second experiment, we examine how much of the variation in the segmentation variable is explained by the right-hand side explanatory variables and what is the relative contribution of each. We use a simple R^2 concept computed as $\frac{Var(S\hat{E}G_{i,t})}{Var(SEG_{i,t})}$ where $S\hat{E}G_{i,t} = \hat{\alpha} + \hat{\beta}x_{i,t}$. The denominator is defined as

$$Var(SEG_{i,t}) = \frac{1}{N}\sum_{i=1}^{N}\frac{1}{T_i}\sum_{t=1}^{T_i}(SEG_{i,t} - S\bar{E}G)^2 \tag{4}$$

where $S\bar{E}G = \frac{1}{N}\sum_{i=1}^{N}\frac{1}{T_i}\sum_{t=1}^{T_i}SEG_{i,t}$. The numerator is defined analogously as

$$Var(S\hat{E}G_{i,t}) = \frac{1}{N}\sum_{i=1}^{N}\frac{1}{T_i}\sum_{t=1}^{T_i}(S\hat{E}G_{i,t} - S\bar{\hat{E}}G)^2 \tag{5}$$

where $S\bar{\hat{E}}G = \frac{1}{N}\sum_{i=1}^{N}\frac{1}{T_i}\sum_{t=1}^{T_i}S\hat{E}G_{i,t}$. These quantities were already reported in Table 6. Across the regression specifications provided, the predicted market segmentation explains

about 30% of the variation of the observed market segmentation in the data. That is, relative to our exploratory regression including only country and year fixed effects discussed above (with an R^2 around 40%), we explain about three-fourths of our benchmark.

To examine the contributions of each of the independent variables to the overall variation of the predicted market segmentation, we compute the following covariance for each explanatory variable j:

$$Cov(S\hat{E}G_{i,t}, \hat{\beta}_j x_{i,j,t}) \quad = \quad \frac{1}{N}\sum_{i=1}^{N}\frac{1}{T_i}\sum_{t=1}^{T_i}\hat{\beta}_j(S\hat{E}G_{i,t} - \bar{S\hat{E}G})(x_{i,j,t} - \bar{x}_j) \tag{6}$$

where $\bar{x}_j$ is defined analogously as above. Summed across all individual explanatory variables, these covariance terms must exactly equal the variance of the predicted market segmentation. In Table 7, we report the ratio of each covariance term to the overall predicted market segmentation variance, $\frac{Cov(S\hat{E}G_{i,t}, \hat{\beta}_j x_{i,j,t})}{Var(S\hat{E}G_{i,t})}$, where each column must necessarily sum to 1. We report this variance decomposition for the two main regression specifications.

In the main equity market openness specification (see Panel A), the largest contributors to the overall variation in the predicted market segmentation are equity market openness (around 20%), the investment profile (around 15%), the two control variables (collectively around 35%), and the U.S. corporate default spread (14%). The contribution from *de jure* trade openness is relatively small. Panel B provides comparable evidence for the main capital account openness specification. The general magnitudes are comparable, although the explanatory contribution from general capital account openness is somewhat smaller at around 12%. The jackknife analysis again confirms that the stock market development variables (both MCAP/GDP and number of firms) are perhaps more important than the final regression point estimates indicate. Again, the VIX, and World GDP growth may be spurious factors. The increased importance of MCAP/GDP remains true when investigating the jackknife results for the capital account openness specification. Trade openness and the VIX also do not appear to generate robustly significant contributions to the explained variance of SEG.

It is also 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. The second decomposition splits the total covariation into a within-year component and a pure time-series between-year component. We describe the formulas for these calculations in Appendix C.

Table 7 reports both decompositions. All covariance terms are again scaled by the variance of the predicted degree of segmentation, $Var(\hat{SEG}_{i,t})$. Both decompositions suggest that the largest contribution to the variation in predicted market segmentation is the cross-sectional component, the between-country component in the case of the first decomposition (accounting for around 58% of the explained variation) and the within-year component in the case of the second decomposition (accounting for 82%). The temporal variation is mostly accounted for by the global factors, but temporal variation in openness, the investment profile, and MCAP/GDP also contribute. Taken together, regulatory globalization is clearly an important determinant of observed market segmentation. That is perhaps not surprising; however, it is important again to reemphasize the distinction between our measures of *de jure* regulatory openness and our new price-based measure of *de facto* segmentation. Further, it is important to note that, beyond regulatory openness, the financial and institutional conditions within which these market and economies operate are important determinants of *de facto* market segmentation.

6 Robustness Checks

Finally, we briefly summarize several robustness checks. Detailed results are available upon request.

U.S. as a benchmark

Using the world market as a benchmark to compare valuation levels has the disadvantage that the number of countries in the index and their relative weights change over time. Therefore, we repeat all of our empirical exercises using the U.S. stock market, the world's largest, as the benchmark. To do this, we drop the U.S. from the list of countries to investigate. Our

results are robust to this change in benchmark. For example, all the coefficients for the four specifications reported in Table 6 are largely unchanged when the U.S. benchmark is used and have similar statistical significance levels.

Equally-weighted industry differentials

As we indicated before, the industry mix of a country may affect its segmentation level. To more cleanly focus on country regulations, we investigate an alternative SEG measure where we employ equal weights for the various industries within each country. The results presented in Table 6 are also largely unchanged under this alternative weighting scheme.

Interaction effects

Finally, the effect of a number of our explanatory variables may themselves be a function of the *de jure* openness of the country. For example, it is conceivable that financial development only contributes to valuation convergence in financially open markets. Therefore, we investigate the role for interaction effects with equity market openness for all the variables in the main specification from column 1 in Table 6. We examine these effects one-by-one to prevent the proliferation of the independent variables. Only two of the variables, MCAP/GDP and local market illiquidity, exhibit a significant interaction effect; for the most part, interaction effects are not statistically significant.

Information variables

A rather extensive literature on home bias (see especially Portes and Rey (2006)) shows that informational frictions play a large role in determining international transactions in financial assets and the level of home bias. To the extent that there is a link between home bias and asset transactions and valuation, such measures may help determine segmentation levels. We therefore also include several proxies for the degree to which countries are connected with the world through telecommunication. In particular, we include the number of fixed line and mobile phone subscribers per 100 people, the number of Internet users per 100 people, and the international voice traffic as measured by minutes per person. Because the latter measure is not available for all observations in our sample, we applied the model reduction

process to a sample that is slightly smaller than the one considered in Section 5. Neither of these information variables survive the robustness process; hence information asymmetry seems not to play a critical role in driving segmentation levels.

7 Conclusions

We study the evolution of market segmentation. Our measure of market segmentation, SEG, the absolute differential between local and global valuation ratios, will shrink as discount rates and growth opportunities become global in nature.

While it is well known that the forces of globalization have reduced market segmentation over the past few decades, it is difficult to quantify the magnitude, the timing, and the sources of this reduction. Our measure allows us to characterize both the time-series and cross-country variation in observed segmentation. We find that segmentation has significantly trended downward through time for both developed and emerging markets, where developed markets are now effectively integrated. *De jure* globalization, such as the openness of equity market to foreign investors, plays a pivotal role in explaining cross-country differences in market segmentation, but so does the institutional environment and local financial market development. Variables reflecting global risk conditions, such as the U.S. corporate bond spread, also account for a significant proportion of SEG's variation. These variables alongside *de jure* openness explain about 30% of the variation in segmentation. We find equity market openness to be the single most important economic explanatory variable, accounting for the largest share of the explained segmentation variance.

Finally, since our segmentation measure employs a country's industrial structure as a key building block, we also explore market segmentation at the industry level. We find that historically heavily regulated industries, such as the banking, insurance, and electricity sectors, were among the least integrated early in our sample and are now among the most integrated.

Much of the literature has focused on equity returns, for example examining return correlations (see Bekaert, Hodrick and Zhang (2007) and the references therein), or the evolution of betas with respect to a global benchmark (see Bekaert and Harvey (2000) and Baele

(2005), among others). While these approaches have sometimes led to the conclusion that integration has significant effects on returns, the tests often lack statistical significance. Our method to examine the effects of globalization on market integration offers an alternative and perhaps more powerful perspective. Our analysis allows us to answer the important questions of why one country is more segmented than another and why the degree of segmentation changes over time.

8 Appendix

A: A simple pricing model for industry portfolios

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

$$\Delta \ln(Earn_{i,j,t}) = GO_{w,j,t-1} + GO_{i,j,t-1} + \epsilon_{i,j,t}. \tag{7}$$

$GO_{w,j,t}$ 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:

$$\begin{aligned} GO_{w,j,t} &= \mu_j + \varphi_j GO_{w,j,t-1} + \epsilon_{w,j,t} \\ GO_{i,j,t} &= \bar{\mu}_{i,j} + \bar{\varphi}_{ij} GO_{i,j,t-1} + \bar{\epsilon}_{i,j,t}. \end{aligned} \tag{8}$$

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

$$\delta_{i,j,t} = r_f(1 - \beta_{i,j} - \bar{\beta}_{i,j}) + \beta_{i,j}\delta_{w,t} + \bar{\beta}_{i,j}\delta_{i,t}. \tag{9}$$

The constant term, with r_f equal to the world risk free rate, arises because the discount rates are *total* not *excess* discount rates. The world market discount rate process follows:

$$\delta_{w,t} = d_w + \phi_w \delta_{w,t-1} + \eta_{w,t}, \tag{10}$$

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

$$\delta_{i,t} = d_i + \phi_i \delta_{i,t-1} + \eta_{i,t}, \tag{11}$$

with $\eta_{i,t} \sim N(0, s^2_i)$. We assume the various shocks to be uncorrelated.

Assuming that each industry pays out all earnings, $Earn_t$, each period, the valuation of the industry under (7)-(11) is:

$$V_{i,j,t} = E_t[\sum_{k=1}^{\infty} exp(-\sum_{\ell=0}^{k-1} \delta_{i,j,t+\ell}) Earn_{i,j,t+k}]. \tag{12}$$

Given that we model earnings growth as in equation (7), the earnings process is non-stationary. We must scale the current valuation by earnings, and impose a transversality condition to obtain a solution:

$$PE_{i,j,t} = \frac{V_{i,j,t}}{Earn_{i,j,t}} \quad = \quad E_t[\sum_{k=1}^{\infty} exp(\sum_{\ell=0}^{k-1} -\delta_{i,j,t+\ell} + \Delta \ln(Earn_{i,j,t+1+\ell}))] \tag{13}$$

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):

$$PE_{i,j,t} = \sum_{k=1}^{\infty} exp(a_{i,j,k} + b_{i,j,k}\delta_{w,t} + c_{i,j,k}GO_{w,j,t} + e_{i,j,k}\delta_{i,t} + f_{i,j,k}GO_{i,j,t}). \tag{14}$$

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, growth opportunities, and earnings growth rates. This dependence may lead to local variables affecting the dependence of the earnings yield on global variables because of non-linearity in the model, but this dependence is likely second-order.

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,

$$\beta_{i,j} = \beta_j. \tag{15}$$

This assumption also implies that financial risk through leverage is identical across countries. Under these assumptions, we can rewrite (14) as:

$$PE_{i,j,t} = \sum_{k=1}^{\infty} exp(a_{i,j,k} + b_{j,k}\delta_{w,t} + c_{j,k}GO_{w,j,t}). \tag{16}$$

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. Critically, the coefficients on $\delta_{w,t}$ and $GO_{w,j,t}$ are not country-specific. Under these assumptions, valuation ratios for the same industry across countries do not need to be strictly identical, but this difference only depends on the constant $a_{i,j,k}$.

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 tied to global ratios for the same industry and price earnings ratios for each local industry depend only on $\delta_{i,t}$ and $GO_{i,j,t}$. While local and global factors may be correlated, local industry PE ratios can now differ substantially from comparable global PE ratios.

B: Constructing 100 random samples of 50 "countries" from U.S. data

We use the sample of 4,594 U.S.firms to construct 100 random samples, each of which resembles our actual data set of 50 countries with respect to the approximate number of firms used.[15] In particular, we allow for cases where a "country" contains 10, 20, 30, 40, 50, 60, 100, 150, 200, 250, 350, 500, or 1,000 firms. We start by defining country $i = 1$ and randomly selecting 10 U.S. firms. We then add another 10 randomly selected firms, then another 10 firms and so on until we have randomly selected 1,000 U.S. firms. We repeat this process a 100 times, obtaining 100 "countries" $i = 1, 2, 3..., 100$ each with 10, 20, 30,..., 1,000 randomly selected firms. We then randomly select 50 out of the 100 "countries" and associate them with the 50 countries present in our actual international data set. For example, Argentina could be associated with $i = 5$, Australia with $i = 43$ and so on. We then choose the number of randomly selected firms that is approximately equal to the number of firms present in

[15]We know the exact number of firms used in a given year for countries for which we use EMDB data, we only know the approximate number of firms used by Datastream in 2006. For countries for which we obtain data from Datastream, we assume that the number of firms used until 1989 is about half (but not less than 50) of the 2006 number of firms and is at the 2006 levels from 1990 onwards.

the actual data. Assume for example that we have 13 firms for Argentina in 1994 and 24 in 1995, we would work with the 10 randomly selected U.S. firms for $i = 5$ in 1994 and with the 20 randomly selected U.S. firms for $i = 5$ in 1995 and so on. Finally, we repeat this random selection process 100 times, obtaining 100 data sets that approximate our actual data sets with respect to the number of firms used in a given year and country. In each case, we proceed exactly as described in Section 3 to calculate a "country's" degree of segmentation, that is we first aggregate earnings yields across firms in the same industry and take absolute differences with respect to the corresponding U.S. earnings yield for the given industry and then aggregate this absolute difference across industries in a given country using industry market values as weights.

C: Variance Decomposition

We conduct two variance decompositions to isolate the time-series and cross-sectional effects of each explanatory variables for predicted segmentation. The first decomposition splits the total covariation for each explanatory variable into a within-country component and a pure cross-sectional between-country component:

$$\begin{aligned} Cov(S\hat{E}G_{i,t}, \hat{\beta}_j x_{i,j,t}) &= \frac{1}{N}\sum_{i=1}^{N}\frac{1}{T_i}\sum_{t=1}^{T_i}\hat{\beta}_j(S\hat{E}G_{i,t} - \bar{S\hat{E}G}_i)(x_{i,j,t} - \bar{x}_{i,j}) \\ &+ \frac{1}{N}\sum_{i=1}^{N}\hat{\beta}_j(\bar{S\hat{E}G}_i - \bar{S\hat{E}G})(\bar{x}_{i,j} - \bar{x}_j) \end{aligned} \tag{17}$$

where $\bar{S\hat{E}G}_i = \frac{1}{T_i}\sum_{t=1}^{T_i} S\hat{E}G_{i,t}$ 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:

$$\begin{aligned} Cov(S\hat{E}G_{i,t}, \hat{\beta}_j x_{i,j,t}) &= \frac{1}{N}\sum_{i=1}^{N}\frac{1}{T_i}\sum_{t=1}^{T_i}\hat{\beta}_j(S\hat{E}G_{i,t} - \bar{S\hat{E}G}_t)(x_{i,j,t} - \bar{x}_{j,t}) \\ &+ \frac{1}{T_i}\sum_{t=1}^{T_i}\hat{\beta}_j(\bar{S\hat{E}G}_t - \bar{S\hat{E}G})(\bar{x}_{j,t} - \bar{x}_j) \end{aligned} \tag{18}$$

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

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Table 1

Summary Statistics by Country

Annual Segmentation

1980 - 2005

		Segmentation		Segmentation over time				Rank	Fixed Effect	
Country	Sample	Average	St. Dev.	Year of first observation	Average segmenation over first five years	Average segmentation 2001 - 2005	Change in segmentation	Rank based on average segmentation 2001 - 2005	Country fixed effect - accounting for year effects	Number of Firms (* as of 2006)
ARG	EM	5.3%	5.2%	1988	9.5%	4.9%	-48.4%	8	8.1%	26
AUS	DEV	1.9%	1.2%	1980	3.7%	1.2%	-68.5%	**48**	4.0%	160*
AUT	DEV	2.4%	0.7%	1980	2.4%	2.7%	11.1%	24	4.5%	50*
BEL	DEV	2.7%	1.7%	1980	4.5%	2.0%	-55.4%	39	4.8%	90*
BGD	EM	6.4%	2.2%	1998	7.6%	5.9%	-22.4%	6	9.5%	49
BRA	EM	6.1%	4.3%	1988	10.1%	4.8%	-52.4%	9	8.9%	74
CAN	DEV	2.3%	1.1%	1980	3.8%	1.7%	-54.6%	44	4.4%	250*
CHE	DEV	2.1%	1.4%	1980	4.5%	1.3%	-70.8%	**46**	4.2%	150*
CHL	EM	2.7%	1.9%	1989	3.8%	2.5%	-35.5%	28	5.6%	41
CHN	EM	2.3%	1.0%	1995	2.6%	2.1%	-18.1%	38	5.5%	215
CIV	EM	7.0%	1.9%	1998	7.6%	6.7%	-11.9%	**2**	10.0%	12
COL	EM	4.5%	3.0%	1986	7.4%	3.1%	-58.8%	18	7.1%	20
DEU	DEV	2.1%	1.0%	1980	3.2%	2.4%	-25.7%	29	4.3%	250*
DNK	DEV	3.5%	2.6%	1980	6.5%	1.3%	-80.6%	**47**	5.6%	50*
EGY	EM	6.0%	2.8%	1998	7.5%	6.1%	-18.4%	**4**	9.1%	51
ESP	DEV	2.0%	1.0%	1989	3.1%	1.5%	-52.2%	45	5.0%	120*
FIN	DEV	4.1%	2.9%	1990	7.3%	2.2%	-69.2%	35	7.2%	50*
FRA	DEV	2.4%	1.2%	1980	4.1%	2.0%	-51.9%	40	4.5%	250*
GBR	DEV	1.9%	1.2%	1980	4.2%	1.2%	-72.8%	**49**	4.0%	550*
GRC	EM	3.1%	2.0%	1991	4.5%	2.7%	-39.7%	22	6.3%	50*
IDN	EM	3.7%	1.4%	1991	2.8%	4.4%	57.5%	10	6.8%	57
IND	EM	3.2%	1.4%	1988	3.2%	2.7%	-13.8%	23	6.0%	100
IRL	DEV	2.7%	2.0%	1980	5.4%	1.7%	-67.8%	43	4.8%	50*
ISR	EM	2.3%	0.6%	1999	2.4%	2.2%	-7.4%	36	5.5%	50
ITA	DEV	2.2%	0.5%	1988	2.5%	1.9%	-23.9%	42	5.0%	160*
JAM	EM	8.7%	5.9%	1998	11.8%	5.1%	-56.7%	7	11.7%	19
JOR	EM	2.6%	1.6%	1988	3.1%	2.9%	-8.5%	21	5.4%	31
KEN	EM	5.3%	2.8%	1998	6.9%	4.1%	-40.0%	11	8.3%	18
KOR	EM	3.6%	1.6%	1988	4.0%	3.6%	-11.0%	14	6.4%	123
LKA	EM	6.1%	4.3%	1995	6.9%	3.4%	-50.5%	15	9.3%	40
MAR	EM	2.7%	1.1%	1998	2.9%	3.1%	4.6%	19	5.8%	11
MEX	EM	3.5%	3.6%	1988	5.8%	2.3%	-61.0%	34	6.3%	58
MYS	EM	3.1%	0.8%	1986	3.9%	2.4%	-38.7%	30	5.7%	92
NGA	EM	6.2%	3.7%	1986	11.1%	2.2%	-80.1%	37	8.8%	25
NLD	DEV	2.6%	1.3%	1980	4.2%	2.6%	-38.5%	25	4.7%	130*
NOR	DEV	5.6%	4.2%	1982	11.3%	3.4%	-70.0%	16	8.0%	50*
NZL	DEV	2.9%	1.4%	1990	2.7%	2.5%	-7.0%	27	6.0%	50*
PAK	EM	5.4%	5.2%	1988	4.3%	6.5%	50.4%	**3**	8.2%	51
PHL	EM	2.9%	0.9%	1990	3.4%	2.5%	-26.0%	26	6.0%	43
PRT	EM	2.2%	0.9%	1990	2.5%	2.3%	-8.9%	33	5.2%	50*
SGP	DEV	3.7%	2.5%	1980	8.2%	2.3%	-71.7%	32	5.8%	100*
SWE	DEV	2.8%	1.2%	1984	2.6%	2.4%	-10.0%	31	5.3%	70*
THA	EM	3.8%	1.8%	1988	2.7%	3.8%	39.9%	12	6.6%	56
TTO	EM	1.7%	0.6%	1998	1.6%	1.9%	16.6%	41	4.8%	11
TUN	EM	3.8%	1.5%	1998	4.6%	3.6%	-21.0%	13	6.8%	17
TUR	EM	3.8%	1.9%	1989	4.5%	3.1%	-32.0%	17	6.8%	41
USA	DEV	0.7%	0.2%	1980	0.6%	0.8%	23.6%	**50**	2.8%	1,000*
VEN	EM	6.8%	4.8%	1988	6.4%	10.0%	55.0%	**1**	9.6%	15
ZAF	EM	2.6%	1.2%	1980	3.5%	2.9%	-18.9%	20	4.7%	70*
ZWE	EM	10.3%	10.0%	1988	19.2%	6.0%	-68.6%	**5**	13.1%	22
Averages of country-level data										
DEV		2.7%	1.5%	1982	4.5%	1.9%	-45.0%	37	5.0%	
EM		4.4%	2.6%	1991	5.8%	3.9%	-20.1%	18	7.3%	
ALL		3.8%	2.2%	1988	5.3%	3.1%	-29.6%		6.4%	
Dispersion of country-level data										
DEV		1.0%	1.0%	3.86	2.4%	0.7%	31.1%		1.2%	
EM		2.1%	2.0%	5.10	3.7%	1.8%	35.4%		2.1%	
ALL		1.9%	1.8%	6.41	3.3%	1.8%	35.6%		2.1%	

The sample includes 19 developed (DEV) and 31 emerging-market (EM) countries detailed in Appendix Table 1. For each country, we report the time-series average and standard deviation of the annual (end of December) segmentation measure *SEG*. We also compare the average segmentation between 1980 and 1984 (or over the first five years for which segmentation data are available) to the average segmentation between 2001 and 2005, indicating the relative change in segmentation over time for each country as well as a country's segmentation rank based on the measured segmentation between 2001 and 2005. A rank of one indicates the highest degree of segmentation. Ranks one through five and 46 through 50 appear in bold. We regress the annual segmentation measure onto a set of country and year dummies and report the estimated fixed effect for each country. The last column reports for each country the number of firms used in the construction of *SEG*. For countries with data from Standard & Poors' Emerging Market Data Base (EMDB), we report the average number of firms over the sample period, for countries with data from Datastream, we only have the approximate number of firms Datastream used in 2006 to calculate country-specific indices. At the bottom of Table 1, we report the cross-sectional average and standard deviation of the country-level statistics reported in the upper part of the table.

Table 2

Summary Statistics by Industry

Annual Segmentation

1980 - 2005

	Segmentation		Segmentation over time			Rank		Fixed Effect
Industry	Average	St. Dev.	Average segmentation 1980 - 1984	Average segmentation 2001 - 2005	Change in segmentation	Rank based on average segmentation 1980 - 1984	Rank based on average segmentation 2001 - 2005	Industry fixed effect - accounting for year effects
Aerospace & Defense	3.0%	2.6%	3.4%	2.5%	-25.7%	26	**37**	3.7%
Automobiles & Parts	5.0%	1.6%	6.4%	4.9%	-24.0%	6	**5**	5.8%
Banks	5.2%	2.4%	8.9%	3.0%	-66.3%	**1**	33	5.9%
Beverages	3.5%	1.5%	4.4%	3.5%	-20.3%	20	27	4.2%
Chemicals	4.1%	1.6%	4.8%	3.9%	-18.0%	14	15	4.8%
Construction & Materials	3.6%	1.1%	4.4%	3.9%	-11.5%	19	16	4.4%
Electricity	3.9%	1.7%	6.1%	3.5%	-42.7%	8	25	4.7%
Electronic & Electrical Equipment	3.1%	1.1%	2.6%	3.2%	22.3%	**36**	31	3.8%
Equity Investment Instruments	4.5%	1.7%	4.4%	4.8%	9.2%	18	6	5.2%
Food & Drug Retailers	3.0%	1.3%	4.8%	2.8%	-41.9%	12	**36**	3.7%
Food Producers	3.4%	1.2%	3.5%	4.0%	12.2%	25	14	4.1%
Forestry & Paper	5.7%	2.2%	4.6%	6.1%	32.3%	15	**1**	6.4%
General Financial	4.6%	1.8%	3.2%	4.4%	36.8%	27	9	5.3%
General Industrials	4.0%	1.4%	4.3%	4.0%	-7.6%	21	13	4.8%
General Retailers	4.4%	2.8%	8.2%	4.1%	-50.4%	**3**	11	5.1%
Gas, Water & Multiutilities	2.6%	1.0%	2.9%	3.7%	28.3%	32	22	3.3%
Healthcare Equipment & Services	3.2%	1.6%	3.1%	3.8%	21.8%	28	19	3.9%
Household Goods	3.7%	1.7%	2.8%	3.8%	35.6%	33	17	4.4%
Industrial Engineering	4.0%	1.7%	6.2%	3.8%	-39.6%	7	20	4.7%
Industrial Metals	5.9%	1.8%	6.9%	5.4%	-20.8%	**5**	**2**	6.7%
Industrial Transportation	4.1%	1.5%	5.2%	4.5%	-13.4%	10	8	4.8%
Leisure Goods	4.6%	2.2%	4.4%	4.1%	-7.1%	17	10	5.3%
Life Insurance	5.1%	3.2%	8.5%	2.9%	-65.7%	**2**	**34**	5.8%
Media	3.0%	1.7%	4.8%	3.1%	-35.4%	13	32	3.7%
Mining	5.1%	2.1%	3.9%	5.2%	31.4%	23	**4**	5.8%
Nonlife Insurance	4.8%	2.0%	7.3%	4.1%	-44.8%	**4**	12	5.5%
Oil Equipment & Services	3.3%	1.7%	3.8%	3.7%	-3.6%	24	24	4.0%
Oil & Gas Producers	4.2%	1.3%	5.1%	3.7%	-28.5%	11	23	4.9%
Personal Goods	4.5%	2.4%	2.2%	4.7%	117.8%	**37**	7	5.3%
Pharmaceuticals & Biotechnology	3.0%	1.2%	3.0%	3.5%	16.1%	31	26	3.7%
Real Estate	3.6%	1.2%	4.1%	3.7%	-10.6%	22	21	4.3%
Software & Computer Services	2.7%	1.6%	2.8%	1.9%	-33.2%	**34**	**38**	3.4%
Support Services	3.0%	1.8%	3.0%	3.2%	6.7%	29	30	3.8%
Technology Hardware & Equipment	3.2%	1.3%	1.7%	3.3%	95.5%	**38**	29	3.9%
Fixed Line Telecommunications	3.5%	1.6%	5.3%	3.8%	-28.1%	9	18	4.3%
Mobile Telecommunications	2.8%	1.1%	4.5%	2.8%	-37.7%	16	**35**	3.6%
Tobacco	3.7%	1.5%	3.0%	3.4%	11.4%	30	28	4.4%
Travel & Leisure	4.0%	1.9%	2.8%	5.4%	92.4%	**35**	**3**	4.8%
Average of industry-level data	3.9%	1.7%	4.5%	3.8%	-2.8%			4.6%
Dispersion of industry-level data	0.9%	0.5%	1.8%	0.9%	41.9%			0.9%

For each of the 38 industries in our sample, we report the time-series average and standard deviation of the annual (end of December) industry segmentation. Industry segmentation is measured as the equally weighted cross-sectional average of the absolute difference between a country-specific industry valuation and the corresponding global industry valuation. We also compare the average industry segmentation between 1980 and 1984 to the average segmentation between 2001 and 2005, indicating the relative change in segmentation over time for each industry as well as an industry's segmentation rank 1980 and 1984 and between 2001 and 2005. A rank of one indicates the highest degree of segmentation. Ranks one through five and 34 through 38 appear in bold. We regress the annual segmentation measure onto a set of industry and year dummies and report the estimated fixed effect for each industry. At the bottom of Table 2, we report the cross-sectional average and standard deviation of the industry-level statistics reported in the upper part of the table.

Table 3

Segmentation for the U.S. Benchmark

100 Random Samples of 50 "Countries"

1973 - 2006

	Percentile				
Distribution of coefficient estimates	5th	10th	50th	90th	95th
Trend x 100	-0.0208	-0.0190	-0.0132	-0.0081	-0.0070
Number of Public Firms (log)	-0.0034	-0.0032	-0.0026	-0.0021	-0.0020
Abs. Difference in Financial Leverage (|Local - US|)	0.0033	0.0052	0.0220	0.0407	0.0427
Abs. Difference in Log Earnings Growth Volatility (|Local - US|)	0.0027	0.0036	0.0068	0.0108	0.0121
Distribution of *t* - stats	5th	10th	50th	90th	95th
Trend	-6.956	-6.366	-4.427	-2.407	-0.668
Number of Public Firms (log)	-12.316	-11.814	-9.329	-6.554	-4.526
Abs. Difference in Financial Leverage (|Local - US|)	0.478	0.625	2.652	4.239	7.134
Abs. Difference in Log Earnings Growth Volatility (|Local - US|)	1.517	1.749	3.222	6.036	7.709

Using annual data for U.S. firms between 1973 and 2006, we construct 100 random samples, each of which resembles our actual data set of 50 countries with respect to the cross-sectional and temporal variation in the number of firms used. For each random sample and each "country" within such a set, we compute the segmentation measure as we do for the actual data, with the U.S. market playing the role of the world market. For each sample, we regress the annual "country"-level segmentation measure on the following control variables: 1) a time trend, 2) the natural logarithm of the number of firms that are used in the construction of the segmentation measure for a given "country" in a given year, 3) the absolute difference between the industry leverage in a given "country" and the U.S. market as a whole, averaged across all industries in a given "country" and year, and 4) the absolute difference between the industry log earnings growth rate volatility in a given "country" and the U.S. market as a whole, averaged across all industries in a given "country" and year. We report the distribution of coefficient estimates and *t*-statistics from the 100 pooled OLS regressions. The reported *t*-statistics account for serial correlation by "country" and contemporaneous correlation across "countries".

Table 4
Trends in Segmentation

Panel A: All Countries (1980 - 2005)

	I	II
Trend	**-0.0007**	**-0.0008**
	(0.0003)	(0.0002)
Number of Public Firms (log)		**-0.0058**
		(0.0019)
Abs. Difference in Financial		0.0564
Leverage (|Local - Global|)		(0.0508)
Abs. Difference in Log Earnings		**0.1279**
Growth Volatility (|Local - Global|)		(0.0276)
N	906	906
R^2	0.02	0.16

Panel B: Developed Countries (1980 - 2005)

	I	II
Trend	**-0.0012**	**-0.0012**
	(0.0003)	(0.0002)
Number of Public Firms (log)		**-0.0030**
		(0.0010)
Abs. Difference in Financial		0.0902
Leverage (|Local - Global|)		(0.0624)
Abs. Difference in Log Earnings		**0.1607**
Growth Volatility (|Local - Global|)		(0.0451)
N	451	451
R^2	0.19	0.41

Panel C: Emerging Market Countries (1988 - 2005)

	I	II
Trend	-0.0012	-0.0011
	(0.0008)	(0.0007)
Number of Public Firms (log)		**-0.0059**
		(0.0030)
Abs. Difference in Financial		0.0050
Leverage (|Local - Global|)		(0.0653)
Abs. Difference in Log Earnings		**0.0669**
Growth Volatility (|Local - Global|)		(0.0295)
N	441	441
R^2	0.02	0.07

The sample includes 19 developed and 31 emerging-market countries detailed in Table 1. We regress the annual country-level segmentation measure *SEG* onto the following control variables: 1) a time trend, 2) the natural logarithm of the number of publicly traded firms in a given country and year, 3) the absolute difference between the industry leverage in a given country and the world market as a whole, averaged across all industries in a given country and year, and 4) the absolute difference between the industry log earnings growth rate volatility in a given country and the world market as a whole, averaged across all industries in a given country and year. Panel A reports results for our entire sample, Panel B for developed countries only, and Panel C for emerging market countries (for comparability with Figure 1, we drop emerging market observations prior to 1988). We report coefficient estimates from pooled OLS regressions. Reported standard errors in parentheses account for serial correlation by country and contemporaneous correlation across countries. We also perform Prais-Winsten regressions and calculate panel corrected standard errors. Bold coefficient estimates denote statistical significance at the 5% level under the panel OLS specification. Underlined coefficient estimates denote statistical significance under the Prais-Winsten specification. *N* denotes the number of country-years and R^2 denotes the coefficient of determination.

Table 5
Market Segmentation Determinants
1980 - 2005

Panel A: Equity Market Openness

	I	II	III	IV	V
Equity Market Openness	**-0.0282**		**-0.0228**	**-0.0253**	**-0.0212**
	(0.0070)		(0.0062)	(0.0063)	(0.0055)
Trade Openness		**-0.0289**	-0.0151	-0.0122	-0.0092
		(0.0117)	(0.0116)	(0.0117)	(0.0107)
Trend				**-0.0008**	**-0.0009**
				(0.0003)	(0.0003)
Number of Public Firms (log)					**-0.0045**
					(0.0016)
Abs. Difference in Financial Leverage (|Local - Global|)					0.0339
					(0.0530)
Abs. Difference in Log Earnings Growth Volatility (|Local - Global|)					**0.1121**
					(0.0277)
N	906	906	906	906	906
R^2	0.11	0.07	0.13	0.15	0.24

Panel B: Capital Account Openness

	I	II	III	IV	V
Capital Account Openness	**-0.0331**		**-0.0296**	**-0.0296**	**-0.0202**
	(0.0086)		(0.0080)	(0.0083)	(0.0071)
Trade Openness		**-0.0185**	-0.0076	-0.0063	-0.0063
		(0.0087)	(0.0091)	(0.0092)	(0.0072)
Trend				**-0.0006**	**-0.0007**
				(0.0003)	(0.0003)
Number of Public Firms (log)					**-0.0047**
					(0.0011)
Abs. Difference in Financial Leverage (|Local - Global|)					0.0478
					(0.0437)
Abs. Difference in Log Earnings Growth Volatility (|Local - Global|)					**0.1074**
					(0.0279)
N	880	880	880	880	880
R^2	0.08	0.03	0.09	0.11	0.23

The sample includes 19 developed and 31 (29 in Panel B) emerging-market countries detailed in Table 1. We regress the annual country-level segmentation measure *SEG* onto the following variables: 1) the degree of equity market openness (investability) (Panel A) or a continuous measure of the degree of capital account openness from Quinn (only 48 countries are available) (Panel B), 2) a 0/1 indicator of trade openness based on trade liberalization dates from Wacziarg and Welch (2003), 3) a time trend, 4) the natural logarithm of the number of publicly traded firms in a given country and year, 5) the absolute difference between the industry leverage in a given country and the world market as a whole, averaged across all industries in a given country and year, and 6) the absolute difference between the industry log earnings growth rate volatility in a given country and the world market as a whole, averaged across all industries in a given country and year. We report coefficient estimates from pooled OLS regressions. Reported standard errors in parentheses account for serial correlation by country and contemporaneous correlation across countries. We also perform Prais-Winsten regressions and calculate panel corrected standard errors. Bold coefficient estimates denote statistical significance at the 5% level under the panel OLS specification. Underlined coefficient estimates denote statistical significance under the Prais-Winsten specification. *N* denotes the number of country-years and R^2 denotes the coefficient of determination.

Table 6

Determinants of Market Segmentation

1980 - 2005

	Equity Market Openness		**Capital Account Openness**	
	Main Specification	Additional Specification	Main Specification	Additional Specification
Trend		0.0006 (0.0004)		0.0004 (0.0003)
Capital Account Openness			**-0.0164** (0.0055) [-0.0181, -0.0035]	**-0.0114** (0.0047)
Equity Market Openness	**-0.0149** (0.0047) [-0.0195, -0.0064]	-0.0071 (0.0043)		
Trade Openness	-0.0082 (0.0102) [-0.0134, -0.0036]	-0.0073 (0.0099)	-0.0014 (0.0073) [-0.0052, 0.0038]	-0.0018 (0.0076)
Trade/GDP				**0.0035** (0.0015)
Investment Profile	**-0.0277** (0.0065) [-0.0328, -0.0074]	**-0.0279** (0.0097)	**-0.0300** (0.0070) [-0.0353, -0.0082]	**-0.0371** (0.0100)
Legal Origin (French)		-0.0056 (0.0033)	-0.0042 (0.0038) [-0.0090, -0.0007]	
Local Equity Market Illiquidity		0.0248 (0.0142)		
MYY R^2 Synchronicity		0.0506 (0.0273)		
MCAP/GDP	-0.0056 (0.0033) [-0.0145, -0.0060]	**-0.0068** (0.0033)	-0.0054 (0.0033) [-0.0130, -0.0048]	**-0.0058** (0.0024)
U.S. Money Supply Growth			**0.1026** (0.0382) [0.0225, 0.1821]	
World GDP Growth	**0.2315** (0.1090) [-0.1029, 0.2339]	**0.2590** (0.1140)		**0.2654** (0.1100)
U.S. Corporate Bond Spread	**2.0605** (0.4360) [0.9646, 2.3691]	**2.2806** (0.5430)	**1.6139** (0.3210) [1.0317, 2.5450]	**2.6339** (0.4340)
VIX Option Volatility Index	**0.0465** (0.0148) [-0.0048, 0.0551]		**0.0471** (0.0099) [-0.0045, 0.0611]	**0.0438** (0.0100)
Abs. Difference in Log Earnings Growth Volatility (|Local - Global|)	**0.0911** (0.0306) [0.0905, 0.1320]	**0.0781** (0.0296)	**0.1044** (0.0280) [0.1003, 0.1299]	**0.0925** (0.0235)
Number of Public Firms (log)	**-0.0042** (0.0015) [-0.0069, -0.0040]	-0.0022 (0.0012)	**-0.0044** (0.0013) [-0.0054, -0.0032]	**-0.0025** (0.0010)
N	906	820	880	802
R^2	0.30	0.30	0.33	0.31

The sample includes (from left to right in the Table): 19/13/19/13 developed and 31/26/29/25 emerging-market countries detailed in Table 1. We regress the annual country-level segmentation measure *SEG* onto the independent variables that have survived the model reduction algorithm (see Appendix Table 3). For a detailed description of all variables, see Appendix Table 2. We report coefficient estimates from pooled OLS regressions. Reported standard errors in parentheses account for serial correlation by country and contemporaneous correlation across countries. We also perform Prais-Winsten regressions and calculate panel corrected standard errors. Bold coefficient estimates denote statistical significance at the 5% level under the panel OLS specification. Underlined coefficient estimates denote statistical significance under the Prais-Winsten specification. Finally, beneath the standard errors (for the main specifications only) in brackets we provide a confidence interval for each entry. These are derived from a jackknife experiment where, for each surviving variable separately, we randomly sample from the 27 *other* possible variables (noted in Appendix Table 3) for which we have full sample data. The number of additional variables and their identities are completely random, but we force the selection of between 8 and 27 additional variables. For this set of explanatory variables, we perform a regression with *SEG* as the dependent variable, throw out variables with *t*-statistics below 1, and perform a regression on the remaining set. For each case, we retain the regression coefficient. We iterate this procedure 1,000 times for each variable separately. The 5 and 95% percentiles are presented in the brackets. *N* denotes the number of country-years and R^2 denotes the coefficient of determination.

Table 7

Contribution of Market Segmentation Determinants

1980-2005

Panel A: Equity Market		Variance Decomposition				
	Effect on Segmentation	Overall Contribution	y_{it}-y_i (TS)	remainder (CS)	y_{it}-y_t (CS)	remainder (TS)
Equity Market Openness	-0.0075	0.192	0.040	0.152	0.191	0.001
		[0.095, 0.321]				
Trade Openness	-0.0016	0.056	0.012	0.044	0.053	0.003
		[0.028, 0.133]				
Investment Profile	-0.0038	0.152	0.063	0.089	0.146	0.006
		[0.049, 0.238]				
MCAP/GDP	-0.0010	0.100	0.043	0.057	0.087	0.013
		[0.105, 0.324]				
World GDP Growth	0.0031	-0.009	-0.009			-0.009
		[-0.009, 0.005]				
U.S. Corporate Bond Spread	0.0098	0.141	0.141			0.141
		[0.077, 0.195]				
VIX Option Volatility Index	0.0034	0.034	0.034			0.034
		[-0.004, 0.049]				
Abs. Diff. in Log Earnings Growth Volatility (|Local - Global|)	-0.0038	0.195	0.087	0.108	0.207	-0.011
		[0.178, 0.304]				
Number of Public Firms (log)	-0.0017	0.138	0.015	0.122	0.138	-0.001
		[0.141, 0.292]				
N	906					
R^2	0.30					

We further analyze the main specifications from Table 7. Panel A reports results for Equity Market Openness and Panel B for Capital Account Openness. In each panel and for each segmentation determinant, we first report the product of the coefficient estimate and either the difference between the average value for developed countries and the average value for emerging market countries or, in the case of variables that vary only over time, one standard deviation of that variable. We then report results from a variance decomposition. In particular, we report the contribution of each variable to the variation of the predicted degree of segmentation, defined as the ratio of the covariance between the given variable and the predicted degree of segmentation relative to the variance of the predicted degree of segmentation. We further distinguish between the time-series (TS) and cross-sectional (CS) component of this overall contribution in two different ways. For details on this distinction, see the corresponding chapter of the paper. Finally, beneath the estimated over all contribution in brackets we provide a confidence interval for each entry. These are derived from a jackknife experiment where, for each surviving variable separately, we randomly sample from the 27 *other* possible variables (noted in Appendix Table 3) for which we have full sample data. The number of additional variables and their identities are completely random, but we force the selection of between 8 and 27 additional variables. For this set of explanatory variables, we perform a regression with *SEG* as the dependent variable, throw out variables with *t*-statistics below 1, and perform a regression on the remaining set. For each case, we retain the overall contribution that the particular variable makes for predicted segmentation. We iterate this procedure 1,000 times for each variable separately. The 5 and 95% percentiles are presented in the brackets. Last, *N* denotes the number of country-years and R^2 denotes the coefficient of determination.

Table 7 (continued)

Panel B: Capital Account		Variance Decomposition				
	Effect on Segmentation	Overall Contribution	y_{it}-y_i (TS)	remainder (CS)	y_{it}-y_t (CS)	remainder (TS)
Capital Account Openness	-0.0058	0.123 [0.03, 0.191]	0.032	0.091	0.125	-0.001
Trade Openness	-0.0002	0.005 [-0.02, 0.032]	0.001	0.003	0.004	0.000
Investment Profile	-0.0038	0.161 [0.053, 0.256]	0.079	0.081	0.153	0.007
Legal Origin (French)	0.0013	-0.011 [-0.031, -0.003]		-0.011	-0.017	
MCAP/GDP	-0.0009	0.110 [0.091, 0.345]	0.052	0.058	0.093	0.016
U.S. Money Supply Growth	0.0036	0.040 [0.013, 0.103]	0.048			0.040
U.S. Corporate Bond Spread	0.0077	0.149 [0.109, 0.296]	0.182			0.149
VIX Option Volatility Index	0.0034	0.049 [-0.005, 0.078]	0.040			0.049
Abs. Diff. in Log Earnings Growth Volatility (|Local - Global|)	-0.0043	0.224 [0.215, 0.36]	0.106	0.118	0.237	-0.013
Number of Public Firms (log)	-0.0016	0.149 [0.116, 0.268]	0.020	0.129	0.152	-0.003
N	880					
R^2	0.33					

Figure 1
Average Segementation Measure: Developed Countries and Emerging Markets
1973 - 2005

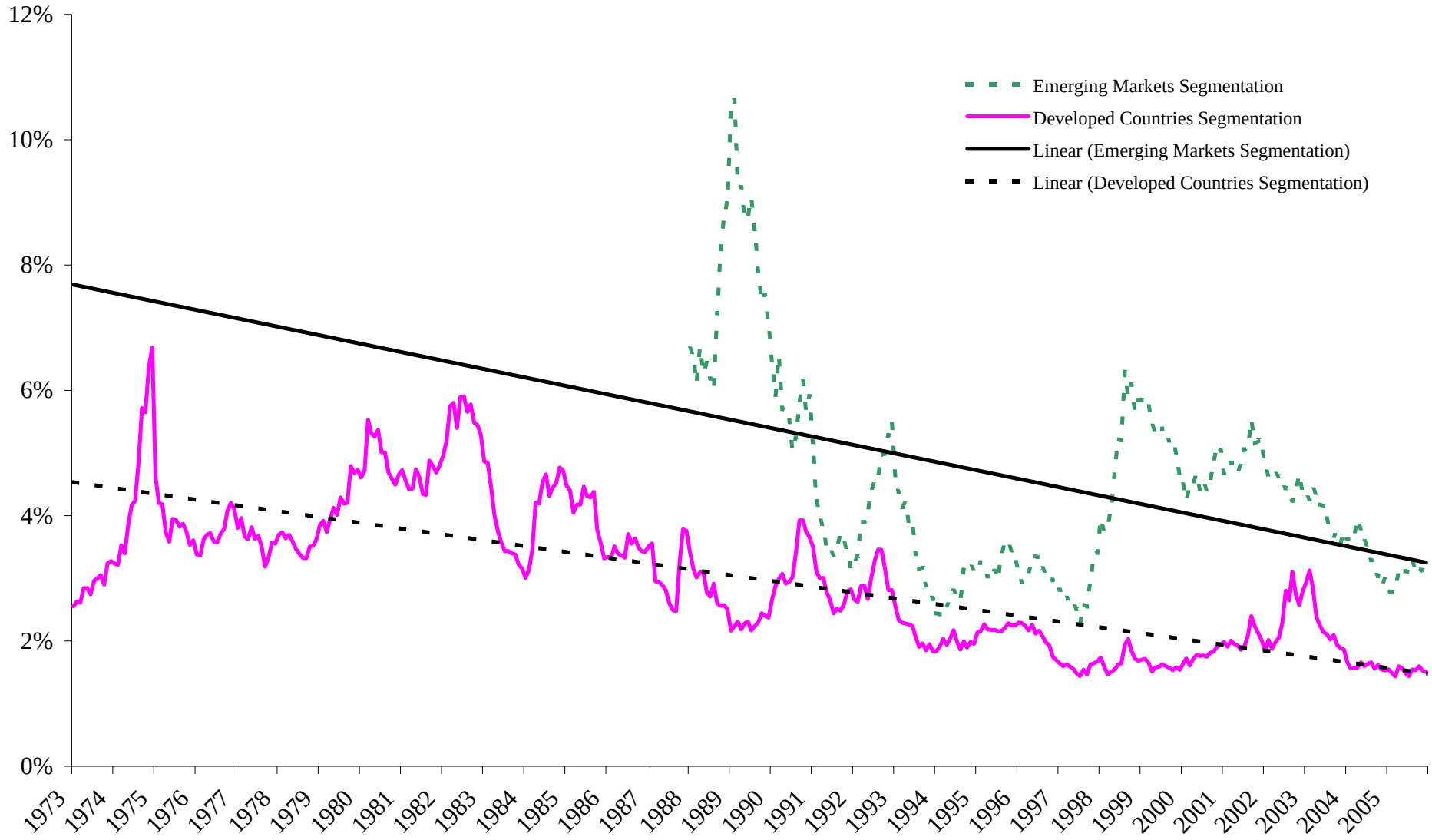
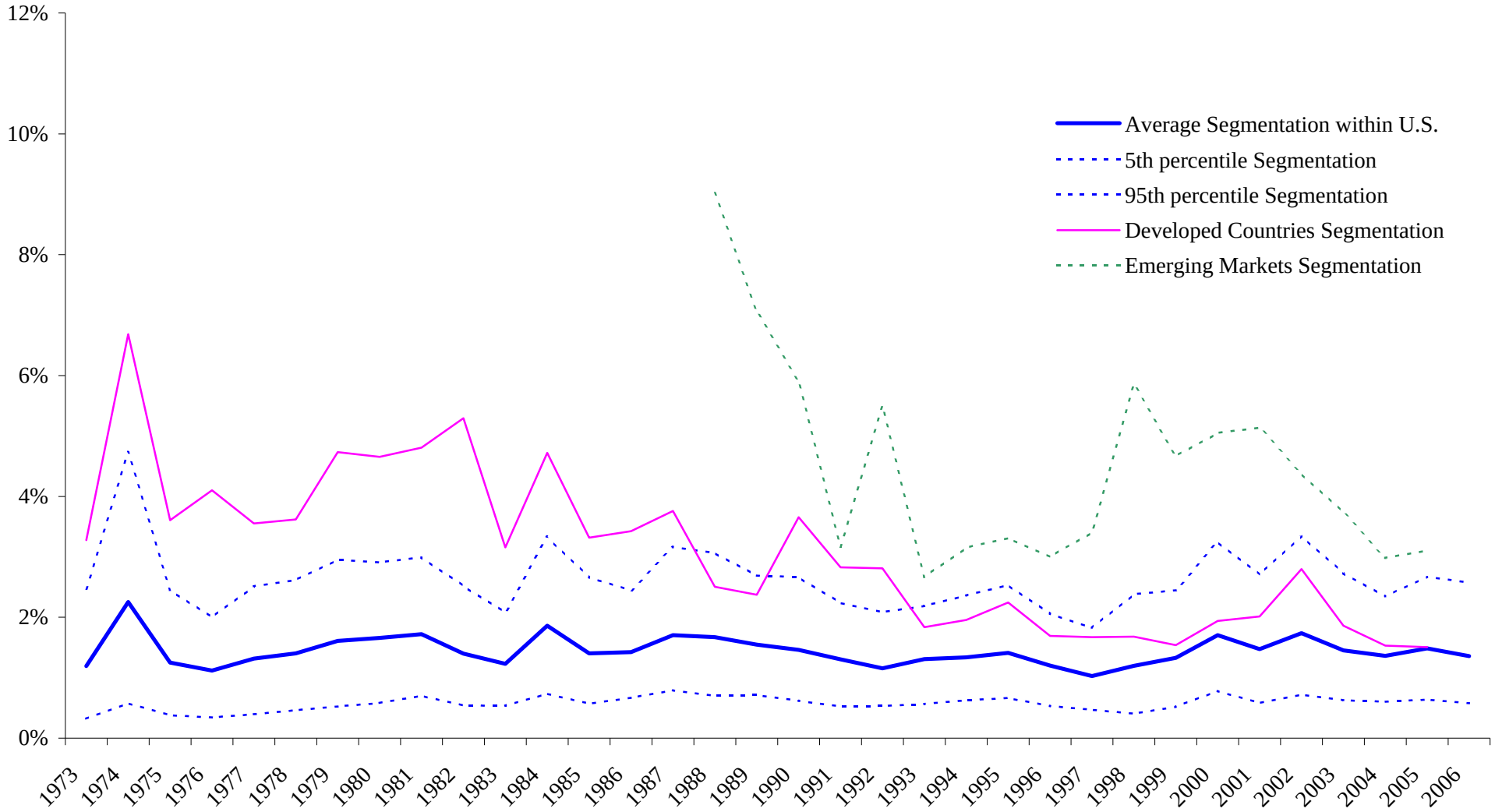


Figure 2
Benchmarking the Segmentation Measure: Segmentation within the U.S., 1973 - 2006
100 Random Samples of 50 "Countries"



Appendix Table 1

Data Availability

Developed				Emerging			
Source	**Code**	**Name**	***SEG* data start**	**Source**	**Code**	**Name**	***SEG* 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	NLD	Netherlands	197301	EMDB	IDN	Indonesia	198912
DS	NZL	New Zealand	198801	EMDB	ISR	Israel	199701
DS	NOR	Norway	198001	EMDB	JAM	Jamaica	199601
DS	SGP	Singapore	197301	EMDB	JOR	Jordan	198607
DS	ESP	Spain	198703	EMDB	KEN	Kenya	199601
DS	SWE	Sweden	198201	EMDB	KOR	Korea	198601
DS	CHE	Switzerland	197301	EMDB	MYS	Malaysia	198412
DS	GBR	United Kingdom	197301	EMDB	MEX	Mexico	198604
DS	USA	United States	197301	EMDB	MAR	Morocco	199601
				EMDB	NGA	Nigeria	198412
				EMDB	PAK	Pakistan	198601
				EMDB	PHL	Philippines	198412
				DS	PRT	Portugal	198801
				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 1 lists the source of the data used in the construction of the measure of segmentation *SEG*: Datastream (DS) or Standard & Poors' Emerging Market Data Base (EMDB). The table also lists the country code and the corresponding country name as well as the first year for which the segmentation measure is available. In our analysis, we generally only include observations after 1979 for which our main independent variables are available. Due to the calculations of the volatility of log earning growth, a country with data availability starting after 1977 is included in our analysis with a delay of two years. For Figures 1 and 2, we report observations prior to 1980. For those early years, we include all data points available.

Appendix Table 2
Description of all Variables

Variable	Description
SEG	*SEG* measures the valueweighted average of the absolute difference between a country's local industry earnings yields and the corresponding global industry earnings yields. Available for all countries. For details, see sections 2 and 3. Frequency: Monthly and Annual. Sources: *Datastream and Standard & Poors' Emerging Market Data Base.*
Openness	
Capital account openness	Quinn's capital account openness measure is created from the text of the annual volume published by the International Monetary Fund (IMF), *Exchange Arrangements and Exchange Restrictions.* 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. Frequency: Annual
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. Frequency: Annual
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. Frequency: Annual. Source: *World Bank Development Indicators* .
Trade openness	We obtain the trade liberalization dates developed in Wacziarg and Welch (2003). Wacziarg and Welch look at five factors: average tariff rates of 40% or 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. Frequency: Annual.
Trade/GDP	The sum of exports and imports of goods and services measured as a share of gross domestic product. Frequency: Annual. Source: *World Bank Development Indicators* .
Political Risk and Institutions	
Quality of institutions	The sum of ICRG subcomponents: Corruption, Law and Order, and Bureaucratic Quality. Available for all countries. Frequency: Annual.
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 such 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. Frequency: Annual.
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. Frequency: Annual.

Appendix 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 given to countries where the bureaucracy has the strength and expertise to govern without drastic changes in policy or 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. Frequency: Annual.
Investment profile	ICRG political risk sub-component. Investment Profile reflects 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. Available for all countries. Frequency: Annual.
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. Available for all countries. Frequency: Annual.
Legal origin	Identifies the legal origin of the company law or commercial code of each country (English, French, Socialist, German, Scandinavian). We construct three indicators that take the value of one when the legal origin is Anglo-Saxon (English law), French (French law), or other (law other), and zero otherwise. This variable is purely cross-sectional and available for all countries. The source is La Porta, Lopez-di-Silanes, Shleifer, and Vishny (1999). Available for all countries.
Financial Development	
Illiquidity	Following Lesmond, Ogden, and Trzcinka (1999), Lesmond (2005), and Bekaert, Harvey, and Lundblad (2007), 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 all firms, and average this proportion over the year. Available for 46 countries. Frequency: Annual.
Equity market turnover	The ratio of equity market value traded to the market capitalization. The data are available for all countries. Frequency: Annual. Source: Standard and Poor's/International Finance Corporation's *Emerging Stock Markets Factbook & World Bank Development Indicators.*
MYY R^2 synchronicity	Equity market synchronicity as developed in Morck, Yeung, and Yu (2000). The measure is an annual value-weighted local market model R^2 obtained from each firm's daily returns regressed on the local market portfolio return for that year. Available for 47 countries. Frequency: Annual
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. Frequency: Annual. Source: *World Bank Development Indicators* .
MCAP/GDP	Equity market capitalization divided by gross domestic product. Available for all countries. Frequency: Annual. Source: *World Bank Development Indicators* .
Risk Appetite and Business Cycle	
G7 real rate	Weighted average real short term interest rate in G7 countries: the prime lending interest rate adjusted for inflation as measured by the GDP deflator. Frequency: Annual.
U.S. money supply growth	Annual growth in money supply (M2) for the United States. Frequency: Annual. 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 Campbell and Cochrane (1999). Frequency: Annual. Source: *Bekaert and Engstrom (2008).*
World GDP growth	Growth of real world per capita gross domestic product. Frequency: Annual. Source: *World Bank Development Indicators.*
U.S. corporate bond spread	The yield spread between U.S. BAA and AAA rated bonds obtianed from the Federal Reserve Board. Frequency: Annual.

Appendix Table 2
(Continued)

Variable	Description
VIX option volatility index	The VIX option volatility index available from the CBOE (www.cboe.com). The Deecember value of the volatility index is used for each year. The volatility index covers 1986 to the present, before which we take the square root of the average daily squared CRSP U.S. total market return over the year to extend the index back to 1980. Frequency: Annual.
Past local equity market return	The lagged annual return, from December to December, on the country-level market portfolio. Available for all counries. Frequency: Annual. Sources: *Datastream and Standard & Poors' Emerging Market Data Base.*
World equity market 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. Frequency: Annual. Source: *Datastream.*
Information Variables	
Phone lines per 100 people	Number of fixed lines and mobile phone subscribers per 100 people. Available for all countries and years. Frequency: Annual. Source: *World Bank Development Indicators* .
Internet users per 100 people	Number of internet users per 100 people. Available for all countries and years. Frequency: Annual. Source: *World Bank Development Indicators* .
International voice traffic	The number of minutes of international phone calls per person. Available for a subset of countries and years. Frequency: Annual. Source: *World Bank Development Indicators.*
Growth Determinants	
Initial log GDP	Logarithm of real per capita gross domestic product reset every five years in 1980, 1985, 1990, 1995, and 2000. Source: *World Bank Development Indicators.*
Secondary school enrollment	Secondary school enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the secondary level of education. Accordingly, the reported value can exceed (or average) more than 100%. Available for all countries. Frequency: Annual. Source: *World Bank Development Indicators.*
Log life expectancy	Growth rate of total population which counts all residents regardless of legal status or citizenship. Available for all countries. Frequency: Annual. Source: *World Bank Development Indicators.*
Population growth	Life expectancy at birth indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life. Available for all countries. Frequency: Annual. Source: *World Bank Development Indicators.*
Controls	
Number of public firms (log)	The log of the number of publicly traded firms in a given country. Frequency: Annual. Source: *World Bank Development Indicators.*
Number of public firms (log) (U.S. benchmark)	The natural logarithm of the number of U.S. public firms used in the construction of the segmentation measure for a given state or "country" in a given year. Frequency: Annual.
Abs. difference in financial leverage (|Local - Global|)	We obtain annual accounting data for all public firms contained in Bureau van Dijk's OSIRIS data base. For industrial firms, we define financial leverage as the ratio of long term interest bearing debt to total assets. For financial firms, we define financial leverage as the ratio of total liabilities to total assets. Weighting each observation by total assets, we aggregate this ratio across all firms per industry, country and year. Since coverage is limited in time and across industries and countries, we use linear regressions based on country dummies, industry dummies, private credit over GDP as well as industry return volatility to predict industry leverage when leverage data are not available. We then take the absolute difference between local industry leverage and the corresponding global industry leverage which we calculate as the weighted average across all firms around the world in a given industry. Finally, for each country and year we average this absolute leverge difference across all industries in a country using an industry's market value as its weight. Available for all countries. Frequency: Annual.

Appendix Table 2
(Continued)

Variable	Description
Abs. difference in financial leverage (|Local - US|)	Used in the U.S. Benchmark Analysis Industry leverage is the ratio of long term debt, data item 9 in Compustat, summed over all firms in a given industry and state/"country", to total assets, data item 6 in Compustat, summed over all firms in a given industry and state/"country". We use an industry's equity market value to average the absolute differences between state/"country" and U.S. market leverage across all industries in a given state/"country". Frequency: Annual. Used in robustness when differentials are measured relative to U.S. earnings yields We obtain annual accounting data for all public firms contained in Bureau van Dijk's OSIRIS data base. For industrial firms, we define financial leverage as the ratio of long term interest bearing debt to total assets. For financial firms, we define financial leverage as the ratio of total liabilities to total assets. Weighting each observation by total assets, we aggregate this ratio across all firms per industry, country and year. Since coverage is limited in time and across industries and countries, we use linear regressions based on country dummies, industry dummies, private credit over GDP as well as industry return volatility to predict industry leverage when leverage data are not available. We then take the absolute difference between local industry leverage and the corresponding U.S. industry leverage. Finally, for each country and year we average this absolute leverge difference across all industries in a country using an industry's market value as its weight. Available for all countries. Frequency: Annual.
Abs. difference in log earnings growth volatility (|Local - Global|)	We measure log earnings growth volatility by calculating the five-year standard deviation of quarterly log growth rates of 12-month earnings for all industries at the country and global level. We require at least eight quarters of data for the calculation. We then form the weighted average of the absolute difference between local and global industry log earnings growth volatility for each country and year, where we use industry market values as weights. Available for all countries. Frequency: Annual.
Abs. difference in log earnings growth volatility (|Local - US|)	Used in the U.S. Benchmark Analysis We calculate the volatility of log industry earnings growth each December by aggregating quarterly firm-level earnings across firms with consecutive earnings data in a given industry and state/"country", taking the log of the growth rate in industry earnings and calculating the standard deviation of the log growth rate over the past 20 quarters, as long as we have non-missing data for at least eight quarters. We use an industry's equity market value to average the absolute differences between state/"country" and U.S. market log earnings growth volatility across all industries in a given state/"country". Frequency: Annual. Used in robustness when differentials are measured relative to U.S. earnings yields We measure log earnings growth volatility by calculating the five-year standard deviation of quarterly log earnings growth rate for all industries at the country. We require at least eight quarters of data for the calculation. We then form the weighted average of the absolute difference between local and U.S. industry log earnings growth volatility for each country and year, where we use industry market values as weights. Available for all countries. Frequency: Annual.

While the list is long, we considered several other potentially useful measures, such as earnings expectations, measures of regulatory conditions and labor market frictions, accounting standards and earnings management, etc., but had to drop them because of data limitations.

Appendix Table 3
Model Reduction
1980 - 2005

	Equity Market Openness				**Capital Account Openness**			
	Main Specification (*N* =906)		**Additional Specification (*N* =820)**		**Main Specification (*N* =880)**		**Additional Specification (*N* =802)**	
Candidate Variables	General Unrestricted Model	Sign of Selected Variables	General Unrestricted Model	Sign of Selected Variables	General Unrestricted Model	Sign of Selected Variables	General Unrestricted Model	Sign of Selected Variables
Constant	**Fixed**	**Positive**	**Fixed**	**Negative**	**Fixed**	**Positive**	**Fixed**	**Negative**
Trend	**X**		**X**	**Positive**	**X**		**X**	**Positive**
Openness								
Capital Account Openness					**X**	**Negative**	**Fixed**	**Negative**
Equity Market Openness	**X**	**Negative**	**Fixed**	**Negative**				
Trade Openness	**Fixed**	**Negative**	**Fixed**	**Negative**	**Fixed**	**Negative**	**Fixed**	**Negative**
Gross FDI/GDP			**X**				**X**	
Trade/GDP	**X**		**X**		**X**		**X**	**Positive**
Political Risk and Institutions								
Quality of Institutions	**X**		**X**		**X**		**X**	
Investment Profile	**X**	**Negative**	**X**	**Negative**	**X**	**Negative**	**X**	**Negative**
Law and Order	**X**		**X**		**X**		**X**	
Insider Trading Law	**X**		**X**		**X**		**X**	
Insider Trading Prosecution	**X**		**X**		**X**		**X**	
Legal Origin (English)	**X**		**X**		**X**		**X**	
Legal Origin (French)	**X**		**X**	**Negative**	**X**	**Negative**	**X**	
Financial Development								
Local Equity Market Illiquidity			**X**	**Positive**			**X**	
Local Equity Market Turnover	**X**		**X**		**X**		**X**	
MYY R^2 Synchronicity			**X**	**Positive**			**X**	
Private Credit/GDP	**X**		**X**		**X**		**X**	
MCAP/GDP	**X**	**Negative**	**X**	**Negative**	**X**	**Negative**	**X**	**Negative**
Risk Appetite and Business Cycles								
G7 Real Rate	**X**		**X**		**X**		**X**	
U.S. Money Supply Growth	**X**		**X**		**X**	**Positive**	**X**	
U.S. Risk Aversion	**X**		**X**		**X**		**X**	
World GDP Growth	**X**	**Positive**	**X**	**Positive**	**X**		**X**	**Positive**
U.S. Corporate Bond Spread	**X**	**Positive**	**X**	**Positive**	**X**	**Positive**	**X**	**Positive**
VIX Option Volatillity Index	**X**	**Positive**	**X**		**X**	**Positive**	**X**	**Positive**
Past Local Equity Market Return			**X**				**X**	
World Equity Market Volatility	**X**		**X**		**X**		**X**	
Information Variables								
Phone Lines per 100 people	**X**		**X**		**X**		**X**	
Internet Users per 100 people	**X**		**X**		**X**		**X**	
Growth Determinants								
Initial Log GDP	**X**		**X**		**X**		**X**	
Secondary School Enrollment	**X**		**X**		**X**		**X**	
Log Life Expectancy	**X**		**X**		**X**		**X**	
Population Growth	**X**		**X**		**X**		**X**	
Controls								
Abs. Difference in Financial Leverage (|Local - Global|)	**X**		**X**		**X**		**X**	
Abs. Difference in Log Earnings Growth Volatility (|Local - Global|)	**X**	**Positive**	**X**	**Positive**	**X**	**Positive**	**X**	**Positive**
Number of Public Firms (log)	**X**	**Negative**	**X**	**Negative**	**X**	**Negative**	**X**	**Negative**
Number of Variables	30	9	34	12	30	10	34	11

Appendix Table 3 lists the independent variables that are part of the unrestricted econometric model (marked by **X** or **Fixed** – **Fixed** indicates that a variable was forced to survive the reduction process) as well as those that survive the model reduction algorithm (marked by **Positive / Negative** – indicating the sign of the estimated coefficient). The dependent variable is the measured degree of segmentation *SEG*. For a detailed description of all variables, see Appendix Table 2. *N* denotes the number of country-years.