Stock Market Integration and the Global Financial Crisis

Abstract

We study the dynamics of stock market integration and its consequences during the recent financial crisis for 23 developed and 60 emerging markets. We find that integration increased slightly for emerging markets but decreased for developed countries during the crisis. Moreover, we argue that the high degree of integration propagated the crisis across the global financial markets at the beginning of the crisis, but it had little effect during the crisis. We also find that integration is mostly affected by financial openness, the institutional environment and global financial uncertainty but that these determinants vary slightly between emerging and developed markets.

JEL classification: F15, F36, F65, G15, G01

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1. Introduction

Market integration is one of the most important and, therefore, one of the most studied aspects of emerging financial markets. The removal of capital controls and trade barriers in emerging markets, primarily at the end of the 1980s and the early 1990s, opened up markets that had been nearly untouchable for foreign investors and provided more investing opportunities for domestic investors. Theoretically, more open and integrated markets should lead to a lower cost of capital, increased investment opportunities, increased savings and, eventually, enhanced economic growth through international risk sharing (Bekaert and Harvey, 2003; Carrieri et al., 2007). Kose et al. (2009) note that financial globalization can also promote the development of local financial markets, improve corporate and public governance, generate efficiency gains among domestic firms that are forced to face international competition and impose discipline on macroeconomic policies. These indirect channels might be even more significant sources of growth and stability than the previously mentioned direct financial channels. In addition, more globalized markets should lead to narrower pricing differentials between different equity markets. However, increased integration can also work as a double-edged sword. On the one hand, integration has its benefits, as mentioned above, but it also makes countries more vulnerable to global shocks. The gains from globalization were especially questioned during the global financial crisis because of the belief that the highly interconnected markets helped propagate the crisis across the global markets. The present study focuses on this issue by examining the relationship between the recent global financial crisis and global market integration, which has received little attention in previous studies.

We employ the integration measure developed by Pukthuanthong and Roll (2009) to study a sample of 83 countries and two of its subsamples, developed and emerging

markets, over the period 1987 to 2011. To our knowledge, this sample represents the largest number of markets covered thus far in integration research.

The contributions of this study can be divided into three parts. First, we study the integration dynamics during the major financial crisis periods of the last two decades. Second, we analyze the effects of integration on these crises, i.e., whether integration played a role in the spread of the crises, and if so, whether more integrated markets suffered more during the crises. The emphasis in these sections is on the recent global financial crisis, but for comparison purposes, other international crises are also examined. The third contribution is a study of the long-term determinants of integration to present new insights into the factors that explain the integration process, to provide support for previous results and to examine possible channels of integration dynamics during times of crisis.

We show that integration decreased during the global financial crisis for developed markets, but it increased slightly for emerging markets. However, we also find that these results depend on the definition of the crisis period. While the liquidity crisis in August 2007 provided a shock that increased integration, the collapse of Lehman Brothers in September 2008 caused a rapid segmentation of the markets. For the other global crises, namely, the Asian financial crisis together with the Long-Term Capital Management (hereafter LTCM) crisis and the Dot-com bubble, the effects were nearly the opposite: in general, integration did not change, or it slightly increased, but for the emerging markets, the increases were smaller and in some cases negative. More importantly, while we find that integration did not affect local returns during the crisis period, the results indicate that at the beginning of the crisis, market integration helped propagate the global stock market collapse in August 2007, demonstrating that the global integration process has its drawbacks.

To study the determinants of integration, we collect a large dataset on possible explanatory variables. Our dataset mostly consists of previously examined factors, but we also study some new ones. To examine whether integration is immune to political institutions, we include each country's democracy level as an explanatory variable, and to account for Frijns et al.'s (2012) finding that integration is sensitive to political crises, we also add the International Country Risk Guide's (ICRG) composite political risk to analyze local political conditions. Moreover, to capture the effects of the global political environment, we construct a measure for international political risk. For the other new variables, we use local crisis dummies to study whether domestic financial crises segment the markets because Chambet and Gibson (2008) suggest that integration decreased during the financial crises of 1990. In addition, we employ the TED spread to examine the effects of changes in global credit risk, and we use inflation to measure local macroeconomic uncertainty. Moreover, we examine changes in exchange rates to account for the effects of exchange rate fluctuations, which can be large especially in emerging markets.

We find that, in general, integration has increased over the past three decades, and financial openness, institutional and technological developments and factors related to global financial uncertainty are the most important determinants of integration. However, the results vary between developed and emerging markets because the former are more affected by better investor protections and liquidity, while the latter are more affected by market openness, technological and economic developments and decreases in political risks. Unlike previous studies, we find only a small role for financial development in the dynamics of integration, and even then, financial development is only significant for developed markets. Thus, we can conclude that international investors are attracted by the possibilities that are created by decreasing political instabilities and increasing development in emerging markets,

while they also look for better investor protections and more liquid markets in developed countries.

The estimations related to the crisis periods are performed with monthly data that better allow the identification of the crises' start periods than annual data. For the determinants of integration, annual data are used as a basis because most of the explanatory variables are only measured at annual frequencies, but the robustness of the results is also examined with monthly data.

The remainder of the paper is organized as follows. The second section introduces the theories about market integration and some of the previous studies on its determinants. The third section presents the construction of the integration measure, the crisis variables and the development of market integration over the last 25 years. The fourth section studies integration dynamics and its effect on returns during the global crisis. The fifth section examines the determinants of integration, and the sixth section concludes.

2. Previous Studies on Stock Market Integration

Financial market theories suggest that in fully integrated markets, while investors bear both the global and local risks in their portfolios, only global risks are priced because the local risks are fully diversified internationally. As a complement, in fully segmented markets, asset prices vary from one country to another, and the prices, and thus the returns, reflect only the domestic risks. Most markets, especially emerging markets, are partially integrated because the prices reflect both local and global factors, and the expected returns are determined according to both of these risk sources (Bekaert and Harvey, 1995). It has been widely accepted that the market integration process is time-varying and takes several years, with

occasional reversals (Bekaert and Harvey, 1995; Carrieri, et al., 2007; Pukthuanthong and Roll, 2009; Bekaert et al., 2011; and Arouri et al., 2012). Although all of these studies find that local risks are still important determinants of emerging market returns, the importance of local risks has weakened over time for most markets, indicating that the markets have become more integrated. However, all of these studies confirm the idea that although foreigners now have relatively free access to capital markets with financial liberalization, such access does not guarantee full market integration.

The relationship between integration and financial crises has not gained much attention in previous studies. Bekaert et al. (2011) provide one figure of the segmentation dynamics for developed markets that shows that segmentation (integration) increased (decreased) toward the end of 2008 but then returned to its pre-crisis levels in 2009. However, this result contradicts the bull vs. bear market results of Pukthuanthong and Roll (2009) that support the idea that markets tend to co-move more during periods of more turmoil. With regard to integration's effects on crisis occurrences, Berger and Pukthuanthong (2012) develop a market fragility index and find robust evidence that the probability of a global financial crash is highest during periods when many countries are highly exposed to common global market factors because negative shocks to the world market can simultaneously propagate to multiple markets. However, Bekaert et al. (2014) examine the globalization hypothesis and find that the most integrated countries did not suffer the most during the crisis. Our aim is to deepen these studies by particularly concentrating on the global financial crisis of 2007-2009 and the role integration played in the spread of the crisis.

To gain insight into the factors that affect integration and that could serve as sources of change during crisis periods, we examine the determinants of integration. The academic world has developed several time-varying measures to capture the dynamics of market integration over the last two decades (see, for example, Bekaert and Harvey, 1995;

Hardouvelis et al., 2006; Carrieri et al., 2007; Chambet and Gibson, 2008; Pukthuanthong and Roll, 2009; Bekaert et al., 2011; Arouri et al., 2012), and although Carrieri et al. (2007) state that there is a broad understanding of the factors that drive market integration, systematic studies on the determinants of market integration remain rather scarce. Bekaert (1995) makes the first attempt to explain differences in integration and argues that there are three different obstacles to market integration: legal barriers that arise from the different legal statuses of foreign and domestic investors in taxation, for example, and government policies to restrict capital movement; barriers arising from differences in available information, accounting standards and investor protection; and emerging market-specific risks such as political, economic policy and liquidity risks that discourage foreign investment and lead to segmentation. Poor credit ratings, high and variable inflation, and the lack of a high-quality regulatory and accounting framework are particularly mentioned as sources of segmentation. However, Bekaert's (1995) analysis suffers from some shortcomings, for example, a constant integration measure, and it should therefore be considered more as directional evidence of market integration. Carrieri et al. (2007) develop a measure for integration and test it for eight emerging markets. According to their results, the development of capital markets and the liberalization of stock markets are statistically important determinants of integration. Chambet and Gibson (2008) study the impact of the trade structure of emerging market economies on the evolution of integration. They find that the degree of openness for foreign trade contributes to the integration process such that the less diversified an economy is with respect to its foreign trade partners, the more integrated its financial market will be. Frijns et al. (2012) argue that political crises with certain characteristics reduce the integration of emerging markets. The authors particularly note that the start of crises, their severity, the number of parties, and U.S. involvement have significant impacts on integration. The most comprehensive study of market integration comes from Bekaert et al. (2011), who propose a

new country-level measure for time-varying market segmentation and apply it to 69 emerging and developed countries. The authors examine how financial and trade openness contribute to decreases in segmentation levels, and they provide a comprehensive analysis of other factors that might affect segmentation. The authors find that in addition to financial and trade openness, stock market development and the political risk profile, as local factors, and the U.S. corporate credit spread, as a global factor, are statistically and economically important determinants of market segmentation.

3. Data

Our main interest lies in the development of integration processes in the share markets, and therefore, we collect data from 60 emerging and 23 developed countries. The next subsections provide a description of our integration measure and define the crisis periods.

3.1 INTEGRATION MEASURE AND DESCRIPTIVE STATISTICS

It seems reasonable that a quantitative measure for global integration should capture the proportion of a country's returns that can be explained by common global factors. The smaller this proportion, the more dominated the market returns by local and regional factors, while a high degree of integration is characterized by the significant influence of common global factors. In addition, the measure should satisfy several attributes. Naturally, it should be able to capture the time-varying dynamics of the integration process, and preferably it should not be tied to any specific asset-pricing model because there is no generally accepted global asset-pricing model. For these reasons, we use an integration measure developed by Pukthuanthong and Roll (2009) that was originally designed to provide an alternative to the

flawed cross-country correlation-related integration measures[2]. The measure uses principal components to estimate common global factors from a set of returns of the most globalized markets. After finding these factors, daily returns of each market are regressed with them separately, and eventually, the proportion that the global factors are able to explain local returns is used to measure the integration level.

This very intuitive, econometrically estimated method is simple to implement and requires only data on the country index returns, which are easily available for several countries from the typical data sources. The use of a different measure from, for example, Carrieri et al. (2007) and Bekaert et al. (2011) also allows us to study whether previously found determinants of integration are sensitive to this method. The main characteristics of the integration measure are explained here, while criticism and robustness checks can be found in Pukthuanthong and Roll (2009).

We use Thomson Datastream as our share market data source, as it provides stock market indices for most of the countries and the longest time periods. More details on the data, all the indices, their starting years and division to price indices and total return indices can be found, together with some descriptive statistics of integration, in Appendix 1, Table AI.

Because the data are daily, the indices include several observations that are not truly market determined. For example, in the case of holidays, the value of the index stays the same as in the previous trading day. Because most holidays are determined at the national level, a downward bias in the measure of market integration could arise. To solve this

[2] Although Puktuanthong and Roll (2009) argue that market correlation is a poor measure of market integration, the relationship between the two should theoretically be positive. See Bekaert and Harvey (1997) and Morana and Beltratti (2008).

problem, we simply exclude the return value unless it is computed from two index values that are either one calendar day apart or, in the case of Friday and Monday, three calendar days apart. In addition, if the values for the previous trading days are identical, the return is removed. Such a case would indicate either a holiday, or in the case of a smaller country, an illiquid market. Although it is possible that an index can remain the same even if it is not a holiday, we believe this scenario to be quite unlikely because the indices consist of several stocks.

To estimate the global factors with the principal component analysis for the integration measure, we use 18 developed countries: Australia, Austria, Belgium, Canada, Denmark, France, Germany, Hong Kong, Ireland, Italy, Japan, Netherlands, Singapore, Spain, Sweden, Switzerland, the U.K. and the U.S.[3] To cover the sample size of the rest of the markets, we select data for these countries' indices that begin on January 1, 1986. These markets are some of the largest economies and have the longest tradition of free capital mobility; therefore, it can be claimed that these countries clearly represent the most globally integrated markets. To account for non-synchronous trading, the data are augmented by the inclusion of the one-day lagged returns from the North American countries, specifically, Canada and the U.S.

For each year from 1986 to 2010, eigenvectors and eigenvalues are calculated and sorted from largest to smallest using a covariance matrix calculated from the returns of the previously mentioned indices[4]. The principal components are estimated from returns in

[3] We differ slightly from Pukthuanthong and Roll (2009) by dropping South Africa and adding Spain and Sweden, thus limiting our analysis only to developed markets when estimating the global factors.

[4] The total dimension of the covariance matrix is 20x20 (18 developed countries plus the lags of the U.S. and Canada).

the subsequent calendar year, i.e., the weightings (eigenvectors) computed from the 1986 covariance matrix are applied to the returns of the same 18 countries for 1987, and the process continues in this manner until the 2010 weightings are applied to the 2011 returns, which is the final full sample year available. This procedure produces 25 calendar years with out-of-sample principal components. As proxies for global variables, we retain the first 10 principal components, which generally account for more than 90% of the cumulative eigenvalues (or 90% of the total volatility in the covariance matrix). We use these 10 components as our common global explanatory variables and regress the daily returns of each country for each year with the variables. The annual market integration value is measured with the adjusted R-square from these regressions. For monthly data, integration is estimated with a rolling regression where the estimation window is two-hundred days and the last day of the month denotes the integration level for that month. The idea behind the measure is that 10 large industry groupings, represented by 10 principal components, should be able to capture the global shocks adequately. Obviously, the caveat of the method is that the measure might be biased for some markets, especially emerging and frontier markets, whose industry structures differ significantly from the developed markets.

Figure 1 presents the average annual adjusted R-squares of the developed and emerging markets. The emerging markets are divided into two groups depending on the beginning of their observation periods. There are 27 countries in the 1987-1993 cohort and 33 countries in the post-1993 cohort. The developed markets are clearly more integrated than the emerging markets over the entire sample period, and the post-1993 cohort is the least integrated. However, the general trend is increasing for all of the data series, and there are several phases when all three of the integration curves behave similarly. The spikes in approximately 1998, 2004 and 2008, followed by dips in 1999, 2005 and 2009, are clearly visible. Thus, it could be argued that the integration process is affected by some global

variables that are common to all countries, although previous studies have found that local variables also play a role in market integration. The steepness of the integration trend differs between the groups; for example, the period 2000 to 2003 presents an increasing trend for developed market integration and a decreasing trend for the emerging markets. This result could possibly be related to the burst of the Dot-com bubble, which mostly affected the developed markets.

FIGURE 1 HERE

Appendix 1, Table AI provides descriptive statistics for integration in each of the markets. It shows the t-statistics of the time trends for the adjusted R-squares together with the means, standard deviations, minimums and maximums for integration. As already shown in Figure 1, the developed markets are more integrated than the emerging markets, and in general, the markets with longer observation periods are also more integrated. It is notable that the U.S. is somewhat unexpectedly quite modestly integrated with the global markets. This result could be related to the results of Rapach et al. (2013) that, instead of following, the market in the U.S. leads other markets, and the global factors that are formed from other markets have only limited explanatory power for movements of the U.S. market. Most of the countries, especially those that are the most integrated, show a significantly positive integration trend, while Bangladesh and Jamaica are the only markets that show statistically significant decreases in their integration levels. Other countries with negative but not significant trend coefficients include Malaysia, Jordan, Venezuela, Ecuador, Ghana and Trinidad & Tobago. Of the developed markets, only Japan and Luxembourg show positive but not significant trends.

3.2 CRISIS PERIODS

We mostly concentrate on the global financial crisis of 2007-2009, but we also consider other global crises for comparison purposes. For the starting period of the global financial crisis, we use two different dates: the initial fall of the stock markets due to the liquidity crisis in 8/2007 and the month of the collapse of Lehman Brothers, 9/2008. For both of these periods, the end of the crisis period is determined to be 6/2009 because the National Bureau of Economic Research (hereafter NBER) considers that date to be the end of the recession in the U.S.

In addition, we examine market integration's role in other international crises to determine whether these crises caused or were caused by similar effects as the global financial crisis. We define the beginning of the Asian financial crisis as 10/1997, when the market in Hong Kong crashed. The Asian crisis period includes the collapse of LTCM (10/1998); therefore, we use just one common name for these crises: Asia and LTCM. The ending period for these crises is defined as 12/1998. The bursting of the Dot-com bubble is defined to be from 10/2000 to 12/2002. In addition, we examine all the U.S. recession periods (determined by NBER) as a general measure of global recessions. The periods that are studied together are 6/1990-3/1991, 3/2001-11/2001 and 12/2007-6/2009.

3.3 ADDITIONAL VARIABLES

In section 5, we also examine the determinants of integration. To save space, we do not present the explanatory variables here, but they can be found in Appendix 2.

4. Integration of World Capital Markets and the Global Financial Crisis

The global financial crisis is particularly well suited for our research framework for two reasons. First, the sheer size of the crisis makes it a good subject to test for integration dynamics and the possible effects of integration. Second, the crisis was uniquely wide and relatively synchronized across the international capital markets. Hence, a global sample of markets can be used to study the crisis, largely avoiding problems related to the timing of the crisis and possible spillover effects. In this section, we examine the relationship between the global financial crisis and the level of stock market integration. To the best of our knowledge, this issue has not been widely studied. We divide the study into two subsections. The first subsection examines what happened to the process of integration during the crisis period, while the second subsection concentrates on the crisis period to analyze whether integration directly affected local market returns. Because the monthly data provide more accurate determinations of starting periods than the annual data, we use the monthly data in this section. Additionally, we use dummy variables to capture the emerging markets as a group of their own. We use this method for two reasons. First, it has become a common practice to study emerging economies separately as their own entity. Second, no two crises are the same. The financial crises that affected the global financial markets were born for various reasons, and they could have affected emerging and developed countries differently. For example, the Asian financial crisis mostly hit the emerging markets in Asia, although it eventually spread to developed economies.

4.1 GLOBAL CRISES AND STOCK MARKET INTEGRATION DYNAMICS

Only a few studies have examined the relationship between stock market integration and financial crises. As noted previously, Bekaert et al. (2011) and Pukthuanthong and Roll

(2009) find contradictory results about integration dynamics during crisis periods. The former find that segmentation increases during crisis periods, while the latter find the opposite. Based on Figure 1 and the general notion that markets tend to co-move more during periods of turmoil, it could be expected that the explanatory power of the global variables should actually increase during crisis periods. On the other hand, during crisis periods, foreign investors tend to leave countries they consider to be too risky, and thus, the integration of these markets should decrease. A good example of this was the Asian financial crisis, when foreign funds withdrew their money from the stressed countries. Additionally, it can be argued that the extra volatility of the global factors during periods of more turmoil may create an upward bias to the Pukthuanthong and Roll (2009) integration measure because the R^2s tend to increase due to abnormal global volatility (see Forbes and Rigobon, 2002). In addition, because the sizes and origins of the crises vary, their effects on integration might also differ. For example, Bekaert et al. (2014) find that their contagion results are not consistent. Thus, there is no clear answer whether the integration should increase or decrease during the crisis period.

We start by presenting integration dynamics in Figure 2. To control for the abnormal volatility, the figure presents the integration measure, which is orthogonalized with respect to VIX and world market volatility (i.e., we study the residuals from the estimation where the integration variable has been regressed with VIX and world market volatility). In addition, we add vertical lines to denote the Asian financial crisis and the LTCM (10/1997-12/1998), the Dot-com crisis (10/2000-12/2002) and the global financial crisis (8/2007-, 9/2008-6/2009). What can be observed is that for both developed and emerging markets, the integration increased at the beginning of the Asian crisis but then dipped during the Russian financial crisis and the collapse of the LTCM in August 1998. However, during the Dot-com crisis, the integration trend is negative for emerging markets, but there is no clear effect for

developed countries. For the global financial crisis, it can be easily observed that the crisis came in two waves, which affected the crisis levels differently, and thus, the effects of global financial crisis depend heavily on the starting date. The first wave was related the crisis in August 2007 and the second to the collapse of Lehman Brothers in September 2008, and while the first wave in 2007 made the markets more integrated, the second wave caused completely opposite effects. Thus, if the crisis would have ended before 9/2008, the total effect of integration would have been positive. However, the collapse of Lehman Brothers in 9/2008 caused a large drop in integration, which was only partly recovered before 6/2009.

FIGURE 2 HERE

To gain a better perspective on the integration dynamics, we also study the question more formally. The following equation forms the basis of our analysis:

$$Integration_{i,t} = \beta_0 + \beta_1 Integration_{i,t-1} + \beta_2 Crisis + \beta_3 trend + EM(\alpha_0 + \alpha_1 Integration_{i,t-1} + \alpha_2 Crisis + \alpha_3 trend) + \gamma_i controls_{i,t} + \varepsilon_{i,t}. \quad (1)$$

Our dependent variable is the integration level, and for independent variables, we use the lagged level of integration, trend and Crisis dummies. To study the differences between developed and emerging markets, an emerging market dummy (EM) and its interactions with the previously mentioned variables are included in the estimations. To control for the effects of excess volatility, we include measures for the VIX index and world volatility in Equation (1). We also estimate the results using the segmentation measure by Bekaert et al. (2011) to

examine their robustness[5]. However, the last observations for this measure for the emerging markets are from 12/2005, and therefore, the data are only available for 20 developed countries for the 2007-2009 crisis period. Hence, the conclusions based on this measure for the global financial crisis period can only be kept as directional.

We estimate Equation (1) using pooled ordinary least squares (OLS) for three different sub-models, numbered I-III, and we present the results in Table I. Models I and II study the global financial crisis using 8/2007 and 9/2008 as the starting months, respectively, while the crisis period ends in 6/2009. Model III examines the U.S. recession periods in general: 6/1990-3/1991, 3/2001-11/2001 and 12/2007-6/2009. Each sub-model in the table consists of two columns: the columns on the left present the direct effects of the variables, $\beta_i's$, while the columns on the right show the coefficients of the interaction term with the emerging markets dummy, $\alpha_i's$.

TABLE I HERE

In general, it can be observed that the model captures the integration dynamics rather well with R-squared as high as 0.98 due to the significant contribution of the previous period's integration level (β_1 is almost one). In addition, the integration level itself is smaller for emerging markets ($\alpha_0 < 0$), and while the time trend is generally positive and significant in all the models ($\beta_3 > 0$), the effect is smaller for the emerging markets ($\alpha_3 < 0, \beta_3 + \alpha_3 > 0$). However, our main interest lies in the crisis dummy coefficients (β_2 and α_2) that capture

[5] We are grateful for the segmentation measure data provided by Geert Bekaert, Campbell R. Harvey, Christian T. Lundblad and Stephan Siegel.

the effects of the crisis period. According to Table I, Models I and II provide slightly different results, as could be expected based on the results of Figure 2. In Model I, when the start of the crisis is defined as 8/2007, integration decreased in general but increased slightly for the emerging markets ($\beta_2 < 0$, $\alpha_2 > 0$ and $\beta_2 + \alpha_2 > 0$). When the start of the crisis is defined as 9/2008, again $\beta_2 < 0$ and $\alpha_2 > 0$, but this time, $\beta_2 + \alpha_2 < 0$, i.e., integration decreased during the crisis period, but the decrease was smaller for the emerging markets. Thus, although it can be concluded that the integration of the emerging markets suffered less than the integration in the developed markets, the results partially depend on how we define the beginning period of the crisis[6]. To provide a general picture of the integration dynamics during recessions, Model III shows the integration level during the U.S. recessions that fall within the sample period. Although the results show some indication that integration decreases during the U.S. recession periods, the effect is not statistically significant[7]. Thus, these results support the conclusions of Bekaert et al. (2011) that during crisis periods, globalization tends to decrease, although the effect might be different between developed and emerging markets.

To further examine the integration dynamics during crisis periods, Table II presents the coefficients for β_2 and α_2 in Panel A for the segmentation measure. Panel B shows the coefficients for the integration measure for the Asian financial crisis and the LTCM together (10/1997-12/1998) and for the Dot-com crisis (10/2000-12/2002) as well as all these crisis periods taken together. In Panel C, the segmentation measure is used for the same periods.

[6] If we define the beginning period according to NBER, i.e., from 12/2007 to 6/2009, the conclusions are similar to Model II.

[7] If the results are estimated without the volatility control variables, there is a significant increase in integration during all the studied periods, and the increase is even higher for the emerging markets, as Figure 1 suggests.

TABLE II HERE

It must be noted that although the entire sample consists of 68 countries, there are only 20 developed countries listed in Panel A for the global financial crisis period. This issue could affect the results, which are not significant for Models I and II. For Model III, the emerging markets show a significant increase in segmentation during the U.S. recession periods. However, the results are more interesting in Panels B and C, where we can examine whether the measures provide similar results for the other financial crisis periods. In Panel B for Asian and LTCM crises, integration is found to increase, but this increase is smaller for the emerging markets ($\beta_2 > 0$, $\alpha_2 < 0$ and $\beta_2 + \alpha_2 > 0$). The segmentation measure provides similar results, except that the emerging markets became more segmented instead of integrated ($\beta_2 < 0$, $\alpha_2 > 0$ and $\beta_2 + \alpha_2 > 0$). However, for the Dot-com crisis, the results are identical in that the emerging markets became more segmented during the period because the crisis mostly affected the developed markets. When all these crisis periods are combined, we find that integration weakens during crisis periods for the emerging markets, but it may actually increase for the developed countries, at least according to the segmentation results.

Overall, the results vary slightly between crises and integration measures. The Asian crisis, followed by the Russian Financial Crisis in 1998, most severely affected the emerging markets, even though it also spread to the developed markets. Thus, although the integration increased in both developed and emerging countries, the increase was smaller in emerging markets. The Dot-com crisis, on the other hand, was caused by the speculations in the information technology sector and thus affected developed markets more severely. Because the integration measure itself is measured with the common factors in the developed

markets and the emerging markets did not experience as significant a bubble behavior in the information technology sector, bubble bursting caused the emerging markets to be less integrated again, while there was no clear effect for developed countries. Thus, it is reasonable to conclude that the integration of the emerging markets suffered during both crises, although the size of the effect is dependent on the specific measure used. For developed markets, integration increased during the Asian crisis, did not move significantly during the Dot-com bubble and decreased during the global financial crisis. Thus, no general conclusions can be made on the relationship between crises periods and integration for them.

4.2 STOCK MARKET RETURNS, GLOBAL FINANCIAL CRISIS AND STOCK MARKET INTEGRATION

In this second subsection, we focus on examining the relationship between integration and stock returns during crisis periods. Based on previous studies, it could be expected that a higher degree of integration could be related to lower returns, especially at the beginning of a crisis, but the effects may not necessarily persist for the whole crisis. Berger and Pukthuanthong (2012) argue that negative global market shocks could propagate simultaneously to multiple markets when several countries are exposed to a common global factor. However, Bekaert et al. (2014) report that the most integrated countries did not suffer the most during the global financial crisis. They find that instead of highly integrated developed markets, several Eastern European emerging markets took the hardest hits during the crisis. The authors argue that good policies and institutions as well as strong macroeconomic fundamentals were the key reasons behind market survival, while financial linkages had only a minor effect on the crisis transmission. Their results are rather expected, as it could be assumed that during the crisis period, investors would abandon the markets

with a poor investment environment and move to more secure markets. However, Bekaert et al. (2014) use the whole crisis period in their estimations without differentiating between the start of the crisis and the remainder of it. Additionally, the use of annual frequency in integration data prevents them from capturing higher-frequency dynamics. Our aim is to study the role of integration in crisis spreading more carefully in this section.

FIGURE 3 HERE

Figure 3 presents the development of the average annual returns for developed markets and the two emerging market country cohorts[8]. It is notable that the developed market and the 1987-1993 emerging market cohorts move quite similarly before the mid-1990s and after 2003, while the post-1993 cohort shows more independent return dynamics. The effects of the Asian financial crisis in 1997 and the bursting of the Dot-com bubble in the early 2000s can be easily observed as negative returns for each index. However, the most remarkable return period is denoted by the sudden drop in 2008, when the global financial crisis swept over the markets, and the recovery of 2009. It is especially clear that each of the three average annual return indices moves almost identically during the crisis period, first declining sharply and then increasing again in the next year. During the aftermath of the crisis, some claimed that the integration of the capital markets was the reason for the collapse of the financial markets around the world. Figure 4 presents some evidence for this theory; it shows the relationship between the integration level of July 2007 and the returns of August 2007. A

[8] We use annual returns to avoid noise the monthly returns would introduce to the figure.

line fits between the observations with a clearly negative slope, indicating that the more integrated countries suffered more at the beginning of the crisis.

FIGURE 4 HERE

We examine this issue further by studying whether the level of integration played any role in the spread of the crisis both at the beginning of the crisis and during the crisis. Thus, we estimate the following model:

$$Returns_{i,t} = \beta_0 + \beta_1 Integration_{i,t-1} + \beta_2 EM + \beta_3 EM * Integration_{i,t-1} + CrisisStart * \left(\alpha_1 + \beta_4 Integration_{i,t-1} + EM\left(\alpha_2 + \beta_5 Integration_{i,t-1}\right)\right) + Crisis * \left(\alpha_3 + \beta_6 Integration_{i,t-1} + EM\left(\alpha_4 + \beta_7 Integration_{i,t-1}\right)\right) + \beta_8 Returns_{i,t-1} + \vartheta_i + \tau_t + \varepsilon_{i,t} \quad (2)$$

where $Returns_{i,t}$ and $Integration_{i,t-1}$ are the local market returns and the integration level of country i at time t and $t-1$, respectively. Coefficient β_1 represents the direct effect of the past integration level on local market returns. EM, $CrisisStart$ and $Crisis$ are the dummy variables for the emerging countries, the first period of the crisis and the crisis period, respectively. With β_2, we can examine whether the emerging markets produced larger returns than the developed markets, while β_3 shows whether the integration level in the emerging markets significantly affected the returns. α_1 captures the effects of the starting period of the crisis, and β_4 displays the effects of the interaction between the starting period of the crisis and integration. α_2 is included to study the effects of the starting period of the crisis in the emerging markets, while β_5 is used to capture integration's effects on the emerging markets

during the same period. The idea is that α_1, α_2, β_4 and β_5 capture the effects of the starting period of the crisis, and α_3, α_4, β_6 and β_7 capture the effects of the crisis period. ϑ_i and $\tau_t$are the country and time fixed effects, respectively, controlling for an unobserved country and time heterogeneity. ε_{it} is an error term, with $E(\varepsilon_{it}) = 0$ for all is.

Here, we divide the question about the effects of integration on the spread of the crisis into two parts. First, we examine the effects of integration at the beginning of the crisis, referring to the propagation of the crisis, while the second part of Equation (2) determines the effects of the past integration levels on the returns during the crisis period. Thus, Equation (2) aims to determine whether integration played any role in the spread of the crisis at its beginning and whether it affected the returns during the crisis. An analogy from everyday life would be a meeting on the street between two strangers, A and B. Person A has the flu and happens to sneeze just when A and B pass one another, thus spreading the flu virus to B, who catches the flu and suffers from it for some time in the future. Hence, the coefficients of the first part of Equation (2) (β_4 and β_5) test whether the sneezing (integration) spread the flu (crisis) to different countries. Continuing with the analogy, the coefficients of the second part of Equation (2) (β_6 and β_7) measure whether A follows B with the intent to constantly sneeze towards him and try to spread the flu. Bekaert et al. (2014) examine only this latter part in their contagion study[9].

The results of Model (2) are presented in Table III. Column I shows the simple relationship between returns and the past integration level without interaction terms and crisis periods. Columns II and III present the monthly data results with slightly different starting

[9] It could be argued that β_4 and β_5 are the coefficients that actually measure the contagion understood as a way of spreading the crisis. However, to remain consistent with the previous contagion literature, we name their effect propagation.

periods. In the estimations, the starting period of the crisis is defined as the first month of the crisis. In Column II, the start of the crisis period is 8/2007, while in Column III, the start of the crisis period is 9/2008. In both cases, the crisis period begins in the next month and lasts until 6/2009[10]. Columns IV and V present robustness checks using the segmentation measure of Bekaert et al. (2011). Column IV has the same starting period as Column II, and Column V has the same starting period as Column III.

TABLE III HERE

The results from Column I show that in the simple model, past integration negatively affects returns. The constant term is positive, and somewhat surprisingly, the EM-dummy is negative and significant, which implies that the emerging markets show lower returns. The estimations also show that positive past returns are related to positive returns. However, in Columns IV and V, the model does not find a significant relationship between current and past returns and past segmentation.

The main interests in Table III are the interactions between past integration levels and the start of the crisis (β_4) and over the entire crisis period (β_6). A significant and negative coefficient for β_4 would imply that greater integration negatively contributed to returns and, therefore, helped propagate the crisis globally at the beginning of the crisis period, while significant results for β_6 would provide evidence that integration affected

[10] It should be noted that in these estimations, the results for the beginning of the crisis are not subject to the possible upward bias in the integration measure due to the abnormal volatility. However, when controlling for VIX and world market volatility, the estimations yield similar results.

returns over the entire crisis period. The results in Columns II and III are very similar, showing both the starting period of the crisis and the entire period to be characterized by negative returns. In addition, the interaction term between the start of the crisis and the past integration level (β_4) is negative and significant, implying that global market integration actually played a role in spreading the crisis internationally. However, the estimations also show that integration did not have a significant effect on the overall market performance during the crisis period because β_6 is insignificant in both columns. These results are consistent with Bekaert et al. (2014), who report that, instead of banking, trade and financial integration, the depth of the crisis was affected by several other factors. While policy responses, such as capital injections together with deposit and debt guarantees, helped to insulate domestic markets from outside exposures, high political risk, large current account deficits, high unemployment and high government budget deficits made countries more vulnerable to crisis contagion.

Altogether, our results imply that the integration of the global markets helped propagate the crisis globally, but it did not have long-term effects, i.e., it affected the wideness of the crisis but not its depth. In Column IV, the segmentation measure provides similar results: the more segmented (the less integrated) the market, the higher its returns at the beginning of the crisis. However, the results in Column V are not significant because the markets became more segmented in the previous year; therefore, the role of integration in the spread of the crisis is more uncertain in this case. Overall, the results still provide support for the argument that the integration of the global markets helped spread the crisis in 2007, i.e., continuing with the analogy, a single sneeze was enough for the flu to spread in 2007.

To further examine the effects of integration and the global crisis periods, we also estimate the results for other crises (Asian & LTCM and Dot-com). The estimation results for β_4 and β_6 can be found in Table IV, where Panel A reports the results for

integration and Panel B the results for the segmentation measure. In Panel A, the relationship between the integration level, the start of the crisis and returns is not significant for the Dot-com crisis, while for the Asian and the LTCM crisis, the effect is positive. For the entire crisis period, the interaction term is significant and positive for the Asian and LTCM crisis but is otherwise insignificant. The results are consistent between the panels except in Panel B, where the coefficient for segmentation at the start of the crisis is not significant. Based on these results, it is evident that integration's role in the spread of the crisis was different for the financial crisis of 2007-2009 compared with the other crisis periods.

TABLE IV HERE

5. Determinants of Integration

As the last contribution of this study, we examine the factors that affect integration and that serve as possible channels of increased or decreased integration during crisis periods. These factors could be understood to capture the reasons why international investors invest in the country's stock market. The basic model for our unbalanced panel dataset is

$$Integration_{i,t} = \alpha + \beta' x_{i,t} + \varepsilon_{i,t} \quad (3)$$

where $Integration_{i,t}$ is the time t measure of integration for country i, $x_{i,t}$ represents the explanatory variables and ε_{it} is an error term capturing all other omitted variables, with $E(\varepsilon_{it}) = 0$ for all is. We estimate the model for all countries jointly with pooled OLS, but we account for cross-sectional dependence by clustering the standard error across country indices. To add robustness to the results, estimations are performed for both yearly and monthly data. To account for any possible upward bias created by extra volatility during

times of crisis, the estimations are also performed for a dataset where the crisis periods are omitted[11].

5.1 ESTIMATION STRATEGY

To gain insight into the determinants of stock market integration, we estimate Model (3) with the full set of explanatory variables (see Appendix 2 and Table AII for a description and the sources of the variables). We analyze three different sample sets: the full sample, consisting of both developed and emerging markets, developed markets only and emerging markets only. However, because we are estimating several highly correlated financial, political and economic variables, an estimation of the full model generates a large number of insignificant regressors that produce unnecessary noise to the results. Thus, our aim is to reduce the number of variables into a more manageable set that best explains the variation in integration. In this task, we follow Bekaert et al. (2011) and Bekaert et al. (2014) and employ a general-to-specific algorithm, as explained for example in Hendry and Krolzig (2005). The algorithm constitutes a multiple-step process that eliminates variables with coefficient estimates that are not statistically significant. Concretely, we start by estimating Model (3) with all the variables. We then eliminate the least statistically significant variable using a significance threshold of 15%. The use of a relatively high significance level reflects the preference of keeping a model with some useless regressors over eliminating important regressors. We continue step-by-step by estimating the model and excluding the individual variables, simultaneously testing at each step whether an already-excluded variable should be included again, until we arrive at a final model specification. After we have obtained the final model,

[11] For the variables that are measured with annual frequency, monthly values are created for the end of the period values, as in Bekaert et al. (2014).

we investigate the economic significance of the explanatory variables by adopting the methods of Bekaert et al. (2011) to conduct two examinations on the effects of each of the variables on the overall integration process.

To save space, we only report the results from the OLS estimations for the full sample[12]. These results are reported in Table V. The models in Table V explain integration rather well, as the R-square results are between 64% and 68%. We can observe that several factors remain consistent across the estimations, namely, equity market openness, investment profile, international political risk, French legal origin, exchange rate, market turnover, past GDP growth, TED spread, VIX, the number of telephones, life expectancy, population growth and the trend. Of these factors, the only inconsistent signs occur with VIX, which has a positive sign for the monthly data but a negative sign for the annual data, which is most likely due to measurement frequency. In most cases, the coefficients have the expected signs. In two cases, however, the results seem slightly counterintuitive: the negative effect on integration from improvements in the international political risk environment and the positive past GDP growth. When the data are divided into developed and emerging countries, we find that for the developed countries, the institutional and market-development-related factors remain consistently significant across the estimations, while for the emerging markets, the openness of the markets, the exchange rate changes, the growth and information variables, the TED spread and the trend remain significant[13].

[12] The results for the developed and emerging market subsamples can be found in Appendix 3, Tables AIII.1 and AIII.2.

[13] It should be noted that we assume that the capital markets in developed countries are open; therefore, the effects of the openness variables on integration dynamics cannot be tested for the developed countries.

TABLE V HERE

However, the economic significance of the variables is even more interesting. Table VI presents the economic significance of the annual variables for each dataset that survived the model selection algorithm and the R-squares of the estimations[14]. Panel A of Table VI presents the changes in integration level when the independent variable moves from the average value for the emerging markets to the average value for the developed markets. For the global and the U.S. variables, which experience only time-series variation, we examine the response to a one-standard-deviation change. Columns I, II and III refer to the full sample, the developed markets and the emerging markets, respectively. The results show that equity market openness is one of the most important factors for the full sample and for emerging markets, and the development of the information variables is important for all the datasets. For the developed markets, the investment profile, inflation and the TED spread are the most important factors, while GDP per capita and the political risk profile are important for the emerging markets.

TABLE VI HERE

To gain a better understanding of the significance of the variables, we examine in Panel B how much of the variation in integration is explained by each of the variables and

[14] To limit the amount of results in the future, we concentrate only on annual data because these data can be considered the least affected by the possible excess volatility bias and all the explanatory variables are measured at annual frequencies.

each variable's individual contribution. First, we calculate the R^2 measure as $\frac{Var(I\hat{n}t_{i,t})}{Var(Int_{i,t})}$, where $I\hat{n}t_{i,t} = \hat{\alpha} + \hat{\beta}'x_{i,t}$, and $x_{i,t}$ is a vector of explanatory variables. The denominator is defined as $Var(Int_{i,t}) = \frac{1}{N}\sum_{i=1}^{N}\frac{1}{T_i}\sum_{t=1}^{T_i}(Int_{i,t} - I\bar{n}t)^2$, where $I\bar{n}t = \frac{1}{N}\sum_{i=1}^{N}\frac{1}{T_i}\sum_{t=1}^{T_i}Int_{i,t}$, and the numerator is defined analogously as $Var(I\hat{n}t_{i,t}) = \frac{1}{N}\sum_{i=1}^{N}\frac{1}{T_i}\sum_{t=1}^{T_i}(I\hat{n}t_{i,t} - I\bar{\hat{n}}t)^2$, where $I\bar{\hat{n}}t = \frac{1}{N}\sum_{i=1}^{N}\frac{1}{T_i}\sum_{t=1}^{T_i}I\hat{n}t_{i,t}$. As seen, of the observed market integration of the data, our predicted models explain 43% of the variation for the emerging countries, 54% of the variation for the developed countries and 68% of the variation for the full sample.

To examine the contributions of each of the variables to the overall variation in integration individually, we compute the following covariance:

$$Cov(I\hat{n}t_{i,t}, \hat{\beta}_j x_{i,j,t}) = \frac{1}{N}\sum_{i=1}^{N}\frac{1}{T_i}\sum_{t=1}^{T_i}\hat{\beta}_j(I\hat{n}t_{i,t} - I\bar{\hat{n}}t)(x_{i,j,t} - \bar{x}_j),$$

where $\bar{x}_j$ is the mean of variable $x_{i,j}$ across countries and time. The sum of these covariances should be exactly the variance of the predicted market integration, i.e., the sum of $\sum_j \frac{Cov(I\hat{n}t_{i,t}, \hat{\beta}_j x_{i,j,t})}{Var(I\hat{n}t_{i,t})}$ should be one. These results are reported in Panel B of Table VI, where Columns I, II and III, again refer to the full sample, the developed countries and the emerging markets, respectively.

As with Panel A, equity market openness (25% and 20%, respectively) and the development of information variables (31% and 24%, respectively) are the most important variables for the full sample and for the emerging markets. In addition, the investment profile (13%) and political risk (11%) stand out for the full sample, although the latter is statistically significant only at the 15% level. These variables explain 80% of the total variance in the estimated integration and, therefore, can be considered the most important explanatory variables. For the emerging markets, the logarithm of GDP per capita (13%), population

growth (12%), the TED spread (10%) and political risk (9%) are the next most influential variables, and together with openness and the amount of internet connections, they account for 88% of the total variance. For the developed markets, the investment profile is by far the most important variable, explaining more than 35% of the total variance. The investment profile is followed in importance by French legal origin (28%), local market turnover (20%) and the TED spread (15%).

Overall, these results show that while integration has increased over the last thirty years, the variables affecting integration differ between developed and emerging markets. Emerging markets' integration has mostly been affected by the openness of the capital markets, development in all economic, technological and social sectors, and decreases in the political risk profile. However, for developed markets, the most important factors affecting integration have been institutional and market-liquidity and efficiency-related factors. Of the global factors, only the TED spread, which captures increases in global uncertainty about integration, is found to be an economically important variable. Contrary to previous studies, we find that a country's financial development plays only a small role in the integration process, and even then, it only applies to developed countries.

The results provide evidence that the higher the stage of economic and technological development and the less politically instable an emerging market, the greater its integration, i.e., international investors are attracted by these characteristics. However, investors also prefer better investor protections and more efficient financial markets, especially during crisis periods, and these characteristics can be found in developed markets.

6. Conclusions

Previous research on market integration has found that, although the process is gradual and time-varying, the international markets are becoming more integrated over time. We examine the dynamics of the stock market integration process for 23 developed and 60 emerging economies using a multi-factor integration measure developed by Pukthuanthong and Roll (2009). We contribute to the growing integration literature in three ways. First, we examine monthly integration behavior during the global financial crisis of 2007-2009, and we find that while general integration decreased during the crisis, the effects differ slightly between developed and emerging markets. Additionally, the integration dynamics are related to the definition of the crisis period. While the liquidity crisis in August 2007 caused an increase in market integration, the collapse of Lehman Brothers in September 2008 had the opposite effect. For other global crises, the results vary slightly, and hence, no general conclusion on the integration dynamics during crises periods can be made. These results highlight the unique nature of financial crises in that no two crises can be treated the same. Second, we investigate the role of integration in the spread of the global financial crisis, and we find that greater market integration worked as a catalyst, propagating the crisis across the global markets at the beginning of the crisis. However, there is no evidence that integration's role would have continued throughout the crisis, which indicates that integration affected the wideness of the crisis but not to its depth. Third, we examine the long-term determinants of integration. Our results confirm the finding from previous studies that integration has increased over the last several decades and that financial liberalization, the institutional environment and variables related to global financial uncertainty affected the degree of integration. Our results also emphasize the development of information variables, but, unlike previous studies, we only find a small role for a country's financial development. The results also vary between developed and emerging market subsamples, as the former are more affected by factors related to the investment environment and market turnover, while for the

latter, equity market openness, technological and economic development and improvements in the political risk profile are the more important issues. The results show that economic, political and technological progress attracts foreign investors to emerging markets, while better investment protection and market liquidity are among the most important reasons to invest in developed markets, especially during periods of higher turmoil.

Appendix

Appendix 1:

A1 Data

Although we mostly use the same indices as Pukthuanthong and Roll (2009), we also add some indices and change some others. Naturally, total return indices, which combine the price performance with the reinvested dividends, are preferable and are selected whenever possible, but because they are not available for all the countries, we are forced to make do with price indices in several cases. To reduce the noise caused by exchange rate movements, all the indices are transformed into a common currency, U.S. dollars. Moreover, due to our integration estimation method, the data frequency is chosen to be daily. The sample period ends in 2011, and, as the Appendix 1, Table AI shows, we have several different starting periods. However, due to the availability of the explanatory variables and to equalize the length of the series somewhat, we limit the earliest starting period for the series to be 1987[15].

[15] In practice, this shortens the observation periods for almost all of the developed markets but only for three emerging market indices (original starting periods in parenthesis): Malaysia (1980), South Africa (1973) and South Korea (1975).

Table AI. Country indices and the descriptive statistics of annual integration

The table reports countries divided into emerging and developed market groups, their corresponding indices and the first full observation years and the number of observation years. In total, there are 60 emerging market indices and 23 developed market indices. Whenever possible, a total return index is preferred to a price index. All the indices have been converted into U.S. dollars. In addition, for each market, the table lists the t-statistics from the simple linear time trend test, the mean integration level and its standard deviation, and minimum and maximum values.

Emerging markets								
Country	Index	First observation	Years	t-stat	Mean	Standard deviation	Min	Max
Argentina	ARGENTINA MERVAL - PRICE INDEX (~U$)	1990	22	4.91	0.254	0.233	0.009	0.681
Bahrain	DOW JONES BAHRAIN - PRICE INDEX (~U$)	2000	12	0.29	0.013	0.038	-0.034	0.104
Bangladesh	BANGLADESH SE ALL SHARE PRICE - PRICE INDEX (~U$)	1990	22	-3.90	0.022	0.045	-0.030	0.155
Botswana	S&P BOTSWANA BMI - PRICE INDEX (~U$)	1996	16	5.41	0.100	0.130	-0.022	0.376
Brazil	MSCI BRAZIL - TOT RETURN IND (~U$)	1988	24	8.58	0.235	0.291	-0.025	0.741
Bulgaria	BULGARIA SE SOFIX - PRICE INDEX (~U$)	2001	11	4.80	0.221	0.172	0.017	0.466
Chile	CHILE SANTIAGO SE GENERAL (IGPA) - PRICE INDEX (~U$)	1987	25	6.67	0.261	0.196	0.000	0.641
China	SHANGHAI SE A SHARE - PRICE INDEX (~U$)	1992	20	3.85	0.074	0.108	-0.017	0.316
Colombia	COLOMBIA-DS Market - TOT RETURN IND (~U$)	1993	8	1.41	0.398	0.204	-0.037	0.558
Cote d'Ivoire	S&P COTE D'IVOIRE BMI - TOT RETURN IND (~U$)	1996	9	2.61	0.199	0.103	0.065	0.363
Croatia	CROATIA CROBEX - PRICE INDEX (~U$)	1997	15	4.30	0.248	0.220	0.011	0.626
Cyprus	CYPRUS GENERAL - PRICE INDEX (~U$)	2005	7	1.23	0.359	0.168	0.087	0.581
Czech	CZECH REP.-DS Market - TOT RETURN IND (~U$)	1994	18	6.09	0.348	0.217	0.061	0.693
Ecuador	ECUADOR ECU (U$) - PRICE INDEX (~U$)	1994	18	-1.50	-0.002	0.028	-0.054	0.067
Egypt	EGYPT HERMES FINANCIAL - PRICE INDEX (~U$)	1995	17	3.66	0.064	0.120	-0.035	0.328
Estonia	OMX TALLINN (OMXT) - PRICE INDEX (~U$)	1997	15	5.21	0.289	0.170	0.030	0.619
Ghana	S&P GHANA BMI - PRICE INDEX (~U$)	1996	16	-0.42	0.004	0.041	-0.039	0.109
Greece	ATHEX COMPOSITE - PRICE INDEX (~U$)	1989	23	5.04	0.322	0.200	0.042	0.724
Hungary	BUDAPEST (BUX) - PRICE	1991	21	6.76	0.336	0.215	0.065	0.721

	INDEX (~U$)							
India	INDIA BSE (100) NATIONAL - PRICE INDEX (~U$)	1987	25	7.53	0.155	0.197	-0.023	0.566
Indonesia	MSCI INDONESIA U$ - PRICE INDEX (~U$)	1988	24	6.13	0.219	0.218	-0.021	0.654
Israel	ISRAEL TA 100 - PRICE INDEX (~U$)	1988	24	5.00	0.208	0.164	0.000	0.530
Jamaica	JAMAICA SE MAIN INDEX - PRICE INDEX (~U$)	1988	24	-1.77	0.016	0.043	-0.034	0.182
Jordan	AMMAN SE FINANCIAL MARKET - PRICE INDEX (~U$)	1989	23	-1.23	0.035	0.061	-0.029	0.188
Kazakhstan	MSCI KAZAKHSTAN U$ - TOT RETURN IND (~U$)	2006	6	0.57	0.289	0.155	0.072	0.502
Kenya	KENYA NAIROBI SE (NSE20) - PRICE INDEX (~U$)	1990	22	1.12	0.021	0.028	-0.021	0.074
Kuwait	KUWAIT KIC GENERAL - PRICE INDEX (~U$)	1995	17	1.40	0.023	0.032	-0.028	0.097
Latvia	OMX RIGA (OMXR) - TOT RETURN IND (~U$)	2000	12	4.24	0.148	0.134	-0.006	0.407
Lebanon	S&P LEBANON BMI - TOT RETURN IND (~U$)	2001	4	1.38	0.044	0.063	0.007	0.139
Lithuania	OMX VILNIUS (OMXV) - TOT RETURN IND (~U$)	2000	12	3.12	0.312	0.172	0.114	0.580
Malaysia	FTSE BURSA MALAYSIA KLCI - PRICE INDEX (~U$)	1987	25	-0.91	0.399	0.221	0.024	0.736
Malta	MALTA SE MSE - PRICE INDEX (~U$)	1996	16	2.31	0.228	0.113	0.004	0.394
Mauritius	S&P MAURITIUS BMI - PRICE INDEX (~U$)	1996	16	1.99	0.036	0.074	-0.057	0.192
Mexico	MEXICO IPC (BOLSA) - PRICE INDEX (~U$)	1988	24	8.12	0.377	0.234	0.005	0.788
Morocco	MOROCCO SE CFG 25 - PRICE INDEX (~U$)	1988	24	2.98	0.152	0.113	-0.015	0.447
Namibia	S&P NAMIBIA BMI - PRICE INDEX (~U$)	2001	11	10.70	0.284	0.215	-0.004	0.530
Nigeria	S&P NIGERIA BMI - PRICE INDEX (~U$)	1996	16	1.40	0.001	0.027	-0.031	0.064
Oman	OMAN MUSCAT SECURITIES MKT. - PRICE INDEX (~U$)	1997	15	2.45	0.037	0.066	-0.025	0.199
Pakistan	KARACHI SE 100 - PRICE INDEX (~U$)	1989	23	0.50	0.029	0.036	-0.045	0.108
Peru	LIMA SE GENERAL(IGBL) - PRICE INDEX (~U$)	1991	21	4.77	0.199	0.167	0.009	0.571
Philippines	PHILIPPINE SE I(PSEi) - PRICE INDEX (~U$)	1987	25	4.09	0.203	0.173	0.032	0.601
Poland	WARSAW GENERAL INDEX - TOT RETURN IND (~U$)	1992	20	6.72	0.370	0.268	-0.001	0.824
Portugal	PORTUGAL PSI GENERAL - PRICE INDEX (~U$)	1988	24	5.61	0.533	0.197	0.148	0.852

Qatar	MSCI QATAR $ - TOT RETURN IND (~U$)	2006	6	1.62	0.123	0.080	0.016	0.203
Romania	ROMANIA BET (L) - PRICE INDEX (~U$)	1998	14	7.00	0.224	0.261	-0.021	0.635
Russia	RUSSIA RTS INDEX - PRICE INDEX (~U$)	1996	16	4.44	0.321	0.226	-0.016	0.657
Saudi Arabia	S&P SAUDI ARABIA $ - TOT RETURN IND (~U$)	1998	14	2.50	0.058	0.080	-0.024	0.225
Slovakia	SLOVAKIA SAX 16 - PRICE INDEX (~U$)	1994	18	3.63	0.108	0.087	-0.013	0.280
Slovenia	MSCI SLOVENIA - TOT RETURN IND (~U$)	2003	9	2.71	0.271	0.212	0.037	0.602
South Africa	SOUTH AFRI-DS Market - TOT RETURN IND (~U$)	1987	25	3.83	0.386	0.223	0.055	0.708
South Korea	MSCI KOREA U$ - PRICE INDEX (~U$)	1988	24	11.69	0.286	0.268	-0.025	0.703
Sri Lanka	COLOMBO SE ALL SHARE - PRICE INDEX (~U$)	1987	25	0.08	0.022	0.043	-0.027	0.168
Thailand	THAILAND-DS MARKET $ - TOT RETURN IND (~U$)	1987	25	2.67	0.239	0.137	0.018	0.498
Trinidad	S&P TRINIDAD & TOBAGO BMI - PRICE INDEX (~U$)	1996	15	-0.06	0.033	0.056	-0.050	0.165
Tunisia	TUNISIA TUNINDEX - PRICE INDEX (~U$)	1998	14	0.88	0.204	0.106	0.077	0.403
Turkey	ISTANBUL SE NATIONAL 100 - PRICE INDEX (~U$)	1988	24	6.26	0.200	0.223	0.002	0.653
UAE	MSCI UAE $ - PRICE INDEX (~U$)	2006	6	1.60	0.151	0.109	-0.018	0.276
Ukraine	S&P UKRAINE BMI - PRICE INDEX (~U$)	1999	13	3.53	0.108	0.197	-0.031	0.647
Venezuela	VENEZUELA-DS Market - TOT RETURN IND (~U$)	1990	22	-0.22	0.025	0.058	-0.028	0.181
Vietnam	MSCI VIETNAM U$ - TOT RETURN IND (~U$)	2007	5	0.00	0.086	0.061	0.014	0.155

Developed markets

Country	Index	First observation	Years	t-statistic	Mean	Standard deviation	Min	Max
Australia	AUSTRALIA-DS Market - TOT RETURN IND (~U$)	1987	25	5.03	0.467	0.193	0.144	0.804
Austria	AUSTRIA-DS Market - TOT RETURN IND (~U$)	1987	25	3.60	0.556	0.182	0.277	0.890
Belgium	BELGIUM-DS Market - TOT RETURN IND (~U$)	1987	25	4.93	0.666	0.169	0.382	0.928
Canada	S&P/TSX COMPOSITE INDEX - TOT RETURN IND (~U$)	1987	25	3.07	0.475	0.199	0.021	0.797
Denmark	DENMARK-DS Market - TOT RETURN IND (~U$)	1987	25	4.43	0.558	0.163	0.318	0.880
Finland	OMX HELSINKI (OMXH) - TOT RETURN IND (~U$)	1991	21	7.44	0.595	0.202	0.233	0.918
France	FRANCE-DS Market - TOT RETURN IND (~U$)	1987	25	6.95	0.764	0.200	0.289	0.981
Germany	DAX 30 PERFORMANCE -	1987	25	6.60	0.742	0.138	0.446	0.937

	TOT RETURN IND (~U$)							
Hong Kong	HONG KONG-DS Market - TOT RETURN IND (~U$)	1987	25	4.53	0.469	0.158	0.186	0.765
Iceland	OMX ICELAND ALL SHARE - PRICE INDEX (~U$)	1993	19	3.30	0.163	0.126	0.011	0.518
Ireland	IRELAND-DS Market - TOT RETURN IND (~U$)	1987	25	3.20	0.512	0.174	0.234	0.886
Italy	ITALY-DS Market - TOT RETURN IND (~U$)	1987	25	6.07	0.622	0.283	0.134	0.948
Japan	TOPIX - TOT RETURN IND (~U$)	1987	25	1.20	0.314	0.135	0.057	0.589
Luxembourg	LUXEMBURG-DS Market - TOT RETURN IND (~U$)	1992	20	1.47	0.296	0.147	0.031	0.639
Netherlands	NETHERLAND-DS Market - TOT RETURN IND (~U$)	1987	25	6.08	0.797	0.127	0.530	0.971
New Zealand	NEW ZEALAND-DS MARKET $ - TOT RETURN IND (~U$)	1988	24	4.49	0.417	0.180	0.127	0.767
Norway	NORWAY-DS MARKET $ - TOT RETURN IND (~U$)	1987	25	4.19	0.529	0.173	0.258	0.878
Singapore	SINGAPORE-DS Market - TOT RETURN IND (~U$)	1987	25	2.38	0.486	0.176	0.190	0.780
Spain	MADRID SE GENERAL (IGBM) - PRICE INDEX (~U$)	1987	25	6.28	0.674	0.195	0.309	0.925
Sweden	OMX STOCKHOLM (OMXS) - PRICE INDEX (~U$)	1987	25	6.40	0.624	0.179	0.313	0.912
Switzerland	SWITZ-DS Market - TOT RETURN IND (~U$)	1987	25	2.43	0.698	0.121	0.446	0.860
UK	UK-DS MARKET $ - TOT RETURN IND (~U$)	1987	25	6.46	0.643	0.175	0.352	0.900
USA	S&P 500 COMPOSITE - DS TOT RETURN IND (~U$)	1987	25	4.06	0.389	0.199	0.018	0.685

Appendix 2:

A2 Determinants of the Stock Market Integration

To ease the comparison to previous works, we use an explanatory variable set that is quite similar to that of Bekaert et al. (2011), and we divide the variables into several different categories. The justification for most of the factors can already be found in Bekaert et al. (2011). Thus, in the following subsections, we only explain the reasoning behind our additional variables, the limitations of our dataset and some simplifying assumptions we make.

A2.1 MEASURES OF OPENNESS

As in Bekaert (1995) and Edison and Warnock (2003), the equity market openness measure is based upon the ratio of the market capitalization of the Standard and Poor's/International Finance Corporation (S&P/IFC) Investable to the S&P/IFC Global indices in each country. A value of one means that all the stocks in the local market are available to foreigners, and a value of zero means the exact opposite. Unfortunately, these data are limited such that they are not available for several countries and are often limited from below to the early and mid-1990s and from above to 2008. Additionally, because the values are from IFC's Emerging market database, the measure is only available for emerging markets. Hence, we make the assumption that the developed markets have completely open equity markets for their whole observation period.

To measure capital account openness, we use the Chinn-Ito financial openness index, which is available for most of our sample countries (see Chinn and Ito (2008) for details and summary statistics of the index). The index attempts to measure regulatory

restrictions on capital account transactions and is based on the information from the IMF's Annual Report on Exchange Arrangements and Exchange Regulations (AREAER). Chinn and Ito (2008) calculate the standardized principal component of the several subcomponents affecting the capital openness. The higher the index value, the more open the country is to cross-border transactions. We normalize the index to a unit interval.

For trade openness, we use the binary measure developed by Sachs et al. (1995) and Wacziarg and Welch (2008). The measure is based on five criteria: high tariff rates, extensive non-tariff barriers, large black-market exchange rate premia, state monopolies on major exports, and socialist economic systems. Country receives a value of zero if it meets any of these criteria and is deemed closed; otherwise, it receives a value one. However, in our use this measure is problematic because it ends already in 2001, and the last ten years in our sample are not covered. Thus, we make that assumption that as the trade is opened, i.e., the measure receives a value of one, it will not be closed afterwards. In practice, all our developed markets are open for the whole observation period. Our other measure for trade openness is the sum of exports and imports as a share of gross domestic product.

A2.2 POLITICAL RISK AND INSTITUTIONS

Institutional features and political instabilities could affect the integration of the markets. Lothian (2006) argues that good policies, such as price stability, fewer direct interventions, property rights protection and sound institutional structures, are associated with higher capital flows, while bad policies, weak institutions and political risks such as wars, internal conflicts and unexpected changes in the government structure negatively affect the preferences of foreign investors to invest in a country. In addition, Alfaro et al. (2008) conclude that

institutional quality is the leading causal variable explaining the differences in global capital flows.

To study the effects of institutions and the political environment, we use the political risk component of the International Country Risk Guide (ICRG) and several of its subcomponents separately. Instead of studying only the quality of institutions, namely, the vector, which combines corruption, law and order, and bureaucracy quality and its first two subcomponents separately, as has been conducted previously, we also examine the composite political risk index on its own as well as its democratic accountability, namely, the subcomponent. More information about the composition of these indices can be found in Appendix 2, Table AII. The higher values of these indices are associated with less risk. Our democracy measure aims to capture the executive constraints, their accountability to their electorate and free and fair elections with open political participation. These can all be related to sound political structures, which, for example, prevent sudden political changes. We also add dummies for countries' legal origins (Anglo-Saxon, French, and other). As a final institutional factor, we introduce an international political risk measure, which is a GDP-weighted sum of political risks across countries divided by global GDP[16]. This measure aims to capture the current global political uncertainty, weighting each country's political risk with its proportion of the global economy. Thus, conflicts in small countries do not change the measure significantly, but changes in the political environment of a major economy have more significant effects.

A2.3 FINANCIAL DEVELOPMENT

[16] Global GDP is calculated only from the list of countries included in the political risks.

We measure the development of the banking sector by the amount of private credit divided by GDP and the development of the stock market with a logarithm of the number of the listed companies and by market capitalization to GDP –ratio. In addition, we also use the market turnover as the value traded relative to GDP to proxy for equity market liquidity and efficiency. These are all standard measures of the financial sector development and widely used in previous literature (see, for example, King and Levine, 1993; and Atje and Jovanovic, 1993).

A2.4 RISK APPETITE AND BUSINESS CYCLES

Our local and global variables aim to capture investor risk appetite and business cycles. Global liquidity is measured with the U.S. broad money supply (M2), and the U.S. corporate bond spread and the Chicago Board Options Exchange Market Volatility (VIX) Index proxy for risk aversion or sentiments of world investors. To measure world business cycle, we include the world GDP growth and the five-year rolling variance of the world market portfolio return. As an additional global variable, which the previous studies have not included, we also add the TED spread to reflect global credit risk. All the above variables exhibit only time-series variation, as they are based on U.S. or global data. For the local variables, we include the past returns of the country portfolio to proxy for momentum investing by international investors and the past GDP growth, which aims to capture the economic performance of the previous year and can therefore affect investors' interests. Inflation has not been used to explain integration in a panel data setting, and thus, it is included to measure macroeconomic uncertainty. Although the global returns and country specific portfolio returns already capture some of the market behavior, we also include dummy variables to measure local crises. We follow Mishkin and White (2002) and let the

dummy receive a value of 1 if the country's market index drops by more than 20% in a single month during the year in question and is zero otherwise. It can be expected that the local crisis would drive away risk-averse international investors and thus decrease the integration of the market. In addition, because all the returns are measured in U.S. dollars, they are affected by exchange rate fluctuations. Thus, we include the change in exchange rate of local currency against the U.S. dollar as an explanatory variable. The appreciation of the exchange rate means the depreciation of the domestic currency with respect to the U.S. dollar.

A2.5 GROWTH AND INFORMATION VARIABLES

We include the common measures of growth to be included as a part of our explanatory variables: logarithm of GDP per capita, secondary school enrollment, log of life expectancy and population growth. In addition, to control for the information frictions, we also include measures for the number of telephone line subscribers per one hundred people and the number of internet users per hundred people.

Table AII. Description of variables

NBER is the National Bureau of Economic Research. WDI refers to World Bank's World Development Indicators and ICRG to the International Country Risk Guide by the Political Risk Services.

Variable	Source:	Description:
Integration	Datastream	Integration measures the integration of local stock markets to global markets. Following Pukthuanthong and Roll (2009) the integration is calculated taking principal components of the 18 most developed markets and using 10 first principal components as explanatory variables for daily local market returns. The integration variable for each country-year is the adjusted R-square. For monthly data, a 200-day rolling window is used for estimations. Frequency: Monthly and annual.
Segmentation	Bekaert et al. (2011)	Segmentation measures the value-weighted average of the absolute difference between country's local industry earnings yield and the corresponding global industry earnings yield. Availability: Developed markets: 1987-2009, Emerging markets: 1987-2005. Frequency: Monthly and annual.
Crisis periods		Global financial crisis: 8/2007 – 6/2009 and 9/2008 – 6/2009. Asian financial crisis and LTCM: 10/1997-12/1998. Dot-com bubble: 10/2000-12/2002.
U.S. recession periods	NBER	Periods: 6/1990-3/1991, 3/2001-11/2001 and 12/2007-6/2009.
Openness		
Capital account openness	Chinn-Ito (2008)	Chinn-Ito (2008) capital openness index normalized to an interval [0,1]. Chinn and Ito measure the capital account openness as a standardized principal component of the capital account restrictions presented in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions.
Equity market openness	Emerging Market Database, S&P/Compustat	The equity market openness measure is based on the ratio of the market capitalization of the constituent firms composing the International Financial Corporation (IFC) Investable index to those that compose the IFC Global index for each country. The IFC Global index is designed to capture 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 while a value of zero means that the market is completely closed from foreigners. Frequency: Annual.
Trade openness	Wacziarg and Welch (2008)	The trade measure from Wacziarg and Welch (2008) used for example in Bekaert et al. (2014). Wacziarg and Welch look at five factors: average tariff rates of 40% or more; non-tariff 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 1970s and 1980s; a state monopoly on major exports; and a socialist economic system. Country gets a value zero if it meets any of these criteria, otherwise one.
Trade/GDP	WDI	The sum of exports and imports of goods and services measured as a share of gross domestic product. Frequency: Annual.
Political Risk and Institutions		
Political Risk	ICRG	The sum of ICRG political risk sub components excluding democratic

		accountability. Frequency: Annual.
Quality of intstitutions	ICRG	The sum of ICRG subcomponents: Corruption, Law and Order, and Bureaucracy quality. Frequency: Annual.
Conflicts and Tensions	ICRG	The sum of ICRG subcomponents: Internal conflict, External conflict, Ethnic tensions, and Religious tensions. Frequency: Annual.
Government stability	ICRG	ICRG political risk subcomponent. Measures both, government's ability to carry out its declared programs and its ability to stay in office. The measure consists of three subcomponents, each scored 0-4 points: Government unity, Legislative strength and Popular support. Thus the data ranges from 0-12 points, higher number denoting lower risk. Frequency: Annual.
External conflicts	ICRG	ICRG political risk subcomponent. Measures the risk of the foreign actions to the governance. The actions could range from diplomatic pressures, trade restrictions, sanctions etc to violent external pressure. The variable is measured with three subcomponents ranging from 0-4: War, Cross-border conflict and Foreign pressures. The maximum points 12 denote very low risk. Frequency: Annual.
Internal conflicts	ICRG	ICRG political risk subcomponent. Measures the political violence and its actual or potential impacts to governance with three subcomponents, each scored 0-4 points: Civil War/Coup threat, Terrorism/Political violence, Civil disorder. Maximum points 12 denote very low risk. Frequency: Annual.
Ethnic tensions	ICRG	ICRG political risk subcomponent. The component is an assessment of the degree of tension within a country attributable to racial, nationality or language divisions. Higher ratings are given to countries where tensions are minimal while lower ratings are given to countries where racial and nationality tensions are high because opposing groups are intolerant and unwilling to compromise. Maximum points are 6. Frequency: Annual.
Military in politics	ICRG	ICRG political risk subcomponent. Assesses in what measure military is involved in politics with 0-6 point scale. The higher the number, the lower the military participation to the politics and the lower the risk. Frequency: Annual.
Religion in politics	ICRG	ICRG political risk subcomponent. Measures with a scale of 0-6 points whether single religious group is able to affect country's politics. The higher the number, the lower the single religion group's effect. Frequency: Annual.
Sosioeconomic conditions	ICRG	ICRG political risk subcomponent. Measures sosioeconomic pressures in society that could affect government actions or fuel social dissatisfaction with three subcomponents scored 0-4: Unemployment, Consumer confidence and Poverty. Maximum points 12 denote very low risk. Frequency: Annual.
Investment profile	ICRG	ICRG political risk subcomponent. Measures the factors of investment risks that are not covered by other political, economic and financial risk components with three subcomponents scored 0-4: Contract viability/Expropriation, Profits repatriation, Payment delays. Maximum points 12 denote very low risk. Frequency: Annual.
Bureaucracy quality	ICRG	ICRG political risk subcomponent. Measures whether the bureaucracy has the strength and expertise to govern without drastic changes in policy or interruptions in government services. In low risk countries, the bureaucracy tends to be somewhat autonomous from political pressure and to have an established mechanism for recruiting and training. Maximum points: 4. Frequency: Annual.
Corruption	ICRG	ICRG political risk subcomponent. Measures the corruption within the political system with a scale of 0-6, the higher points denoting less corruption. Frequency: Annual.

Law and order	ICRG	ICRG political risk subcomponent. Law and order are assessed separately, with each sub-component consisting of 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) in terms of its judicial system, but a low rating (1) if it suffers from a very high crime rate or if the law is routinely ignored without effective sanction. The higher number denotes lower risk. Frequency: Annual.
Legal origin	La Porta, Lopez-de-Silanes, Shleifer and Vishny (1997)	Dummy variables capturing the origin of the company law or commercial code of each country (English, French or other).
International political risk	ICRG and WDI	GDP weighter sum of political risks across countries divided with global GDP. Frequency: Annual.
Financial Development		
Equity market turnover	WDI	The ratio of equity market calue traded to the market capitalization. Frequency: Annual.
Private credit/GDP	WDI	Private credit divided by gross domestic product. Credit to private sector refers to financial resources provided to the private sector, suc as through loans, purchases of non-equity securities, and trade credits and other accounts receivable that establish a claim for repayment. Frequency: Annual.
MCAP/GDP	WDI	Equity market capitalization divided by gross domestic product. Frequency: Annual.
Number of public firms	WDI	The log of the number of publicly traded firms in a given country. Frequency: Annual.
Risk Appetite and Business Cycle		
U.S. Money supply growth	WDI	Annual growth in money supply (M2) for the United States. Frequency: Annual.
World GDP Growth	WDI	Growth of real world per capita gross domestic product. Frequency: Annual.
U.S. Corporate bond spread	Federal Reserve Bank of St. Louis.	The yield spread between U.S. Baa and Aaa rated bond spreads. Frequency: Monthly and annual.
VIX option volatility index	Chicago Board Options Exchange	The VIX option volatility index available from the CBOE (http://www.cboe.com). Frequency: Monthly and annual..
TED spread	Federal Reserve Bank	The difference between the interest rates for the three-month Eurodollars contracts and the three-month Treasury bill interest rate. Frequency: Monthly and annual.
Past local equity	Datastream	The lagged annual return, from December to December, on the country-level

market return		market portfolio. Available for all countries. Frequency: Monthly and annual.
World equity market volatility	Datastream	The variance of the world market portfolio returns, measures as the five-year rolling variance of the monthly return on the world market portfolio. Frequency: Monthly and annual..
Local Crisis	Datastream	Dummy variable gets value one if the local market has experienced a 20% drop during a single month in a year. Frequency: Monthly and annual.
Past GDP growth	WDI	Lagged annual percentage growth rate of GDP. Frequency: Annual.
Inflation	WDI	Inflation as measured by the annual growth rate of the GDP implicit deflator shows the rate of price change in the economy as a whole. The GDP implicit deflator is the ratio of GDP in current local currency to GDP in constant local currency. Frequency: Annual.
Exchange rate change	Datastream	Exchange rate is measured against the U.S. dollar. The appreciation of the exchange rate means the depreciation of the domestic currency with respect to the U.S. dollar. Frequency: Monthly and annual.
Information variables		
Phone lines per 100 people	WDI	Number of fixed lines and mobile phone subscribers per 100 people. Frequency: Annual.
Internet users per 100 people	WDI	Number of internet users per 100 people. Frequency: Annual.
Growth determinants		
log GDP per capita	WDI	Logarithm of real per capita gross domestic product measured as current US dollars. Frequency: Annual.
Secondary school enrollment	WDI	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) 100%. Frequency: Annual.
Log life expectancy	WDI	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. Frequency: Annual.
Population growth	WDI	Growth rate ot total population that counts all residents regardless of legal status or citizenship. Frequency: Annual.

Appendix 3:

Table AIII.1. Determinants of stock market integration: developed markets

The table reports the relationship between country market integration level and several independent variables. Equation (3) is used for developed markets with monthly data, excluding crises periods and annual data. Integration is regressed with the independent variables that have survived the model reduction algorithm. For the detailed description of all variables, see Appendix 2, Table AII. The table reports the coefficient estimates from pooled OLS regressions and the clustered standard errors, which account for cross-sectional correlation across country indices. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively. N denotes the number of observations and, R^2 is the coefficient of determination.

Dependent variable: Stock market integration			
Developed markets	Monthly	Monthly excl. crises	Annual
Variable			
Investment Profile	0.0507***	0.0505***	0.0427***
	(0.0077)	(0.0086)	(0.0089)
International Political Risk	-0.0478***	-0.0496***	-0.0170***
	(0.0047)	(0.0058)	(0.0057)
Legal origin (French)	0.1979***	0.2007***	0.1993***
	(0.0356)	(0.0369)	(0.0358)
Past Local Equity Market Returns	0.0626*		0.0447***
	(0.0354)		(0.0141)
Local crisis	-0.0458*		0.0742*
	(0.0265)		(0.0377)
Exchange rate			-0.1233**
			(0.0502)
Local Market Turnover	0.0009*	0.0011**	0.0011*
	(0.0005)	(0.0005)	(0.0005)
Private Credit/GDP	-0.0006*	-0.0008**	-0.0010**
	(0.0003)	(0.0004)	(0.0004)
Inflation			-0.0101
			(0.0065)
Past Local GDP Growth			-0.0098
			(0.0060)
World GDP Growth	-0.0069**		
	(0.0029)		
U.S. Corporate Bond Spread	-0.0251*		-0.0918***
	(0.0146)		(0.0221)
TED Spread		0.0468*	0.1981***
		(0.0245)	(0.0354)
World Market Volatility		28.7773	0.4796**
		(18.6082)	(0.2109)
VIX	0.0050***	0.0037***	

	(0.0008)	(0.0010)	
Number of Telephones	0.0040	0.0046*	0.0042
	(0.0025)	(0.0024)	(0.0025)
School Enrollment	0.0014*	0.0016	
	(0.0008)	(0.0010)	
Population Growth	-0.0825**	-0.0743*	
	(0.0388)	(0.0404)	
Intercept	3.3605***	3.3548***	1.1738***
	(0.3613)	(0.4687)	(0.3831)
N	4818	3534	396
R^2	0.56	0.58	0.57

Table AIII.2. Determinants of stock market integration: emerging markets

The table reports the relationship between country market integration level and several independent variables. Equation (3) is used for emerging markets with monthly data, excluding crises periods and annual data. Integration is regressed with the independent variables that have survived the model reduction algorithm. For the detailed description of all variables, see Appendix 2, Table AII. The table reports the coefficient estimates from pooled OLS regressions and the clustered standard errors, which account for cross-sectional correlation across country indices. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively. N denotes the number of observations and, R^2 is the coefficient of determination.

Dependent variable: Stock market integration			
Emerging markets	Monthly	Monthly excl. crises	Annual
Variable			
Equity Market Openness	0.1435***	0.1194***	0.1407***
	(0.0211)	(0.0221)	(0.0234)
Capital Account Openness		-0.0421	-0.0872**
		(0.0275)	(0.0358)
Trade Openness		0.0529***	
		(0.0193)	
Democracy	0.0133**	0.0151*	0.0101
	(0.0065)	(0.0077)	(0.0061)
Political Risk	0.0026**		0.0025**
	(0.0011)		(0.0012)
International Political Risk	-0.0083*	-0.0145***	
	(0.0041)	(0.0038)	
Legal origin (French)		0.0460**	0.0586**
		(0.0200)	(0.0237)
Past Local Equity Market Returns	-0.0309**		0.0205**
	(0.0148)		(0.0092)

Local crisis		-0.0198	0.0489**
		(0.0127)	(0.0198)
Exchange rate	-0.1196*	-0.1988**	-0.1008**
	(0.0658)	(0.0777)	(0.0408)
Private Credit/GDP	0.0007**	0.0009***	
	(0.0003)	(0.0003)	
Trade/GDP	-0.0004*		
	(0.0002)		
Inflation		-0.0001	-0.0013***
		(0.0001)	(0.0004)
GDP per capita (log)			0.0266**
			(0.0125)
Past Local GDP Growth	-0.0037**	-0.0039**	-0.0020*
	(0.0015)	(0.0015)	(0.0012)
TED Spread	0.0236**	0.0543**	0.0817***
	(0.0095)	(0.0213)	(0.0177)
VIX	0.0016**		
	(0.0007)		
Number of Internet Connections	0.0025***	0.0023***	0.0030***
	(0.0008)	(0.0009)	(0.0007)
Life Expectancy (log)	-0.1951**	-0.2763***	-0.3543***
	(0.0766)	(0.0859)	(0.1254)
Population Growth	-0.0156***	-0.0407***	-0.0211***
	(0.0054)	(0.0086)	(0.0052)
Trend	0.0006**	0.0005**	0.0049*
	(0.0002)	(0.0002)	(0.0025)
Intercept	1.1830**	2.1616***	1.0839**
	(0.4753)	(0.4819)	(0.4912)
N	6902	4068	566
R^2	0.45	0.47	0.49

Appendix 4:

Table AIV. Multicollinearity test for the determinants of integration

The table examines the multicollinearity of the determinants of integration by presenting the VIF (variance inflation factor) values for the explanatory variables with annual data. First column refers to the full sample, second to developed markets only and third to emerging markets only.

	Full sample	Developed markets	Emerging Markets
Integration	3.16	2.33	1.95
Equity Market Openness	2.43		1.72
Capital Account Openness			1.71
Investment Profile	3.75	2.28	
Democracy			1.39
Political Risk	4.58		2.15
International Political Risk	2.57	1.81	
Legal origin (French)	1.58	1.57	1.96
Past Local Equity Market Returns	1.1	1.24	1.07
Local crisis	1.37	2.1	1.3
Exchange rate	2.71	1.33	1.55
Local Market Turnover	1.24	1.58	
Private Credit/GDP		1.54	
Inflation	1.53	1.14	1.43
GDP per capita (log)			3.02
Past Local GDP Growth	1.39	1.59	1.11
U.S. Corporate Bond Spread		5.48	
TED Spread	3.52	4.58	1.38
World Market Volatility		2.31	
VIX	2.33		
U.S. Money Growth	2.18		
Number of Telephones	4.71	1.45	
Number of Internet Connections			3.37
Life Expectancy (log)	2.97		2
Population Growth	1.27		1.32
Trend	2.71		2.29
Mean VIF	2.42	2.16	1.81

Appendix 5:

Table AV. Stock market returns, integration and expansion periods

The table reports the relationship between stock market returns, past integration level and expansion periods using Equation (2) without starting period variables for the full country sample, including EM-dummy variables for the emerging markets. The left column reports the estimations with the integration measure by Pukthuanthong and Roll (2009), and the right column uses the segmentation measure of Bekaert et al. (2011). All estimations control for the country- and time-fixed effects. The table reports the coefficient estimates from pooled OLS regressions and the clustered standard errors, which account for cross-sectional correlation across country indices. ** and *** denote statistical significance at the 5% and 1% levels, respectively. N denotes the number of observations, and R^2 is the coefficient of determination.

Dependent variable: Local market returns	Integration	Segmentation
$Integration_{t-1}$	0.0089	-0.0373
	(0.0188)	(0.1338)
EM	0.0135	-0.0069
	(0.0143)	(0.0072)
$Boom\ period$	0.0947***	0.0535***
	(0.0257)	(0.0167)
$EM * Integration_{t-1}$	-0.0252	0.2156
	(0.0171)	(0.1616)
$Boom\ period * Integration_{t-1}$	-0.0223	0.0573
	(0.0230)	(0.1407)
$Boom\ period * EM$	-0.0228	-0.0053
	(0.0172)	(0.0072)
$Boom\ period * EM * Integration_{t-1}$	0.0300	-0.1104
	(0.0208)	(0.1646)
$Return_{t-1}$	0.0497**	0.0345
	(0.0211)	(0.0228)
Intercept	-0.0139	-0.0094
	(0.0187)	(0.0103)
Country fixed	Yes	Yes
Time fixed	Yes	Yes
Countries	82	68
N	18452	11925
R^2	0.30	0.27

Appendix 6:

Table AVI. Correlation coefficients of all market integration determinants

	Integration	Segmentation	Equity Market Openness	Capital Account Openness	Trade Openness	Trade/GDP
Integration	1.00					
Segmentation	-0.28	1.00				
Equity Market Openness	0.60	-0.35	1.00			
Capital Account Openness	0.45	-0.32	0.35	1.00		
Trade Openness	0.27	-0.15	0.27	0.38	1.00	
Trade/GDP	0.12	-0.04	0.08	0.24	0.10	1.00
Political Risk	0.55	-0.30	0.55	0.56	0.32	0.27
Quality of Institutions	0.52	-0.30	0.66	0.48	0.23	0.17
Conflicts and Tensions	0.31	-0.16	0.37	0.37	0.26	0.20
Democracy	0.50	-0.20	0.47	0.35	0.30	-0.12
Investment Profile	0.45	-0.22	0.17	0.47	0.27	0.29
Law and Order	0.43	-0.28	0.53	0.45	0.19	0.19
Legal origin (Anglo-Saxon)	0.02	-0.11	0.19	0.00	-0.07	0.15
Legal origin (French)	0.10	0.01	0.13	0.01	0.13	-0.24
International Political Risk	-0.18	0.11	-0.03	0.02	-0.05	0.02
Local Market Turnover	0.32	-0.16	0.28	0.06	-0.05	-0.12
Private Credit/GDP	0.53	-0.33	0.50	0.41	0.15	0.22
Market Cap/GDP	0.30	-0.36	0.35	0.30	0.16	0.48
Number of companies (ln)	0.25	-0.19	0.38	0.06	-0.05	-0.21
U.S. Money supply growth	-0.04	0.05	0.01	0.05	0.00	0.07
World GDP growth	-0.08	-0.04	0.06	-0.01	-0.03	0.01
U.S. Corporate Bond Spread	0.20	0.16	-0.11	0.05	0.05	0.07
VIX	0.10	0.23	-0.03	0.01	-0.04	0.04
TED spread	0.18	0.10	-0.05	0.02	-0.03	0.03
Past Local Equity Market Returns	0.02	-0.10	0.01	0.01	0.01	0.01
World Market Volatility	0.17	0.12	-0.04	-0.02	0.04	0.00
Local crisis	0.03	0.22	-0.06	-0.11	-0.11	-0.03
Past Local GDP Growth	-0.21	-0.05	-0.21	-0.13	-0.14	0.10
Inflation	-0.10	0.18	-0.05	-0.15	-0.12	-0.09
Exchange Rate	-0.18	0.24	-0.06	-0.22	-0.12	-0.11
Number of Telephones	0.60	-0.29	0.63	0.56	0.26	0.20
Number of Internet Connections	0.55	-0.20	0.25	0.43	0.16	0.26
GDP per capita (ln)	0.63	-0.35	0.61	0.65	0.40	0.25
School Enrollment	0.54	-0.21	0.50	0.53	0.29	0.10
Life Expectancy (ln)	0.49	-0.22	0.55	0.51	0.31	0.21
Population Growth	-0.25	0.00	-0.16	-0.08	-0.10	0.07

	Political Risk	Quality of Institutions	Conflicts and Tensions	Democracy	Investment Profile	Law and Order
Integration						
Segmentation						
Equity Market Openness						
Capital Account Openness						
Trade Openness						
Trade/GDP						
Political Risk	1.00					
Quality of Institutions	0.83	1.00				
Conflicts and Tensions	0.84	0.64	1.00			
Democracy	0.55	0.55	0.36	1.00		
Investment Profile	0.61	0.28	0.25	0.28	1.00	
Law and Order	0.81	0.88	0.67	0.39	0.32	1.00
Legal origin (Anglo-Saxon)	-0.12	0.08	-0.28	-0.02	-0.08	-0.03
Legal origin (French)	-0.18	-0.17	-0.06	0.03	-0.17	-0.21
International Political Risk	0.12	0.01	0.08	-0.02	0.10	0.07
Local Market Turnover	0.14	0.22	-0.03	0.06	0.16	0.21
Private Credit/GDP	0.56	0.57	0.31	0.33	0.42	0.52
Market Cap/GDP	0.33	0.28	0.17	0.02	0.33	0.23
Number of companies (ln)	0.03	0.17	-0.12	0.13	0.00	0.10
U.S. Money supply growth	0.08	-0.04	0.02	0.00	0.17	0.03
World GDP growth	0.02	0.03	0.02	0.02	-0.06	0.03
U.S. Corporate Bond Spread	-0.02	-0.10	-0.11	0.00	0.23	-0.08
VIX	0.02	-0.03	-0.06	-0.02	0.10	-0.02
TED spread	-0.02	-0.01	-0.09	0.02	0.05	-0.03
Past Local Equity Market Returns	0.00	-0.01	0.00	0.01	0.02	-0.01
World Market Volatility	-0.10	-0.10	-0.16	-0.02	0.12	-0.14
Local crisis	-0.10	-0.11	-0.07	-0.02	-0.06	-0.09
Past Local GDP Growth	-0.13	-0.18	-0.12	-0.24	0.00	-0.11
Inflation	-0.07	-0.04	0.00	-0.07	-0.11	-0.07
Exchange Rate	-0.22	-0.14	-0.14	-0.09	-0.27	-0.16
Number of Telephones	0.76	0.80	0.54	0.58	0.38	0.71
Number of Internet Connections	0.48	0.31	0.12	0.32	0.68	0.29
GDP per capita (ln)	0.79	0.74	0.56	0.50	0.53	0.69
School Enrollment	0.70	0.64	0.54	0.56	0.39	0.58
Life Expectancy (ln)	0.63	0.63	0.46	0.41	0.35	0.60
Population Growth	-0.23	-0.20	-0.24	-0.34	-0.08	-0.16

	Legal origin (Anglo-Saxon)	Legal origin (French)	International Political Risk	Local Market Turnover	Private Credit/GDP	Market Cap/GDP
Integration						
Segmentation						
Equity Market Openness						
Capital Account Openness						
Trade Openness						
Trade/GDP						
Political Risk						
Quality of Institutions						
Conflicts and Tensions						
Democracy						
Investment Profile						
Law and Order						
Legal origin (Anglo-Saxon)	1.00					
Legal origin (French)	-0.36	1.00				
International Political Risk	-0.02	-0.02	1.00			
Local Market Turnover	0.11	-0.03	0.03	1.00		
Private Credit/GDP	0.20	-0.18	-0.09	0.30	1.00	
Market Cap/GDP	0.31	-0.13	0.02	0.18	0.51	1.00
Number of companies (ln)	0.43	0.02	0.01	0.46	0.33	0.29
U.S. Money supply growth	-0.03	-0.03	0.44	0.07	-0.02	0.09
World GDP growth	0.02	0.01	0.18	-0.01	-0.05	0.06
U.S. Corporate Bond Spread	-0.03	-0.03	-0.24	0.05	0.09	-0.04
VIX	-0.01	-0.03	0.20	0.05	0.01	-0.06
TED spread	0.01	-0.01	-0.12	0.07	0.06	-0.01
Past Local Equity Market Returns	0.00	0.00	-0.06	0.04	-0.05	0.07
World Market Volatility	-0.01	-0.01	-0.46	-0.05	0.07	-0.09
Local crisis	-0.07	0.08	-0.05	0.06	-0.05	-0.15
Past Local GDP Growth	0.07	-0.06	0.05	0.01	-0.16	0.05
Inflation	-0.05	0.12	-0.05	-0.01	-0.04	-0.07
Exchange Rate	-0.04	0.14	0.08	-0.04	-0.18	-0.16
Number of Telephones	0.00	-0.14	0.06	0.25	0.62	0.37
Number of Internet Connections	-0.01	-0.16	-0.19	0.27	0.54	0.31
GDP per capita (ln)	-0.09	-0.08	-0.12	0.20	0.62	0.38
School Enrollment	-0.13	0.00	0.05	0.13	0.41	0.21
Life Expectancy (ln)	-0.14	0.09	-0.05	0.23	0.50	0.26
Population Growth	0.15	0.01	-0.08	-0.05	-0.11	0.09

	Number of companies (ln)	U.S. Money supply growth	World GDP growth	U.S. Corporate Bond Spread	VIX	TED spread
Integration						
Segmentation						
Equity Market Openness						
Capital Account Openness						
Trade Openness						
Trade/GDP						
Political Risk						
Quality of Institutions						
Conflicts and Tensions						
Democracy						
Investment Profile						
Law and Order						
Legal origin (Anglo-Saxon)						
Legal origin (French)						
International Political Risk						
Local Market Turnover						
Private Credit/GDP						
Market Cap/GDP						
Number of companies (ln)	1.00					
U.S. Money supply growth	-0.01	1.00				
World GDP growth	0.02	0.37	1.00			
U.S. Corporate Bond Spread	-0.03	0.11	-0.31	1.00		
VIX	-0.02	0.29	-0.17	0.63	1.00	
TED spread	0.00	0.26	-0.19	0.73	0.61	1.00
Past Local Equity Market Returns	0.00	0.14	0.51	0.04	-0.08	-0.01
World Market Volatility	-0.02	-0.61	-0.31	0.21	0.01	-0.19
Local crisis	0.01	0.03	-0.16	0.40	0.35	0.38
Past Local GDP Growth	0.01	0.28	-0.05	0.11	0.04	0.16
Inflation	0.03	-0.06	0.01	-0.01	-0.03	0.00
Exchange Rate	-0.04	0.09	0.03	0.08	0.15	0.13
Number of Telephones	0.22	0.04	0.01	-0.01	0.02	-0.02
Number of Internet Connections	0.07	-0.07	-0.10	0.30	0.05	0.23
GDP per capita (ln)	0.09	0.00	-0.03	0.11	0.01	0.07
School Enrollment	0.10	0.04	-0.03	0.01	0.02	-0.02
Life Expectancy (ln)	0.19	-0.03	-0.02	0.04	0.00	0.04
Population Growth	-0.09	-0.01	-0.03	0.05	-0.01	0.07

	Past Local Equity Market Returns	World Market Volatility	Local crisis	Past Local GDP Growth	Inflation	Exchange Rate
Integration						
Segmentation						
Equity Market Openness						
Capital Account Openness						
Trade Openness						
Trade/GDP						
Political Risk						
Quality of Institutions						
Conflicts and Tensions						
Democracy						
Investment Profile						
Law and Order						
Legal origin (Anglo-Saxon)						
Legal origin (French)						
International Political Risk						
Local Market Turnover						
Private Credit/GDP						
Market Cap/GDP						
Number of companies (ln)						
U.S. Money supply growth						
World GDP growth						
U.S. Corporate Bond Spread						
VIX						
TED spread						
Past Local Equity Market Returns	1.00					
World Market Volatility	-0.10	1.00				
Local crisis	-0.01	0.02	1.00			
Past Local GDP Growth	0.11	-0.20	0.06	1.00		
Inflation	0.04	0.02	0.12	-0.02	1.00	
Exchange Rate	0.01	-0.06	0.31	0.00	0.43	1.00
Number of Telephones	0.00	-0.02	-0.10	-0.21	-0.10	-0.17
Number of Internet Connections	-0.03	0.25	0.02	-0.17	-0.07	-0.21
GDP per capita (ln)	0.01	0.07	-0.06	-0.20	-0.07	-0.20
School Enrollment	-0.01	-0.05	-0.09	-0.25	-0.08	-0.20
Life Expectancy (ln)	-0.01	0.03	-0.03	-0.14	-0.07	-0.15
Population Growth	-0.04	-0.03	0.01	0.22	0.03	0.05

	Number of Telephones	Number of Internet Connections	GDP per capita (ln)	School Enrollment	Life Expectancy (ln)	Population Growth
Integration						
Segmentation						
Equity Market Openness						
Capital Account Openness						
Trade Openness						
Trade/GDP						
Political Risk						
Quality of Institutions						
Conflicts and Tensions						
Democracy						
Investment Profile						
Law and Order						
Legal origin (Anglo-Saxon)						
Legal origin (French)						
International Political Risk						
Local Market Turnover						
Private Credit/GDP						
Market Cap/GDP						
Number of companies (ln)						
U.S. Money supply growth						
World GDP growth						
U.S. Corporate Bond Spread						
VIX						
TED spread						
Past Local Equity Market Returns						
World Market Volatility						
Local crisis						
Past Local GDP Growth						
Inflation						
Exchange Rate						
Number of Telephones	1.00					
Number of Internet Connections	0.47	1.00				
GDP per capita (ln)	0.86	0.60	1.00			
School Enrollment	0.75	0.43	0.78	1.00		
Life Expectancy (ln)	0.72	0.48	0.76	0.65	1.00	
Population Growth	-0.29	-0.04	-0.11	-0.29	-0.18	1.00

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Figures

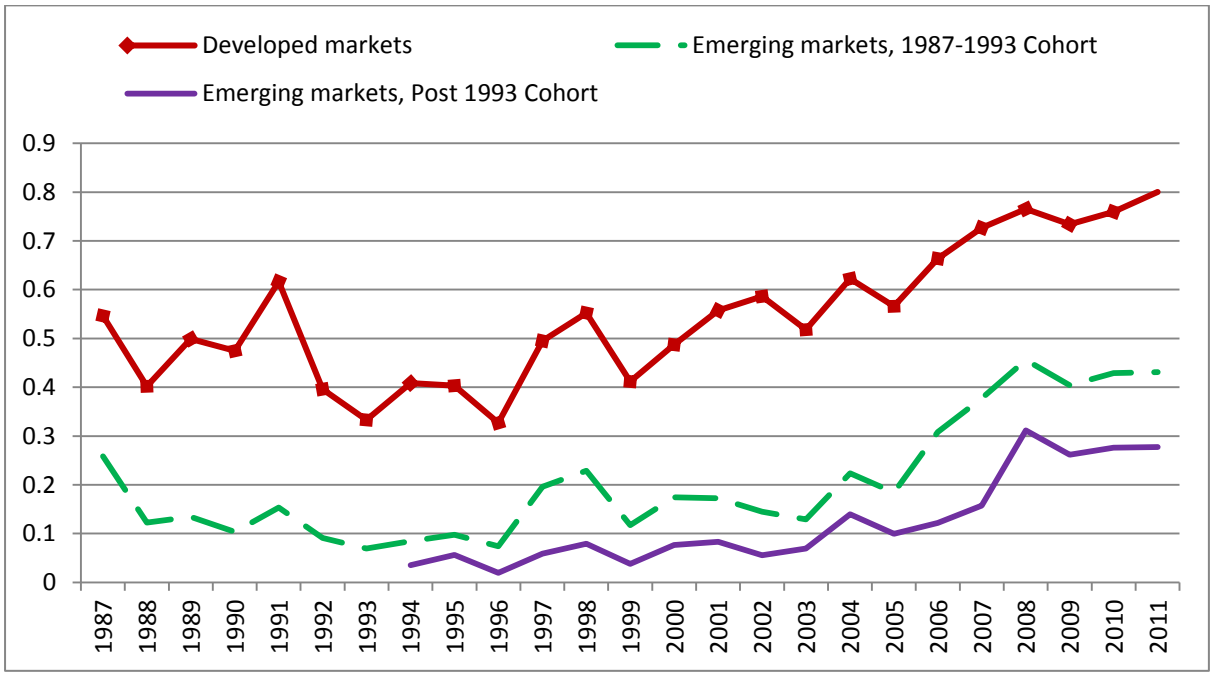

Figure 1. Average integration: Developed and emerging markets, 1987-2011. Global market integration for developed markets and two emerging market country cohorts. Integration is measured as an adjusted R-squared statistic from regressions of country index returns on global factors. Global factors are estimated using out-of-sample principal components based on the covariance matrix in the previous calendar year computed using the returns from 18 industrialized economies. The figure shows within-country cohort averaged annual R-square estimates. The cohorts are formed based on how countries initially appear in our dataset. Most developed markets and some emerging markets are limited to begin in 1987.

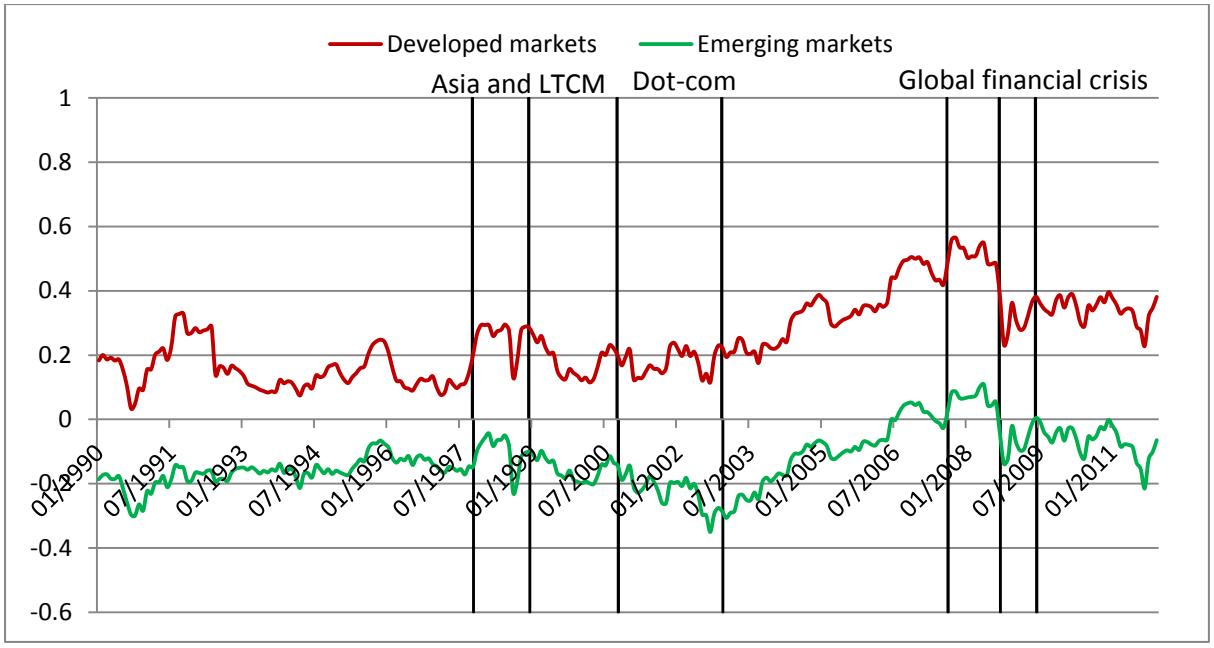

Figure 2. Integration dynamics and crises periods: Average monthly integration. The integration measure is orthogonalized with respect to VIX and world market volatility, i.e., the original measure is regressed with respect to VIX and world volatility, and we use the residuals as the measure. Vertical lines denote the Asian financial crisis and the LTCM crises: 10/1997-12/1998; the Dot-com crisis: 10/2000-12/2002; and the global financial crisis: 8/2007-, 9/2008-6/2009.

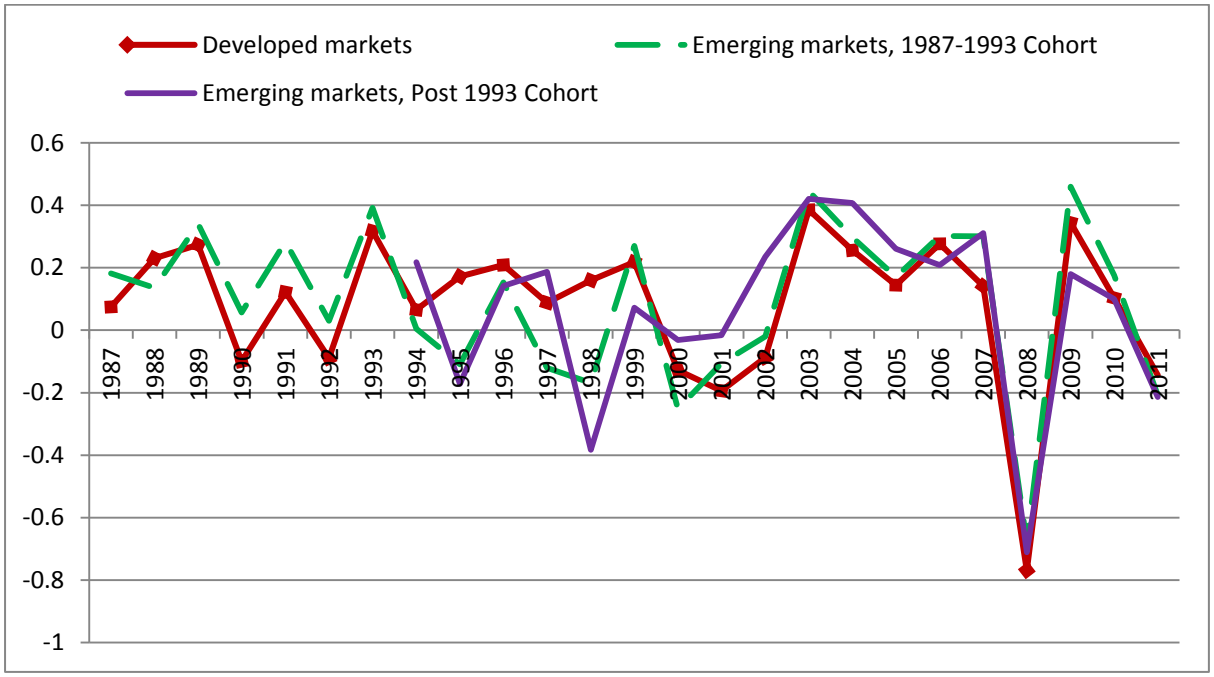

Figure 3. Average annual returns: Developed and emerging markets, 1987-2011. Average returns for developed markets and two emerging market country cohorts measured as annual returns and denominated in U.S. dollars.

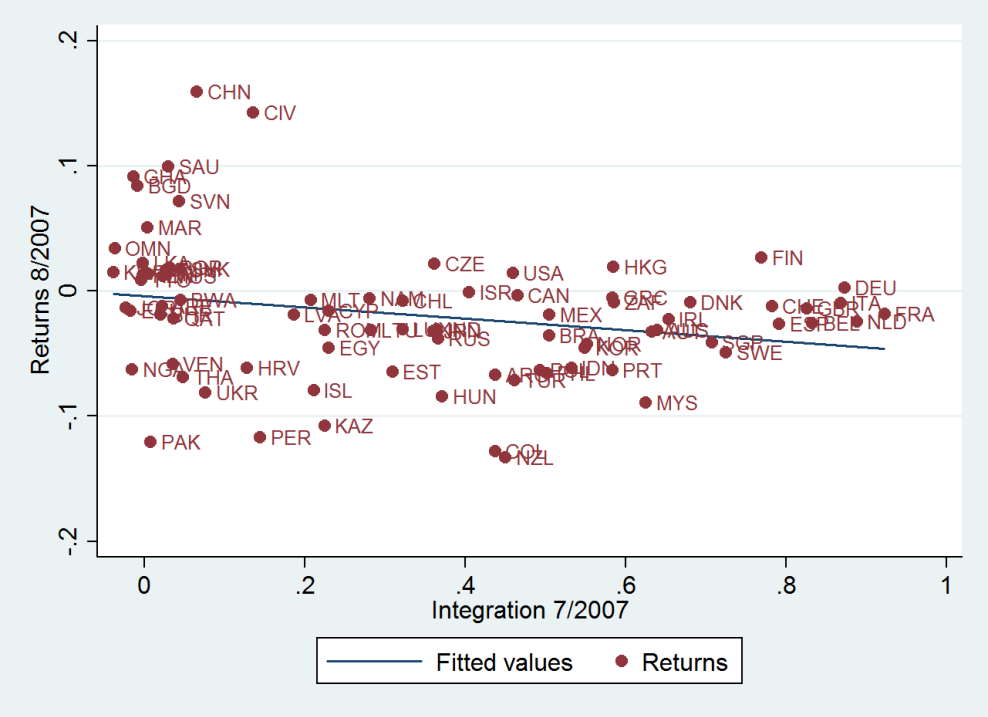

Figure 4. Local stock market returns in 8/2007 and integration level in 7/2007

Tables

Table I: Market integration and global financial crisis

The table presents the relationship between the stock market integration level and the global financial crisis. In columns I and II, the crisis period is defined to be from 8/2007 to 6/2009 and 9/2008 to 6/2009, respectively. Column III concerns the U.S. recession periods: 6/1990-3/1991, 3/2001-11/2001 and 12/2007-6/2009. In all cases, the estimated model is Equation (1), where crises are measured at the monthly level. All the regressions also include the previous period's integration level and the time-trend as well as a constant. Each of these variables is also regressed with the emerging market dummy to study whether there are differences between emerging and developed markets. To control for possible bias created by abnormal volatility of the markets, control measures for VIX and world volatility are also included. The table reports the coefficient estimates from pooled OLS regressions and the clustered standard errors, which account for cross-sectional correlation across country indices. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively. N denotes the number of observations, and R^2 is the coefficient of determination.

Dependent variable: $Integration_t$	I		II		III	
		EM-dummy		EM-dummy		EM-dummy
$Integration_{t-1}$	0.9833***		0.9834***	0.0016	0.9832***	0.0022
	(0.0037)		(0.0037)	(0.0044)	(0.0036)	(0.0043)
Global crisis 2007	-0.0026*	0.0043**				
	(0.0015)	(0.0018)				
Global crisis 2008			-0.0074**	0.0069*		
			(0.0030)	(0.0036)		
Recession					-0.0015	-0.0011
					(0.0018)	(0.0019)
EM	-0.0039***		-0.0041***		-0.0048	
	(0.0014)		(0.0014)		(0.0014)	
VIX	0.0006***		0.0006***		0.0006***	
	(0.0001)		(0.0001)		(0.0001)	
World volatility	-1.3914***		-1.5187***		-1.6617***	
	(0.2968)		(0.2705)		(0.2993)	
$Trend * 100$	0.0034***	-0.0019**	0.0034***	-0.0017**	0.0030***	-0.0012
	(0.0007)	(0.0008)	(0.0007)	(0.0008)	(0.0007)	(0.0009)
Intercept	-0.0050***		-0.0056***		-0.0048***	
	(0.0013)		(0.0012)		(0.0012)	
Countries	82		82		82	
N	17655		17655		17655	
R^2	0.98		0.98		0.98	

Table II: Integration and stock market crises

The table presents the relationship between the stock market integration level and the global financial crisis using Equation (1). To save space, only the coefficients β_2 and α_2 are presented. In panel A, the dependent variable is the segmentation measure by Bekaert et al. (2011), and the estimated models are similar to Table I. In panels B and C, the crisis variables are the Asian financial crisis and the LTCM crises: 10/1997-12/1998; the Dot-com crisis: 10/2000-12/2002; and all the previously used crises combined. The table reports the coefficient estimates from pooled OLS regressions and the clustered standard errors, which account for cross-sectional correlation across country indices. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively. N denotes the number of observations, and R^2 is the coefficient of determination.

Panel A	Dependent variable: Segmentation					
	Global crisis 2007		Global crisis 2008		Recession	
		EM-dummy		EM-dummy		EM-dummy
Crisis period	0.0005		-0.0010		0.0003	0.0012*
	(0.0004)		(0.0007)		(0.0003)	(0.0007)
Countries	68		68		68	
N	11257		11257		11257	
R^2	0.90		0.90		0.90	
Panel B	Dependent variable: Integration					
	Asia and LTCM		Dot-com		All Crises	
		EM-dummy		EM-dummy		EM-dummy
Crisis period	0.0080***	-0.0063**	0.0003	-0.0065***	0.0006	-0.0046***
	(0.0017)	(0.0024)	(0.0009)	(0.0012)	(0.0012)	(0.0014)
Countries	82		82		82	
N	17655		17655		17655	
R^2	0.98		0.98		0.98	
Panel C	Dependent variable: Segmentation					
	Asia and LTCM		Dot-com		All Crises	
		EM-dummy		EM-dummy		EM-dummy
Crisis period	-0.0015***	0.0030***	-0.0001	0.0009*	-0.0007**	0.0019***
	(0.0003)	(0.0008)	(0.0002)	(0.0005)	(0.0003)	(0.0005)
Countries	68		68		68	
N	11257		11257		11257	
R^2	0.90		0.90		0.90	

Table III. Stock market returns, global financial crisis and market integration

The table presents the relationship between stock market returns, past integration level and the global financial crisis using Equation (2) for the full country sample, including EM-dummy variables for the emerging markets. Column I measures the effect of the past integration level on stock returns. Columns II and III concern the effects of past integration on the propagation of the crisis and its effect on the returns during the crisis using monthly data and an integration measure. Columns IV and V concern the same question with the segmentation measure of Bekaert et al. (2011) instead of integration. All estimations in columns II-V control for the country- and time-fixed effects on the estimations. The table reports the coefficient estimates from pooled OLS regressions and the clustered standard errors, which account for cross-sectional correlation across country indices. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively. N denotes the number of observations, and R^2 is the coefficient of determination.

Dependent variable: Local market returns					
	I	II	III	IV	V
$Integration_{t-1}$	-0.0068***	-0.0103*	-0.0139**	0.0104	-0.0026
	(0.0025)	(0.0057)	(0.0058)	(0.0590)	(0.0611)
EM	-0.0032**	-0.0074**	-0.0082**	-0.0122***	-0.0127***
	(0.0012)	(0.0034)	(0.0035)	(0.0029)	(0.0030)
$CrisisStart$		-0.0454*	-0.0765***	-0.0702***	-0.0889***
		(0.0254)	(0.0212)	(0.0180)	(0.0192)
$CrisisPeriod$		-0.1154**	-0.1532**	-0.0515***	-0.0550***
		(0.0447)	(0.0641)	(0.0167)	(0.0165)
$EM * Integration_{t-1}$		0.0016	0.0031	0.1228	0.1356
		(0.0075)	(0.0074)	(0.0822)	(0.0838)
$CrisisStart * Integration_{t-1}$		-0.0463*	-0.0440*	1.0429**	0.2619
		(0.0235)	(0.0247)	(0.4259)	(0.3111)
$CrisisPeriod * Integration_{t-1}$		0.0479	0.0980	-0.1115	-0.0170
		(0.0511)	(0.0758)	(0.1704)	(0.1557)
$CrisisStart * EM$		0.0171	-0.0424*		
		(0.0199)	(0.0243)		
$CrisisPeriod * EM$		0.0457	0.0746		
		(0.0426)	(0.0650)		
$CrisisStart * EM * Integration_{t-1}$		0.0201	-0.0219		
		(0.0396)	(0.0481)		
$CrisisPeriod * EM * Integration_{t-1}$		-0.0587	-0.0883		
		(0.0517)	(0.0785)		
$Return_{t-1}$	0.1306***	0.0493**	0.0495**	0.0349	0.0350
	(0.0195)	(0.0210)	(0.0209)	(0.0228)	(0.0229)
Intercept	0.0099***	0.0786***	0.0812***	0.0446***	0.0453***
	(0.0016)	(0.0161)	(0.0161)	(0.0164)	(0.0163)
Country fixed	No	Yes	Yes	Yes	Yes
Time fixed	No	Yes	Yes	Yes	Yes
Countries	82	82	82	68	68

N	18452	18452	18452	11925	11925
R^2	0.02	0.30	0.30	0.27	0.27

Table IV. Stock market returns, financial crises and market integration

The table presents the relationship between stock market returns, past integration level and financial crises using Equation (2) for the full country sample, including EM-dummy variables for the emerging markets. Only coefficients β_4 and β_6 are reported. In panel A, the integration is measured with the measure by Pukthuanthong and Roll (2009), while in panel B, the segmentation measure of Bekaert et al. (2011) is used. All estimations control for the country- and time-fixed effects on the estimations. The table reports the coefficient estimates from pooled OLS regressions and the clustered standard errors, which account for cross-sectional correlation across country indices. ** and *** denote statistical significance at the 5% and 1% levels, respectively. N denotes the number of observations, and R^2 is the coefficient of determination.

Panel A	Dependent variable: Local market returns		
	Asian and LTCM	Dot-com	All Crises
$CrisisStart * Integration_{t-1}$	0.1466***	0.0252	-0.0234
	(0.0365)	(0.0437)	(0.0193)
$CrisisPeriod * Integration_{t-1}$	0.0320**	-0.0153	0.0019
	(0.0159)	(0.0109)	(0.0118)
Country fixed	Yes	Yes	Yes
Time fixed	Yes	Yes	Yes
Countries	82	82	82
N	18452	18452	18452
R^2	0.30	0.30	0.30
Panel B	Dependent variable: Local market returns		
	Asian and LTCM	Dot-com	All Crises
$CrisisStart * Segmentation_{t-1}$	-0.2893	0.4338	0.1418
	(1.5024)	(1.0473)	(0.4252)
$CrisisPeriod * Segmentation_{t-1}$	-1.0243**	0.3592	-0.2296
	(0.5021)	(0.2342)	(0.1540)
Country fixed	Yes	Yes	Yes
Time fixed	Yes	Yes	Yes
Countries	68	68	68
N	11925	11925	11925
R^2	0.28	0.28	0.28

Table V. Determinants of stock market integration: full sample

The table reports the relationship between the country market integration level and several independent variables. Equation (3) is used for the full sample with monthly data, excluding crises periods and annual data. Integration is regressed with the independent variables that have survived the model reduction algorithm described above. For the detailed description of all variables, see Appendix 2, Table AII. The table reports the coefficient estimates from pooled OLS regressions and the clustered standard errors, which account for cross-sectional correlation across country indices. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively. N denotes the number of observations, and R^2 is the coefficient of determination.

Dependent variable: Stock market integration			
Full sample	Monthly	Monthly excl. crises	Annual
Variable			
Equity Market Openness	0.1714***	0.1524***	0.1785***
	(0.0296)	(0.0311)	(0.0317)
Investment Profile	0.0190*	0.0280***	0.0229***
	(0.0072)	(0.0060)	(0.0071)
Quality of Institutions		0.0122*	
		(0.0066)	
Political Risk	0.0037**		0.0029
	(0.0018)		(0.0017)
International Political Risk	-0.0274***	-0.0302***	-0.0086**
	(0.0039)	(0.0043)	(0.0033)
Legal origin (French)	0.1168***	0.1219***	0.1294***
	(0.0394)	(0.0430)	(0.0372)
Past Local Equity Market Returns		-0.0517***	0.0175*
		(0.0194)	(0.0097)
Local crisis			0.0346
			(0.0211)
Exchange rate	-0.2186**	-0.2862**	-0.1068***
	(0.0909)	(0.1278)	(0.0359)
Local Market Turnover	0.0005**	0.0005**	0.0005**
	(0.0002)	(0.0002)	(0.0002)
Inflation			-0.0022***
			(0.0006)
Past Local GDP Growth	-0.0071***	-0.0064**	-0.0062***
	(0.0018)	(0.0025)	(0.0019)
World GDP Growth		0.0043	
		(0.0028)	
U.S. Corporate Bond Spread	-0.0291***		
	(0.0086)		
TED Spread	0.0409***	0.0704***	0.1607***
	(0.0068)	(0.0176)	(0.0220)
World Market Volatility	14.8342*		

	(7.5321)		
VIX	0.0028***	0.0023***	-0.0023***
	(0.0006)	(0.0007)	(0.0006)
U.S. Money Growth		-0.0036**	-0.0067***
		(0.0017)	(0.0019)
Number of Telephones	0.0045***	0.0042***	0.0044***
	(0.0012)	(0.0014)	(0.0012)
Life Expectancy (log)	-0.3391*	-0.3689*	-0.3594**
	(0.1711)	(0.1912)	(0.1704)
Population Growth	-0.0139*	-0.0211*	-0.0191**
	(0.0080)	(0.0107)	(0.0085)
Trend	0.0007***	0.0008***	0.0052***
	(0.0002)	(0.0002)	(0.0029)
Intercept	2.9690***	3.4075***	1.7850**
	(0.8042)	(0.9069)	(0.7762)
N	12084	8425	999
R^2	0.66	0.64	0.68

Table VI. Contribution of integration variables

Columns I, II and III refer to the full sample, developed markets and emerging markets, respectively. In panel A, we report the effects of each integration variable when it experiences either a change with a value of one standard deviation (for the global and U.S. variables) or the change with the magnitude of the difference between the mean value of developed countries and the mean value of emerging countries (for the remainder of the variables). Panel B reports the contributions of each of the explanatory variables to the predicted integration level, defined as the ratio of the covariance between the given variable and the predicted integration level relative to the variance of the predicted integration level. N denotes the country-years and R^2 the coefficient of determination.

Panel A: Effect on integration			
Variable	I	II	III
Equity Market Openness	0.1074		0.0847
Capital Account Openness			-0.0343
Investment Profile	0.0285	0.0531	
Democracy			0.0140
Political Risk	0.0532		0.0464
International Political Risk	-0.0187	-0.0366	
Legal origin (French)	-0.0110	-0.0169	-0.0050
Past Local Equity Market Returns	0.0001	0.0002	0.0001
Local crisis	-0.0034	-0.0074	-0.0049
Exchange rate	0.0053	0.0061	0.0050
Local Market Turnover	0.0161	0.0349	
Private Credit/GDP		-0.0614	
Inflation	0.0450	0.2043	0.0268
GDP per capita (log)			0.0545
Past Local GDP Growth	0.0108	0.0171	0.0035
U.S. Corporate Bond Spread		-0.0495	
TED Spread	0.0688	0.0848	0.0350
World Market Volatility		0.0355	
VIX	-0.0184		
U.S. Money Growth	-0.0252		
Number of Telephones	0.1458	0.1393	
Number of Internet Connections			0.0622
Life Expectancy (log)	-0.0430		-0.0424
Population Growth	0.0120		0.0133
Trend	-0.0124		-0.0117
Panel B: Overall contribution to market integration			
Variable	I	II	III
Equity Market Openness	0.2537		0.1985
Capital Account Openness			-0.0358
Investment Profile	0.1335	0.3533	
Democracy			0.0653
Political Risk	0.1118		0.0891

International Political Risk	0.0061	0.0344	
Legal origin (French)	0.0281	0.2773	0.0003
Past Local Equity Market Returns	0.0016	-0.0001	0.0112
Local crisis	-0.0001	0.0297	0.0235
Exchange rate	0.0164	0.0110	0.0287
Local Market Turnover	0.0515	0.2037	
Private Credit/GDP		-0.0155	
Inflation	0.0422	0.0207	0.0312
GDP per capita (log)			0.1317
Past Local GDP Growth	0.0354	0.0456	0.0084
U.S. Corporate Bond Spread		-0.1249	
TED Spread	0.0514	0.1508	0.0956
World Market Volatility		0.0453	
VIX	-0.0043		
U.S. Money Growth	-0.0051		
Number of Telephones	0.3108	-0.0313	
Number of Internet Connections			0.2450
Life Expectancy (log)	-0.1060		-0.0682
Population Growth	0.0536		0.1194
Trend	0.0196		0.0562
Total variance contribution	1.00	1.00	1.00
N	999	396	566
R^2	0.68	0.54	0.43