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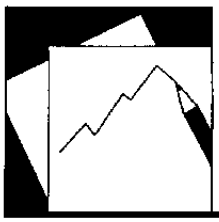

IMF Working Paper

International Stock Returns and Market Integration: A Regional Perspective

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Research Department

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Abstract

The views expressed in this Working Paper are those of the author(s) and do not necessarily represent those of the IMF or IMF policy. Working Papers describe research in progress by the author(s) and are published to elicit comments and to further debate.

We investigate the relative importance of country and industry effects in international stock returns, with the innovation that we decompose country effects into region and within-region country effects. We divide the global stock market into the Americas, Asia, and Europe and find that most of the variation explained by country effects is actually due to region effects. Over time, these region effects have fallen. Within regions, however, only in Europe has segmentation declined, while it has increased elsewhere. Europe is also the only region where industry effects are now robustly more important than country effects.

JEL Classification Numbers: G11, G15

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I. INTRODUCTION

A stylized fact in the literature on portfolio diversification is that diversifying across countries is more effective for risk reduction than diversifying across industries. Heston and Rouwenhorst (1994, 1995), Griffin and Karolyi (1998), and Rouwenhorst (1999) show that country effects are more important in explaining international variation in stock returns than global industry effects. More recently, however, against the backdrop of a dramatic rise in comovement across national stock markets, Cavaglia et al. (2000) and L'Her et al. (2002) find that global industry effects now surpass country effects in importance.[2]

Both papers explain this shift largely in terms of greater integration across capital markets. For example, they argue that declining barriers to international investment and advances in information technology are reducing home bias so that country-specific investor sentiment now plays a smaller role in national stock markets than in the past. In addition, they argue that firms are becoming more diversified across countries in their revenues and operations so that country-specific economic shocks now matter less for national stock markets than before. Both hypotheses imply that the importance of country-specific shocks should have fallen over time. This is not, however, what Cavaglia et al. (2000) find. For the cross-section of stocks in the 21 countries included in the MSCI World Developed Markets universe, they show that country effects have, if anything, become more important from 1989 to 1999. Instead, the recent shift in the balance between global industry and country effects is driven largely by a dramatic rise in the magnitude of global industry effects.[3]

Can this rise be explained in terms of greater market integration? Brooks and Del Negro (2002) construct a new dataset that covers virtually the entire global stock market and find—for this more comprehensive dataset—that industry effects have grown so dramatically in recent years that they have gone from less than half to almost twice as important as country effects since the mid-1990s. However, they find that this rise is driven by a narrow set of sectors. Outside of technology, media, and telecommunications (TMT), the magnitude of industry effects is unchanged in absolute and in relative terms since the mid-1980s.[4] Based

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[2] The correlation coefficient of U.S. stock returns with equity returns in other developed countries has risen from a relatively stable level of around 0.4 from the mid-1980s to the mid-1990s to close to 0.9 recently. We calculated these correlations using a rolling two-year window for U.S. dollar-denominated monthly returns from the DataStream Global Equity indices. The developed markets index excluding the United States comprises the United Kingdom, France, Germany, Italy, Japan, Canada, Australia, Austria, Belgium, Denmark, Hong Kong SAR, Ireland, the Netherlands, New Zealand, Norway, Spain, Portugal, Sweden, Switzerland, Finland, Luxembourg, and Singapore.

[3] L'Her et al (2002) find that country effects have fallen in importance since 1992. This is consistent with Cavaglia et al (2000) who find that country effects rose from a low in the late 1980s to a peak in the early 1990s and then fell. Overall, however, they have risen slightly since 1989.

[4] They focus on TMT because these sectors have been identified in the financial press as being central to the recent stock market bubble. Following the market peak in March 2000,

on this result, they explore if the increase in TMT industry effects is consistent with the notion that these sectors are more international than the rest of the economy. Ranking their sample by the percentage of total sales that firms generate abroad and the fraction of total assets held internationally, they find that industry effects have risen by more for the bottom quartile of firms (low international sales or assets) than for the top quartile (very international firms), a pattern hard to reconcile with the notion that TMT firms are more international than the rest of the economy. More generally, augmenting the Heston and Rouwenhorst (1994) regressions with international diversification effects (decile dummies based on the share of international sales and assets), they find that these diversification effects explain none of the recent rise in industry effects. Overall, their results point against the recent increase in global industry effects being driven by market integration, leaving open the possibility that their rise is a temporary phenomenon driven by the recent stock market bubble.

At the global level, efforts to explain the evolution of country and industry effects in terms of market integration have therefore not been successful. But is the global stock market the wrong place to look? The emergence of large regional trading blocks—the European Union, the North American Free Trade Agreement, and the Association of Southeast Asian Nations—suggests that evidence on market integration may be stronger at a regional level. In addition, institutional changes in Europe such as European Monetary Union (EMU) and the associated rise in harmonization of government policies stand in contrast to the Americas and Asia where there has been little comparable momentum. As a result, there may be significant differences *across* regions in the degree to which capital markets are becoming integrated *within* regions, a perspective that is lost in a purely global analysis.

In this paper we explore the evolution of country and industry effects from a regional perspective. We do this in two steps. First, we investigate if country effects have become less important within regions, even if they have not fallen at the level of the global stock market. We do this by replacing the country effects in the model of Heston and Rouwenhorst (1994) with region effects, which measure the degree of segmentation of regional stock portfolios relative to the global stock portfolio, and within-region country effects, which measure the extent to which country stock portfolios are segmented vis-à-vis the relevant regional stock portfolio. Using the dataset constructed by Brooks and Del Negro (2002), we then follow the Morgan Stanley Capital International (MSCI) index classification in dividing the global stock market into three broad regions: the Americas, Asia, and Europe.

Broadly speaking, we find that these region effects explain between 60 percent and 90 percent of the historical importance of the Heston and Rouwenhorst (1994, 1995) and Griffin and Karolyi (1998) country effects. This suggests that portfolio managers may be able to achieve much of the benefit from cross-country diversification—with much lower transaction costs than when explicitly diversifying across dozens of countries—by simply

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The Economist writes in November 25, 2000: "Where there has been uncommon value since June has been in shorting TMT shares and buying conservative value shares." In its May 5, 2001 issue *The Economist* links the TMT sectors and the stock market bubble even more explicitly: "Excessive as the TMT-NASDAQ bubble may have become, it helped finance an infrastructure that has boosted the American economy."

holding diversified regional portfolios for the Americas, Asia, and Europe. Even without diversifying across such regional portfolios, portfolio managers may still be able to achieve similar levels of diversification in a cost-effective way, by investing in a diversified country portfolio for the most integrated national stock market within each region—the market with the smallest within-region country effect.

Over time, however, the magnitude of these region effects has declined, though the degree to which this has occurred differs across regions. It is most pronounced for Asia, which in spite of the Asian crisis has actually become more integrated into the global stock portfolio—the Asian crisis as we will explain below actually better resembles a series of country-specific shocks within Asia. The Americas and Europe also have declining region effects, though the magnitudes are smaller. Overall though, all three regions have become more integrated into the global stock market.

Within regions the picture is very different. Within the Americas, the degree of segmentation across national stock markets is broadly unchanged from the mid-1980s to today. Over the same period, the degree of segmentation across markets within Asia has risen dramatically. Only within Europe has there been a significant decline in segmentation, which coincides in its timing with the relaxation of capital controls in preparation for the single market in 1992. In addition, we find that the decline in within-region country effects for Europe is led by countries in the euro zone, for which segmentation relative to the European stock portfolio has fallen by more than half. This suggests that European Monetary Union (EMU) may have been a key factor behind greater integration across national stock markets within Europe.

Second, we explore how the relative importance of country and industry effects has changed in the Americas, Asia, and Europe. Here we follow Brooks and Del Negro (2002) in checking the robustness of our results to the exclusion of TMT firms. There are two reasons for this robustness check. For one thing, if market integration is behind the increase in industry effects, there is no a priori reason to think that it should be confined to a narrow set of sectors. For another, large industry effects for the TMT sectors are possibly a temporary phenomenon associated with the recent stock market bubble.

Our results suggest that Europe is again quite different from the Americas and Asia. In Europe, there has been a broad-based increase in the relative and absolute importance of industry effects. Even without TMT firms, industry effects have gone from half as important as country effects during the mid-1980s to almost twice as important in recent years. In the Americas, industry effects became significantly more important than country effects in the late 1990s. However, this result fails to hold up in the absence of TMT firms, evidence that the rise in sector effects in the Americas may be driven mainly by the recent stock market bubble and could thus be temporary. In Asia, the margin by which country effects outweigh industry effects in magnitude is broadly unchanged since the mid-1980s.

Overall, though the evolution of country and industry effects is hard to explain in terms of market integration at the level of the global stock market, we find that there is more encouraging evidence at a regional level. Consistent with our a priori notion that market integration has advanced more in Europe than in the Americas or Asia due to institutional changes such as EMU, we find that Europe is the only region where (i) segmentation across national stock markets, as measured by the magnitude of within-region country effects, has

fallen significantly since the mid-1980s and (ii) industry effects have risen significantly above country effects and this shift is robust to the exclusion of TMT firms. For portfolio managers our results suggest that outside of Europe country-oriented diversification strategies may still have merit. Within Europe, however, greater market integration means that industry-based diversification strategies may now be more effective.

The paper is organized as follows. Section II discusses the data, while Section III reviews our empirical approach. Section IV presents the results. Section V concludes.

II. The Data

We use data constructed by Brooks and Del Negro (2002), which we briefly review here. The data cover monthly total U.S. dollar stock returns and market capitalizations from January 1985 to February 2002 for 9,679 companies.[5] The data include all constituent firms in the DataStream country indices for 42 developed and emerging markets as of March 2002 and are augmented with a list of active and inactive stocks for each market derived from Worldscope. Each company is assigned to one of 40 (Level 4) DataStream industries (see *www.ftse.com* for a description of this classification). Table 1 lists these industries and shows how they can be aggregated into the broader (Level 3) FTSE industry sectors.

Compared to the existing literature, the data differ in five respects. First, coverage across and within countries is more comprehensive. For example, Heston and Rouwenhorst (1994) examine data on 829 stocks in 12 European countries. Griffin and Karolyi (1998) collect data on 2,400 firms in 25 developed and emerging markets. Cavaglia et al. (2000) cover 2,645 firms in 21 developed countries. The greater coverage within markets has the advantage that the database comes closer to approximating the true universe of stocks, while greater coverage across markets allows us to better approximate the global stock portfolio, the benchmark portfolio with respect to which country and industry effects are estimated. Second, the number of industries (40) is similar to the number of countries (42), so that—on average—country and industry portfolios are of equal size. In this respect, the paper follows Griffin and Karolyi (1998) who argue that broad industry classifications (such as Level 3) bias against finding important industry effects because they result in industry portfolios that are larger and therefore more diversified than country portfolios. Third, the sample period goes back to 1985, while Griffin and Karolyi (1998) use a shorter sample period that goes from 1992 to 1995. The advantage of starting in 1985 is that the data include the October 1987 stock market crash, an important benchmark against which to judge the market downturn since March 2000, and that the longer sample period allows a more accurate assessment of how country and industry effects have changed over time. Fourth, the data include firms that become inactive over time, due to bankruptcy or mergers for example. This phenomenon is significant, with 1,996 companies in the sample becoming inactive after January 1995, of which 806 companies became inactive after March 2000. In contrast to

[5] Using U.S. dollar-denominated returns has the effect of lumping nominal currency influences into country-specific effects in international stock returns. We investigate the magnitude of this bias by redoing our estimations using returns denominated in foreign countries' local currency and generally find it to be negligible.

earlier work, the results in this paper are therefore less likely to exhibit survivorship bias. Fifth, the FTSE industry assignments we use differ from the MSCI classification which is used by Rouwenhorst (1999) and elsewhere. We have investigated the general robustness of our results to the FTSE industry classification by redoing our analysis using MSCI industry categories. Our results are little changed using either classification.

For illustrative purposes, the data in December 2000 contain 8,391 active firms.[6] The overall market capitalization of the sample amounts to $31,486 billion at that point, which is almost 99 percent of the actual market capitalization across our 42 countries, according to the International Finance Corporation's (IFC) stock market fact book. The United States makes up almost 50 percent of the sample in percent of overall market capitalization. The United Kingdom and Japan each make up about 10 percent of the sample. In contrast, emerging stock markets constitute only a small fraction of the data. In terms of market capitalization, companies in the financial sector are most heavily represented, making up almost 24 percent, while the information technology sector is the second largest, at just under 16 percent. Two-thirds of all companies in this sector are located in the United States, judging by market capitalization. Coverage is relatively stable going back towards the beginning of the sample. In December 1990, for instance, the overall market capitalization of the sample comes to $9,102 billion, about 97 percent of stock market capitalization in the 42 sample countries as measured by the IFC.

III. The Model

In our investigation of the relative importance of country and industry effects, we follow Heston and Rouwenhorst (1994, 1995) who assume that the return on each stock has four components: a common factor (α), global industry factors (β), country factors (γ), and a firm-specific disturbance (e). We write the return on stock i in industry j and country k as:

$$R_{it} = \alpha_t + \beta_{jt} + \gamma_{kt} + e_{it} \tag{1}$$

We then estimate a time series for the realization of the common factor, industry factors, and country factors by running the following cross-sectional regression every month:

$$R_i = \alpha + \sum_{j=1}^{J} \beta_j I_{ij} + \sum_{k=1}^{K} \gamma_k C_{ik} + e_i \tag{2}$$

[6] Economies covered are the United States, the United Kingdom, France, Germany, Italy, Japan, Canada, Australia, Austria, Belgium, Denmark, Hong Kong SAR, Ireland, the Netherlands, New Zealand, Norway, Spain, Sweden, Switzerland, Finland, Greece, Portugal, Luxembourg, Malaysia, Singapore, South Africa, Korea, Thailand, the Philippines, Taiwan Province of China, Argentina, Mexico, Turkey, Chile, India, Indonesia, Peru, Colombia, Poland, China, and the Czech Republic.

where I_{ij} is a dummy variable that equals one if the stock belongs to industry j and zero otherwise, and C_{ik} is a similar dummy variable that identifies country affiliation. There are J industries and K countries in total.

Equation (2) cannot be estimated in its present form because it is unidentified due to perfect multicollinearity. Intuitively, this is because every company belongs to both an industry and a country, so that industry and country effects can be measured only relative to a benchmark. To resolve this indeterminacy, we follow the literature in imposing the restriction that the weighted sum of industry and country effects equal zero at every point in time, so that the industry and country effects are estimated as deviations from the intercept α:

$$\sum_{j=1}^{J} \beta_j \sum_{i=i}^{N} I_{ij} x_i = \sum_{j=1}^{J} \beta_j w_j = 0 \tag{3}$$

$$\sum_{k=1}^{K} \gamma_k \sum_{i=1}^{N} I_{ik} x_i = \sum_{k=1}^{K} \gamma_k v_k = 0 \tag{4}$$

N is the total number of firms in a given month. Equation (2) is estimated using weighted least squares, with each stock return weighted by its beginning-of-month share of world stock market capitalization x_i. Then w_j corresponds to the market capitalization of industry j as a share of the total, while v_k is the market capitalization share of country k.

We extend this framework to examine if country effects have become less important within regions, even if this is not the case relative to the global stock portfolio. We do this by replacing the country effects in the model of Heston and Rouwenhorst (1994, 1995) with region effects, which measure the degree of segmentation of regional stock portfolios relative to the global stock portfolio, and within-region country effects, which measure the extent to which country stock portfolios are segmented relative to the relevant regional stock portfolio. Equation (2) then becomes:

$$R_i = \alpha + \sum_{j=1}^{J} \beta_j I_{ij} + \sum_{k=1}^{K} \gamma_k C_{ik} + \sum_{k=1}^{K} \sum_{l_k=1}^{L_k} \delta_{l_k k} D_{i l_k k} + e_i \tag{5}$$

In this specification C_{ik} is a dummy variable that denotes which region firm i belongs to, while γ_k is the associated region effect. $D_{il_k k}$ is a dummy variable that denotes within-region country affiliation, while $\delta_{l_k k}$ is the associated within-region country effect. There are L_k countries within region k. The interpretation of I_{ij} and β_j is unchanged from equation (2). Across regions, the within-region country effects are thus neutralized relative to the industrial composition of the global stock portfolio, not relative to the industrial composition of the regional stock portfolio as they would be if we ran separate regressions for each region. This permits a comparison across regions of how the importance of within-region country effects has evolved over time or, in other words, how segmentation has changed within regions.

To estimate our within-region country effects as deviations from the relevant region effect, we restrict the weighted sum of the within-region country effects to zero at every point in

time, using within-region capitalization shares for each country as weights. For region k this restriction can be written as:

$$\sum_{l_k=1}^{L_k} \delta_{l_k k} \sum_{i=1}^{N_k} D_{i l_k k} y_i = \sum_{l_k=1}^{L_k} \delta_{l_k k} \eta_{l_k k} = 0 \tag{6}$$

where y_i is the market capitalization of the i'th firm relative to the relevant regional stock portfolio. $\eta_{l_k k}$ is then the capitalization share of the l_k'th country within the region.

We follow Rouwenhorst (1999) in using mean absolute deviations (MADs) to present our results.[7] For illustration, in the case of the model with only country and industry effects, this measure weights the absolute values of the country and industry effects by their respective market capitalizations. Country and industry MADs in a given month are:

$$MAD_{Ct} = \sum_{k=1}^{K} v_{kt} |\gamma_{kt}| \tag{7}$$

$$MAD_{It} = \sum_{j=1}^{J} w_{jt} |\beta_{tj}| \tag{8}$$

where w_{jt} and v_{kt} are the capitalization weights at the beginning of period t. The country MAD can be interpreted as the capitalization weighted average tracking error for returns on industry-neutral country portfolios relative to returns on the benchmark portfolio. The industry MAD has an analogous interpretation. The recent literature, Cavaglia et al. (2000) for instance, has emphasized the ratio of country to industry MADs as a measure of their relative importance. A ratio greater than one means that in period t country effects dominate industry effects. The opposite is true if the ratio is smaller than one. Intuitively, the implication of the MADs for portfolio managers is as follows. If the ratio is greater than one the return of a portfolio that is not diversified across countries will on average deviate from the benchmark more than a portfolio that is not diversified across industries.

In our extended specification, we use MADs to characterize the importance of region and within-region country effects. In particular, we present our results in terms of region MADs and composite within-region country MADs. These are:

$$MAD_{kt}^{R} = |\gamma_{kt}| \tag{9}$$

$$MAD_{kt}^{WR} = \sum_{l_k=1}^{L_k} \eta_{l_k kt} |\delta_{l_k kt}| \tag{10}$$

[7] We have explored different representations of our results, for example, capitalization-weighted time-series variances for the pure country and industry effects. The conclusions from these alternative representations are similar to those using MADs and are therefore omitted for brevity.

where MAD^{R}_{kt} is the region MAD for the k'th region in period t and MAD^{WR}_{kt} is the composite within-region country MAD for the same region.

IV. The Results

The section is divided into two parts. The first investigates the evolution of region and within-region country effects in the Americas, Asia and Europe. The second asks how the relative importance of country and industry effects has changed within these regions. In this exercise, our results are robust to whether the benchmark portfolio is the global or the regional stock portfolio—we will elaborate on this point below.

A. Region and Within-Region Country Effects in the Americas, Asia, and Europe

In this section, we study the evolution of region and within-region country effects and assess their relative importance. We explore the extent to which cross-region diversification delivers much of the gain from cross-country diversification and the extent to which country effects have become less important within regions, even if they have not become more important relative to the global stock portfolio. We estimate our extended version of the Heston and Rouwenhorst (1994, 1995) model in a specification that allows for three broad regions within the global stock portfolio: the Americas, Asia, and Europe. We follow MSCI in allocating the countries in our dataset to each of these regions.[8]

Figures 1 through 3 plot the region and composite within-region country MADs for the Americas, Asia, and Europe. To assess the changing importance of region and within-region country effects over time, the MADs are given for 2-year (lagged) moving averages, along with error bands that measure two standard deviations either side.[9] Looking first at the evolution of region effects, we observe that all three regions have become more integrated into the global stock portfolio since the mid-1980s, though the degree to which they have become more integrated differs across regions. The Americas region effect falls from 3.06 percent in the first two years of our sample to 2.70 percent during the last two years of

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[8] Our MSCI Americas region has eight markets: Argentina, Brazil, Canada, Chile, Colombia, Mexico, Peru and the United States. Our MSCI Asia region has 13 markets: Australia, China, Hong Kong SAR, India, Indonesia, Japan, Korea, Malaysia, New Zealand, the Philippines, Singapore, Taiwan Province of China, and Thailand. Our MSCI Europe region has 20 countries: Austria, Belgium, the Czech Republic, Denmark, France, Finland, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, Spain, Sweden, Switzerland, Turkey, and the United Kingdom. Our country coverage within regions does not match exactly that of the MSCI regions. For example, the MSCI index for the Americas includes Venezuela while we do not. See the MSCI coverage matrix (http://www.msci.com/equity/coverage_matrix.pdf) for more information.

[9] The variance of the country and industry MADs is computed every month using the Delta method, which is described in Green (1993). The variances are then averaged over time along with the MAD point estimates to construct the error bands. This procedure assumes that there is no serial correlation in the residuals of equation (5).

data, a decline significant at the 12 percent level for a one-sided test. Over the same period, the Europe region effect falls from 2.62 percent to 1.63 percent, a decline significant at the 6 percent level for a one-sided test. The Asia region effect declines from 2.70 to 1.67 percent over the same period, a decline that is highly significant at the 1 percent level for a one-sided test.[10] The decline in segmentation relative to the global stock market is therefore most pronounced for the Asia region. Overall, the Americas region is the most segmented over our sample period, while Europe is the most integrated. The Americas region effect averages 2.67 percent over our sample period, while the corresponding values are 2.26 percent and 1.84 percent for Asia, and Europe respectively.[11]

It is worth noting that these region effects explain a substantial portion of the variation attributed to the Heston and Rouwenhorst (1994, 1995) or Griffin and Karolyi (1998) country effects, which lump together across-region and within-region variation. The Heston and Rouwenhorst (HR hereafter) composite country MAD for the Americas averages 2.98 percent over our sample. The Americas region MAD averages 2.7 percent over the sample, capturing 90 percent of "country-specific" variation in the region. The HR composite country MAD for Europe averages 3.04 percent over our sample, compared with 1.84 percent for the Europe region MAD. The region effect captures 60 percent of "country-specific" variation. In Asia, the HR composite country MAD averages 3.39 percent, compared with 2.26 percent for the corresponding region MAD. This amounts to 66 percent of the variation explained by the HR country effects. Thus, between 60 and 90 percent of the benefits from cross-country diversification are actually due to region effects and can therefore be captured by simply diversifying across broad region portfolios.

We now turn our attention to the importance of within-region country effects where the picture is very different. Figure 1 shows that the degree of segmentation across national stock markets within the Americas region has increased slightly over our sample period. The composite within-region country MADs average 0.38 percent during the two-year period to December 1986. This number rises to 0.46 percent in the last two years of the sample, though this increase is not significant at conventional levels. In contrast, Figure 2 reveals that the degree of segmentation across equity markets within Europe has declined substantially since the mid-1980s. The composite within-region country MADs for Europe fall from an average of 3.02 percent in the two years at the beginning of the sample to 1.81 percent in the two years to February 2002, a decline that is significant at the 1 percent level for a one-sided test. Figure 3 shows that there has been a substantial increase in segmentation across stock markets within Asia. The composite within-region country MADs average 1.55 percent during the first two years of data but rise to 3.40 percent during the two–year period to

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[10] If x_1 is the initial two-year average of the region MADs and x_2 is the end-of-sample two-year average of the region MADs, we use the test statistic $t=(x_2-x_1)/(\text{sqrt}(\text{var}(x_1)+\text{var}(x_2))$, which is asymptotically distributed as a $N(0,1)$, to test if the initial and terminal MADs are significantly different.

[11] We investigated if the rise in the Americas region MAD in the late 1990s is driven by Latin America and found this not to be the case. Instead it is driven largely by the United States.

February 2002. Overall, our results suggest that within-region segmentation is lowest in the Americas region where the composite within-region country MADs average 0.73 percent over the full sample. It is next lowest in Europe where the corresponding value is 2.39 percent and highest in Asia where it measures 2.62 percent. However, these level differences must be interpreted carefully. This is because they in part capture differences in composition across regions. For example, the composite within-region country MADs for the Americas are so low because the regional stock portfolio is dominated by the United States. In contrast, no single market in Asia or Europe dominates those regions to the same extent, causing the composite within-region country MADs to be higher in those regions on average. Because of these difficulties in interpretation, we focus on the evolution of the composite within-region country MADs over time.[12]

The main insight from these results is that only in Europe has the importance of within-region shocks to stock returns declined since the mid-1980s. In the Americas and Asia the opposite is true: within-region country effects have become more important over time. This result is consistent with our *a priori* notion that market integration has advanced more in Europe than in the Americas or Asia due to institutional changes. In particular, much of the decline in the within-region composite country MAD for Europe occurs in the period from the late 1980s to the mid-1990s, a period when Western European countries were rapidly relaxing capital controls in preparation for the single market in 1992. Using data on capital account restrictions from Edison et al. (2002), Figure 4 shows that almost 70 percent of Western European countries had capital account restrictions in 1987. By 1995, the last year in which this restriction measure is available, this number had fallen to zero. The resulting rise in capital flows may be one reason why stock markets within Europe have become so much more integrated. According to data in Edison et al. (2002), which is also pictured in Figure 4, the average stock of accumulated capital inflows and outflows in percent of GDP for Western European nations rose from 44 percent in 1986 to 162 percent in 1998.[13]

The dismantling of capital account restrictions in Europe from the late 1980s to the early 1990s is unmatched elsewhere. In the Americas, neither Canada nor the United States have had capital account restrictions since the 1970s. For the region as a whole, however, the

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[12] We find that the rise in the importance of the within-region composite country MADs for Asia is driven by developed markets (Australia, Hong Kong SAR, Japan, New Zealand, and Singapore), not by emerging Asia. This suggests that the difference across Asia and Europe in the evolution of within-region country effects is not simply a reflection of the fact that our Europe region contains relatively fewer emerging markets.

[13] The capital account restriction measure in Edison et al. (2002) is published by the International Monetary Fund in its *Annual Report on Exchange Arrangements and Exchange Restrictions* and in a given year takes a value of one if a country has rules or regulations that inhibit cross-border flows. It takes a value of zero otherwise. The data on the accumulated stock of capital flows are based on Lane and Milesi-Ferretti (2001). For both measures, the reported numbers are simple averages across the following 15 Western European countries: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

percentage of countries with capital account restrictions is unchanged from 1970 at 63 percent. In percent of GDP, accumulated capital inflows and outflows increased more slowly for Canada and the United States than for Western Europe, up from 49 percent in 1986 to 114 percent in 1998. For the region as a whole, they rose from 20 percent in 1986 to 56 percent in 1998. Meanwhile, developed markets in Asia (Australia, Japan, New Zealand, and Singapore) had eliminated capital account restrictions by 1984. For the region as a whole, however, the fraction of countries with capital account restrictions was stable at around 50 percent from 1984 onwards. The average for accumulated capital inflows and outflows in percent of GDP for developed Asian markets rose from 45 percent in 1986 to 133 percent in 2000, while the same numbers for the overall region are 23 percent and 66 percent, respectively. The relaxation of capital account restrictions and the resulting growth in capital flows in Western Europe is thus unmatched even for developed markets in the Americas and Asia.[14]

Another reason for rising integration within Europe may be the institutional changes associated with EMU. Figure 5 compares the evolution of the composite country MADs for two sets of countries: the eleven original euro zone countries and five Western European countries not participating in EMU—Denmark, Norway, Sweden, Switzerland, and the United Kingdom. Both series are weighted averages of the within-region country MADs from the estimation of equation (5), using the market capitalization shares for each country in the relevant group (EMU and non-EMU) as weights. The within-region country MADs for the euro zone average 3.70 percent in the first two years of the sample and decline to 1.67 percent in the two-year period to February 2002, a decline significant at the 1 percent level for a one-sided test. Meanwhile, within-region country MADs for the other five countries average 2.46 percent during the first two years of the sample and decline to 1.62 percent during the last two-year period, a decline significant at the 11 percent level. Market integration relative to the European stock portfolio has thus proceeded faster in the euro zone than in other Western European countries, consistent with the view that EMU is a key factor driving market integration in Europe.[15] In addition, we find that the euro zone countries have been on average more segmented in relation to the European stock portfolio than other Western European countries. The margin by which this is the case is fairly constant at about 100 basis points but disappears around the time when EMU begins in January 1999. Of course, given that stock markets are forward looking, the announcement date may be more important than the date of implementation. Nonetheless, we see this as further evidence that EMU has helped integrate euro zone countries relative to the rest of Western Europe.

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[14] Bekaert, Harvey and Lumsdaine (2002) study the relationship between exogenous (official) and endogenous (market driven) dates of integration for emerging equity markets. Brooks and Del Negro (2002) find that the evolution of country effects for emerging markets tends to be related to market integration, as measured in Bekaert, Harvey, and Lumsdaine.

[15] Of course, the more pronounced decline in the within-region composite country MAD for the euro area could also result from the fact that the region includes markets such as Portugal that were relatively more segmented at the beginning of our sample. For example, Bekaert et al. (2001) report a liberalization date for the Portuguese stock market of 1986. Dropping Portugal from the euro area, our results are qualitatively unchanged however.

In conclusion, our results point to a strong decline in the importance of within-region country effects in the region, Europe, where we would a priori expect such a decline to show up because of institutional changes. Moreover, we show that this decline in within-region country effects is more pronounced for euro zone countries than for other Western European markets, evidence to support the view that EMU is a key factor driving integration within Europe.

B. Country Versus Industry Effects in the Americas, Asia, and Europe

This section explores how the relative importance of country and industry effects has changed in the Americas, Asia and Europe since the mid-1980s. We revert to estimating the standard Heston and Rouwenhorst (1994, 1995) regression model in (2) and follow Brooks and Del Negro (2002) in checking the robustness of our results to the exclusion of TMT firms. As we note in the introduction, there are two reasons for this robustness check. For one thing, if market integration is behind the increase in industry effects, there is no a priori reason to think that it should be confined to a narrow set of sectors. For another, large industry effects for the TMT sectors are possibly a temporary phenomenon associated with the recent stock market bubble. We follow Cavaglia et al. (2000) in using the ratio of country to industry MADs to examine the relative importance of country and industry effects in stock returns.

Figure 6 explores how the relative importance of country and industry effects has changed in the 12 Western European countries that are the focus of Rouwenhorst (1999).[16] The underlying country and industry effects are estimated for a sample that drops all other countries. This means that the benchmark portfolio, relative to which we are estimating the country and industry effects, is the European stock portfolio. We are thus implicitly adopting the perspective of a portfolio manager whose performance benchmark is the European stock market. Since our results are qualitatively unchanged for the full sample of European markets used above, they are omitted for brevity.

Figure 6 plots a two-year moving average for the ratio of country to industry MADs, along with two standard deviation error bands, for the full sample regression as well as for the no TMT sector regression. There is a broad-based increase in the relative and absolute importance of industry effects in Europe. Even without TMT firms, industry effects have gone from half as important as country effects during the mid-1980s to almost twice as important in recent years. Figure 7 shows that this result carries over to a setting where we select the global stock market to be the benchmark portfolio. Even from the perspective of a portfolio manager whose performance is evaluated relative to the global stock market, it is the case that industry effects have gone from half as important as country effects during the mid-1980s to almost twice as important in recent years, with or without TMT firms.

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[16] The 12 Western European countries covered in Heston and Rouwenhorst (1994, 1995) and Rouwenhorst (1999) are Austria, Belgium, Denmark, France, Germany, Italy, the Netherlands, Norway, Spain, Sweden, Switzerland, and the United Kingdom.

Europe is unique in the sense that industry effects have become significantly more important than country effects with or without TMT firms in the sample. Figure 8 plots a two-year moving average for the ratio of country to industry MADs, along with two standard deviation error bands, for Asia—with and without TMT firms in the sample. This figure is directly comparable to Figure 7 because the global stock market is again the benchmark portfolio—country and industry effects are neutralized relative to the same portfolio as in Figure 7. We see from Figure 8 that the margin by which country effects outweigh industry effects in magnitude is broadly unchanged since the mid-1980s. Figure 9 plots a two-year moving average for the ratio of country to industry MADs, along with two standard deviation error bands, for the Americas—with and without TMT firms in the sample. This figure is directly comparable to Figures 7 and 8 because country and industry effects are neutralized as before relative to the global stock portfolio. Figure 9 shows that industry effects in the Americas became significantly more important than country effects during the late 1990s. However, this result fails to hold up in the absence of TMT firms, when it is no longer the case that the MADs ratio falls significantly below one. The growing importance of sector effects in the Americas is therefore more closely associated with TMT than in Europe and therefore more likely to be a temporary phenomenon associated with the recent stock market bubble.

Of course, there are no emerging markets among the 12 Western European countries, while there are many such markets in the Americas and the Asia regions. This difference in composition does not, however, explain why Europe is different. Without TMT firms, we find that the ratio of country to industry MADs does not fall significantly below one for a sample that looks only at developed countries. The rise in industry relative to country effects is thus more broad-based, and thus more robust, than in other developed countries.

According to Rouwenhorst (1999), even in Western Europe there is no evidence that differences across countries (as measured by the importance of country effects) have disappeared. He finds that country MADs always dominated industry MADs in Western European stock returns from 1978 to 1998. Our work challenges his result. Most importantly, we show that the Western European ratio of country to industry MADs declines practically throughout our sample period, which is consistent with the notion of nonreversible market integration, and that this decline is robust to the exclusion of firms in the TMT sectors. Why is our result for Europe different from that of Rouwenhorst (1999)? We find that industry effects only become significantly more important than country effects after August 1998, which is when his sample period ends. The rise in European industry effects is therefore a relatively recent phenomenon.

V. Conclusion

A stylized fact in the literature on portfolio diversification is that diversifying across countries is more effective for risk reduction than diversifying across industries. Against the backdrop of a dramatic rise in comovement across national stock markets, several papers have recently reported that industry effects now surpass country effects in importance in explaining the variation in global stock returns. The shift is typically explained in terms of greater market integration, which would suggest that country effects should have declined in importance. Yet the shift is actually driven by a dramatic increase in global industry effects. Attempts to explain this rise in industry effects in terms of greater market integration have so far not been successful.

But perhaps the global stock market is the wrong place to look for evidence on market integration. The emergence of large regional trading blocks—the European Union, the North American Free Trade Agreement, and the Association of Southeast Asian Nations—suggests that evidence on market integration may be stronger at a regional level. In addition, institutional changes surrounding EMU and the associated rise in harmonization of government policies stand in contrast to the Americas and Asia where there has been little comparable momentum. As a result, there may be significant differences *across* regions in the degree to which capital markets are becoming integrated *within* regions, a perspective that is lost in a purely global analysis.

In this paper we explore the evolution of country and industry effects from a regional perspective. We do this in two steps. First, we investigate if country effects have become less important within regions, even if they have not fallen at the level of the global stock market. Second, we explore how the relative importance of country and industry effects has changed in the Americas, Asia, and Europe. We find that though the evolution of country and industry effects is hard to rationalize in terms of market integration at the level of the global stock market, there is more encouraging evidence at a regional level. Consistent with our a priori notion that market integration has advanced more in Europe than in the Americas or Asia due to institutional changes such as EMU, we find that Europe is the only region where (i) segmentation across national stock markets, as measured by the magnitude of within-region country effects, has fallen significantly since the mid-1980s; and (ii) industry effects have risen significantly above country effects and this shift is robust to the exclusion of TMT firms. For portfolio managers our results suggest that outside of Europe country-oriented diversification strategies may still have merit. Within Europe, however, greater market integration means that industry-based diversification strategies may now be more effective.

Separately, we show that between 60 percent and 90 percent of the historical importance of the Heston and Rouwenhorst (1994, 1995) and Griffin and Karolyi (1998) country effects can actually be explained by region effects. This suggests that portfolio managers may be able to achieve much of the benefit from cross-country diversification—at much lower transaction cost than when diversifying across dozens of countries—by simply holding three diversified portfolios for the Americas, Asia and Europe. Even without diversifying across such regional portfolios, portfolio managers may still be able to achieve similar levels of diversification in a cost-effective way, by investing in a diversified country portfolio for the most integrated national stock market within each region—the market with the smallest within-region country effect.

Table 1. Industry Sectors

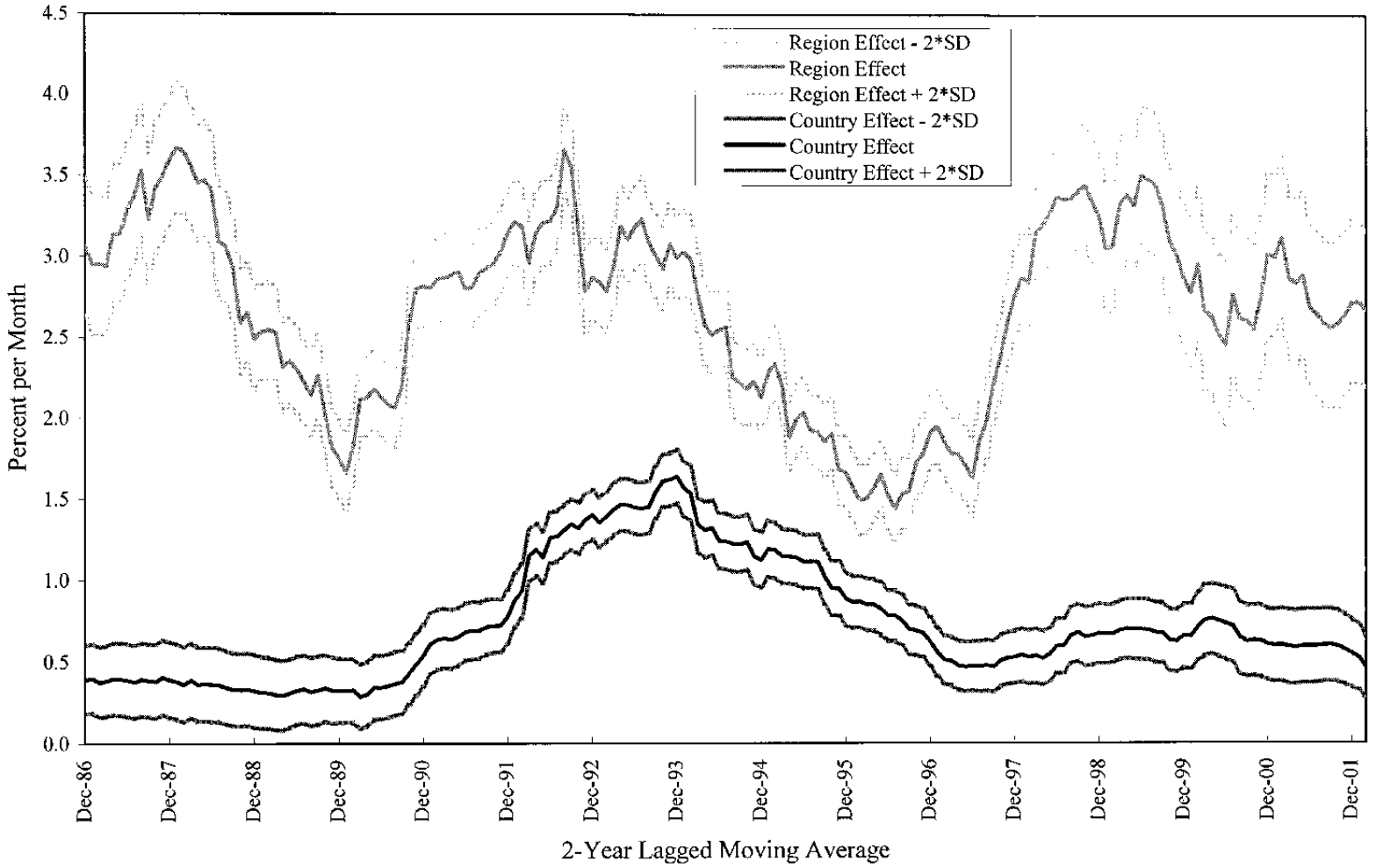
Level 3 Sectors	Level 4 Sectors	Level 6 Sectors
BASIC Basic Industries	CHMCL Chemicals	CHEMICALS, COMMODITY
		CHEMICALS, SPECIALITY
	CNSBM Construction & Building Materials	CHEMS.ADVANCED MATS.
		BUILDERS MERCHANTS
		BUILDING MATERIALS
		HOUSE BUILDING
		OTHER CONSTRUCTION
	FSTPA Forestry & Paper	FORESTRY
		PAPER
	STLOM Steel & Other Metals	NON-FERROUS METALS
		STEEL
GENIN General Industrials	AERSP Aerospace & Defense	AEROSPACE
		DEFENCE
	DIVIN Diversified Industrials	DIVERSIFIED INDUSTRY
	ELTNC Electronic & Electrical Equipment	ELECTRICAL EQUIPMENT
		ELECTRONIC EQUIPMENT
	ENGEN Engineering & Machinery	COMMERCIAL VEHICLES
		ENG. CONTRACTORS
		ENG. FABRICATORS
		ENGINEERING, GENERAL
CYCGD Cyclical Consumer Goods	AUTMB Automobiles & Parts	AUTO PARTS
		AUTOMOBILE
		TYRES AND RUBBER
	HHOLD Household Goods & Textiles	CLOTHING + FOOTWEAR
		FURN. + FLOORCOVERING
		HSEHOLD APPS+HSEWARES
		LEISURE EQUIPMENT
		TEXTILES+LEATHER GDS
NCYCG Non-Cyclical Consumer Goods	BEVES Beverages	BREWERS
		DISTILLERS + VINTNERS
		SOFT DRINKS
	FOODS Food Producers & Processors	FARMING AND FISHING
		FOOD PROCESSORS
	HLTHC Health	HEALTH MAINT. ORGS.
		HOSPITAL MANAGEMENT
		MED EQUIP + SUPPLIES
		OTHER HEALTH CARE
	PCKGN Packaging	PACKAGING
	PERSH Personal Care & Household Products	HOUSEHOLD PRODUCTS
		PERSONAL PRODUCTS
	PHARM Pharmaceuticals	PHARMACEUTICALS
	TOBAC Tobacco	TOBACCO
	BIOTE Biotechnology	BIOTECHNOLOGY
CYSER Cyclical Services	DISTR Distributors	DISTRIB. IND. COMPS.
		VEHICLE DISTRIBUTION
		OTHER DISTRIBUTORS
	RTAIL Retailers, General	DISCOUNT STORES
		RETAIL, HARDLINES
		RETAILERS E-COMMERCE
		RETAILERS, MULTI DEPT
		RETAILERS, SOFT GOODS
	LESUR Leisure, Entertainment & Hotels	GAMING
		HOME ENTERTAINMENT
		HOTELS
		LEISURE FACILITIES
		RESTAURANTS AND PUBS

Notes: Levels 3 and 4 are from the FTSE Global Classification System and are equivalent to Economic Groups and FTSE Sectors respectively. Level 6 is the DataStream industry classification system.

Table 1. Industry Sectors (concluded)

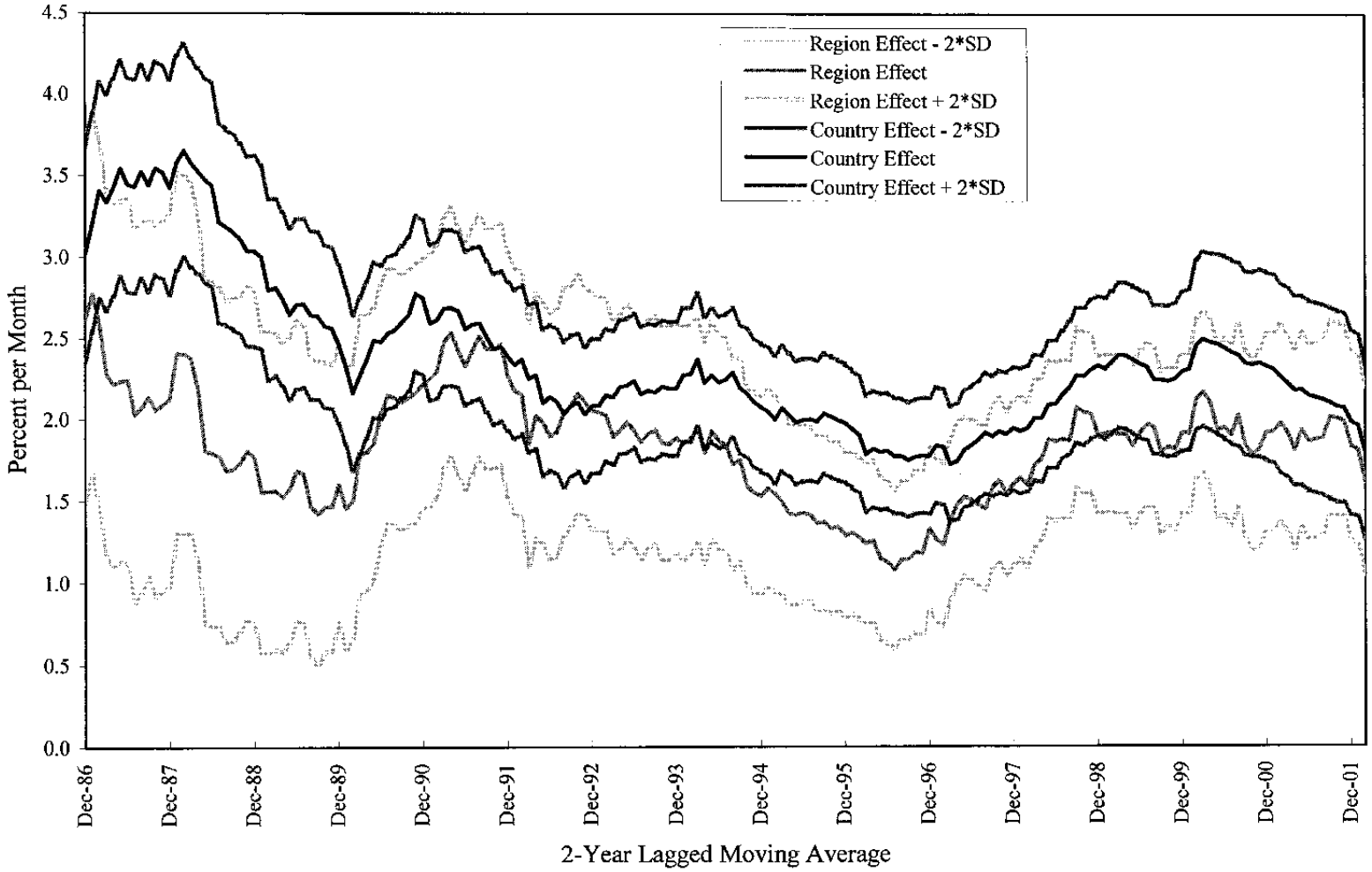
Level 3 Sectors	Level 4 Sectors	Level 6 Sectors
CYSER Cyclical Services	MEDIA Media & Photography	BROADCASTING
		CABLE + SATELLITE
		MEDIA AGENCIES
		PHOTOGRAPHY
		PUBLISHING + PRINTING
	SUPSV Support Services	BUSINESS SUPPORT
		EDUCATION + TRAINING
		ENVIRONMENTAL CONTROL
		FUNERALS + CEMETERIES
		LAUNDERIES + CLEANERS
		SECURITY AND ALARMS
	TRNSP Transport	AIRLINES + AIRPORTS
		RAIL, ROAD, FREIGHT
		SHIPPING AND PORTS
NCYSR Non-Cyclical Services	FDRET Food & Drug Retailers	FOOD + DRUG RETAILERS
	TELCM Telecom Services	TELECOM FIXED LINE
		TELECOM WIRELESS
UTILS Utilities	ELECT Electricity	ELECTRICITY
	GASDS Gas Distribution	GAS DISTRIBUTION
	WATER Water	WATER
ITECH Information Technology	INFOH Information Tech. Hardware	COMPUTER HARDWARE
		SEMICONDUCTORS
		TELECOM EQUIPMENT
	SFTCS Software & Computer Services	COMPUTER SERVICES
		INTERNET
		SOFTWARE
TOTLF Financials	BANKS Banks	BANKS
	INSUR Insurance	INSURANCE BROKERS
		INSURANCE NON-LIFE
		OTHER INSURANCE
		RE-INSURANCE
	LIFEA Life Assurance	LIFE ASSURANCE
	INVSC Investment Companies	INVESTMENT COS.(6)
		INV.TST INTERNATIONAL
		INV.TST.EMERGING MKTS
		INV.TST.EUROPEAN
		INV.TST.GEOG.SPECLSTS
		INV.TST.VENTURE + DEV
		INVESTMENT TRUST UK
		AUTH. UNIT TRUSTS
		INVESTMENT COS. (UK)
		OFFSHORE FUNDS
		OTHER S.842 INV.TRUST
		SPLIT CAPITAL INV.TST
		UNQUOTED EQUITIES
	RLEST Real Estate	PROPERTY AGENCIES
		REAL ESTATE DEV.
		REAL ESTATE INV. TST.
	SPFIN Speciality & Other Finance	ASSET MANAGERS
		CONSUMER FINANCE
		INVESTMENT BANKS
		MORTGAGE FINANCE
		OTHER FINANCIAL
RESOR Resources	MNING Mining	GOLD MINING
		MINING FINANCE
		OTHER MINING
	OILGS Oil & Gas	OIL + GAS EXPL/PROD.
		OIL INTEGRATED
		OIL SERVICES
OTHER	OTHER	SUSPENDED EQUITIES

Figure 1. Region Effect and Within-Region Country Effect MADs: MSCI Americas Region



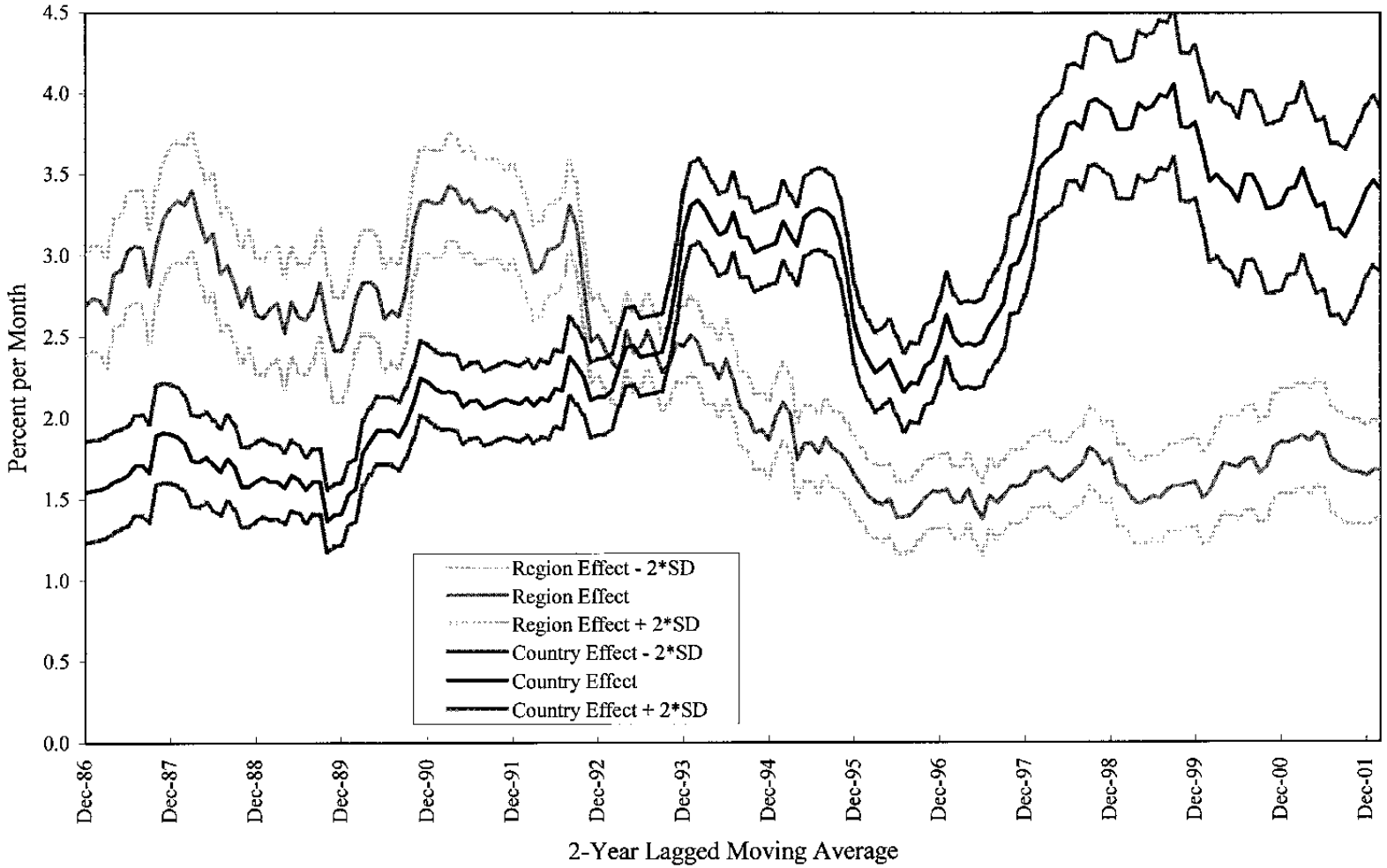
Note: Region and composite (capitalization-weighted) within-region country mean absolute deviations (MADs) for the Americas region. Error bands are constructed using the Delta method and assume no serial correlation in the residuals of equation (5). All series are 24-month lagged moving averages. The full sample covers monthly U.S. dollar-denominated market caps and returns of almost 10,000 stocks in 42 countries from January 1985 to February 2002. Returns are in percent per month.

Figure 2. Region Effect and Within-Region Country Effect MADs: MSCI Europe Region



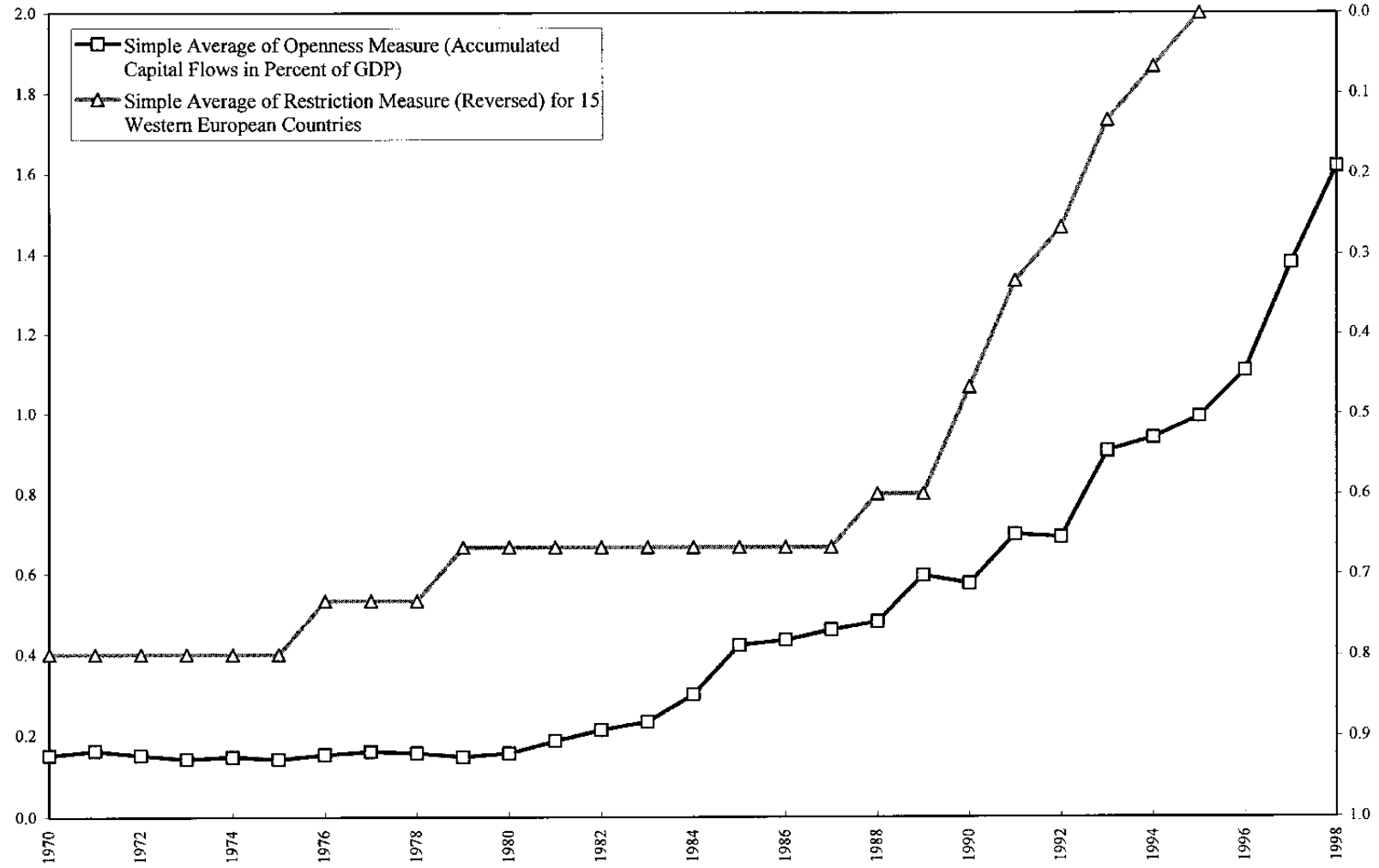
Note: Region and composite (capitalization-weighted) within-region country mean absolute deviations (MADs) for the Europe region. Error bands are constructed using the Delta method and assume no serial correlation in the residuals of equation (5). All series are 24-month lagged moving averages. The full sample covers monthly U.S. dollar-denominated market caps and returns of almost 10,000 stocks in 42 countries from January 1985 to February 2002. Returns are in percent per month.

Figure 3. Region Effect and Within-Region Country Effect MADs: MSCI Asia Region



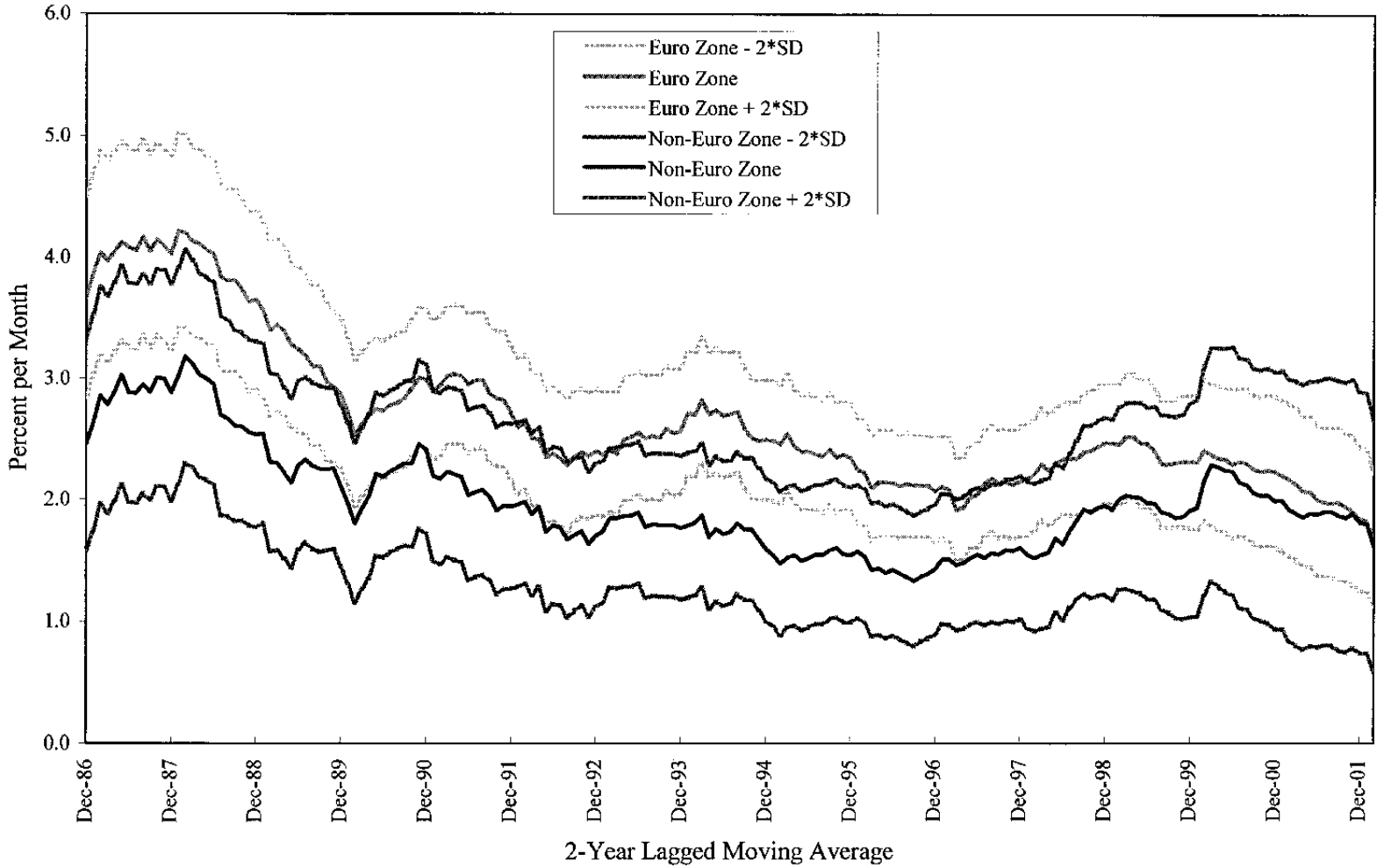
Note: Region and composite (capitalization-weighted) within-region country mean absolute deviations (MADs) for the Asia region. Error bands are constructed using the Delta method and assume no serial correlation in the residuals of equation (5). All series are 24-month lagged moving averages. The full sample covers monthly U.S. dollar-denominated market caps and returns of almost 10,000 stocks in 42 countries from January 1985 to February 2002. Returns are in percent per month.

Figure 4. Restriction and Openness Measures for Western Europe



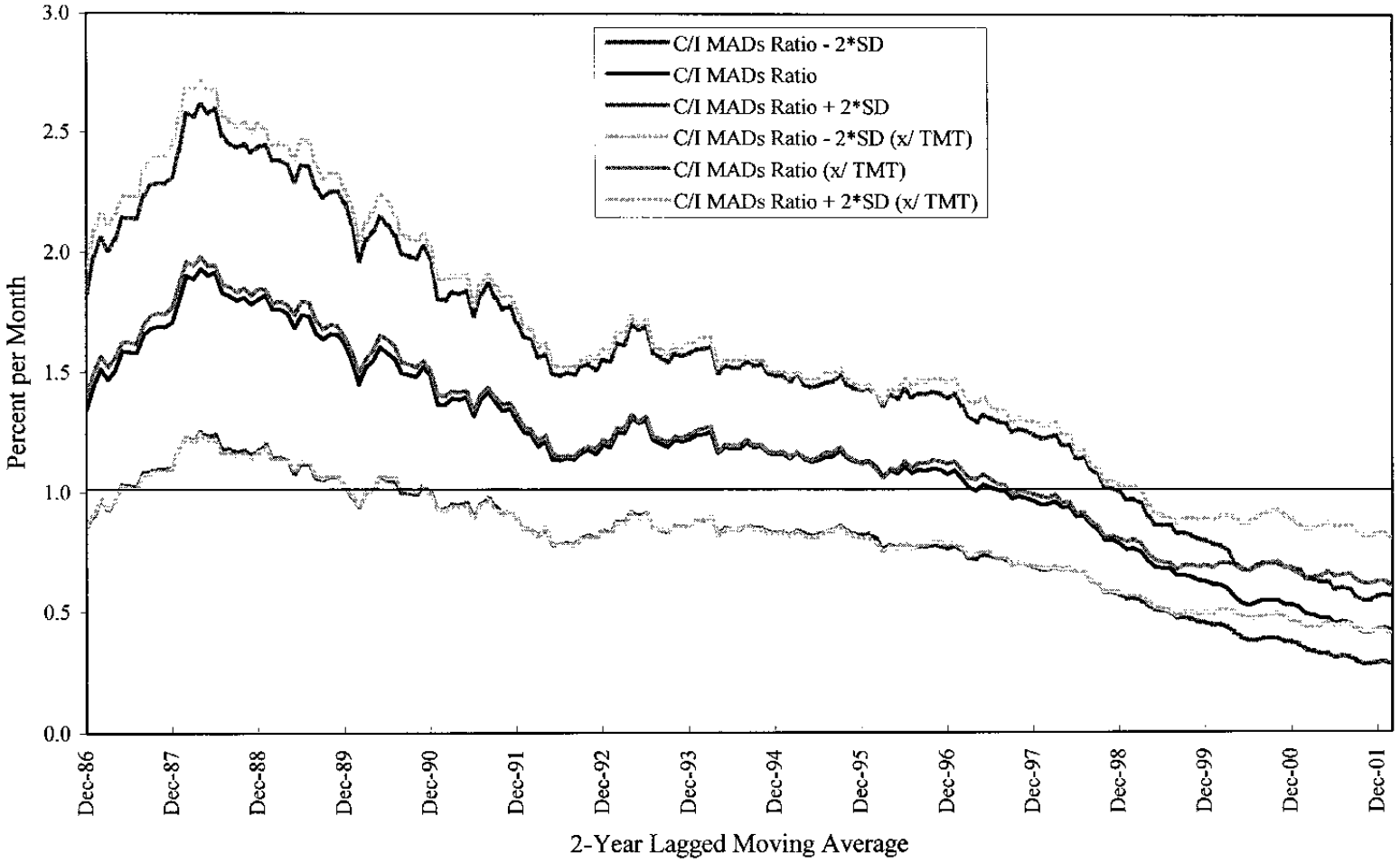
Note: Simple averages across 15 Western European countries for the capital account restriction and openness measures. The former is constructed by the IMF and takes a value of one in a given year if a country has rules or regulations that inhibit cross-border flows. It takes a value of zero otherwise. The data on the accumulated stock of capital flows are from Lane and Milesi-Ferretti (2001). For both measures, the reported numbers are simple averages across the following countries: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingom.

Figure 5. Within-Region Country Effect MADs: Euro Area and Non-Euro Area Developed Europe



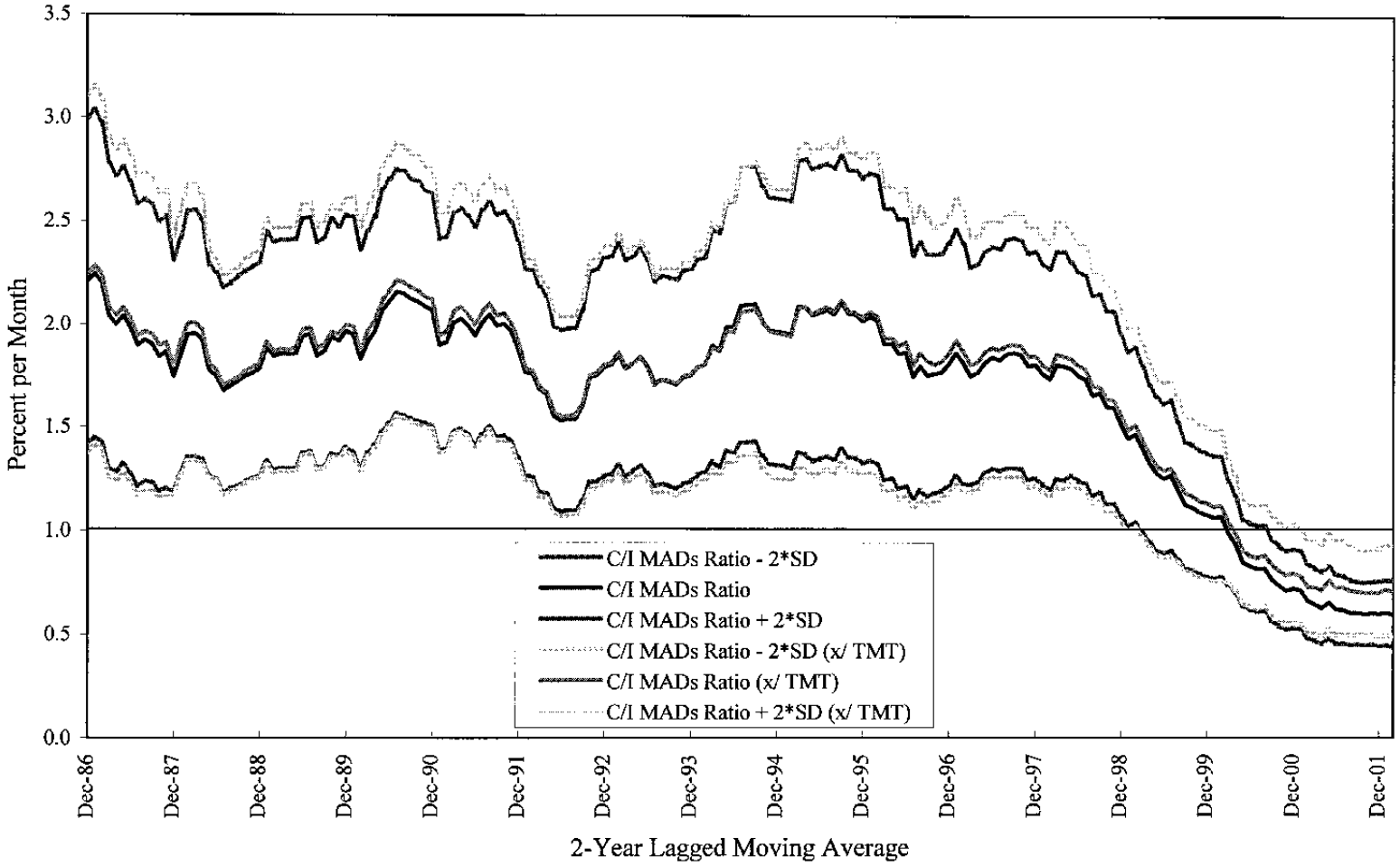
Note: Composite (capitalization-weighted) within-region country mean absolute deviations (MADs) for the Euro zone countries and for non-euro zone countries (Denmark, Norway, Sweden, Switzerland, U.K.). Error bands are constructed using the Delta method and assume no serial correlation in the residuals of equation (5). All series are 24-month lagged moving averages. The full sample covers monthly U.S. dollar-denominated market caps and returns of almost 10,000 stocks in 42 countries from January 1985 to February 2002. Returns are in percent per month.

Figure 6. Ratio of Country to Industry MADs for Developed European Markets with and without TMT Firms
(Regional Benchmark Portfolio)



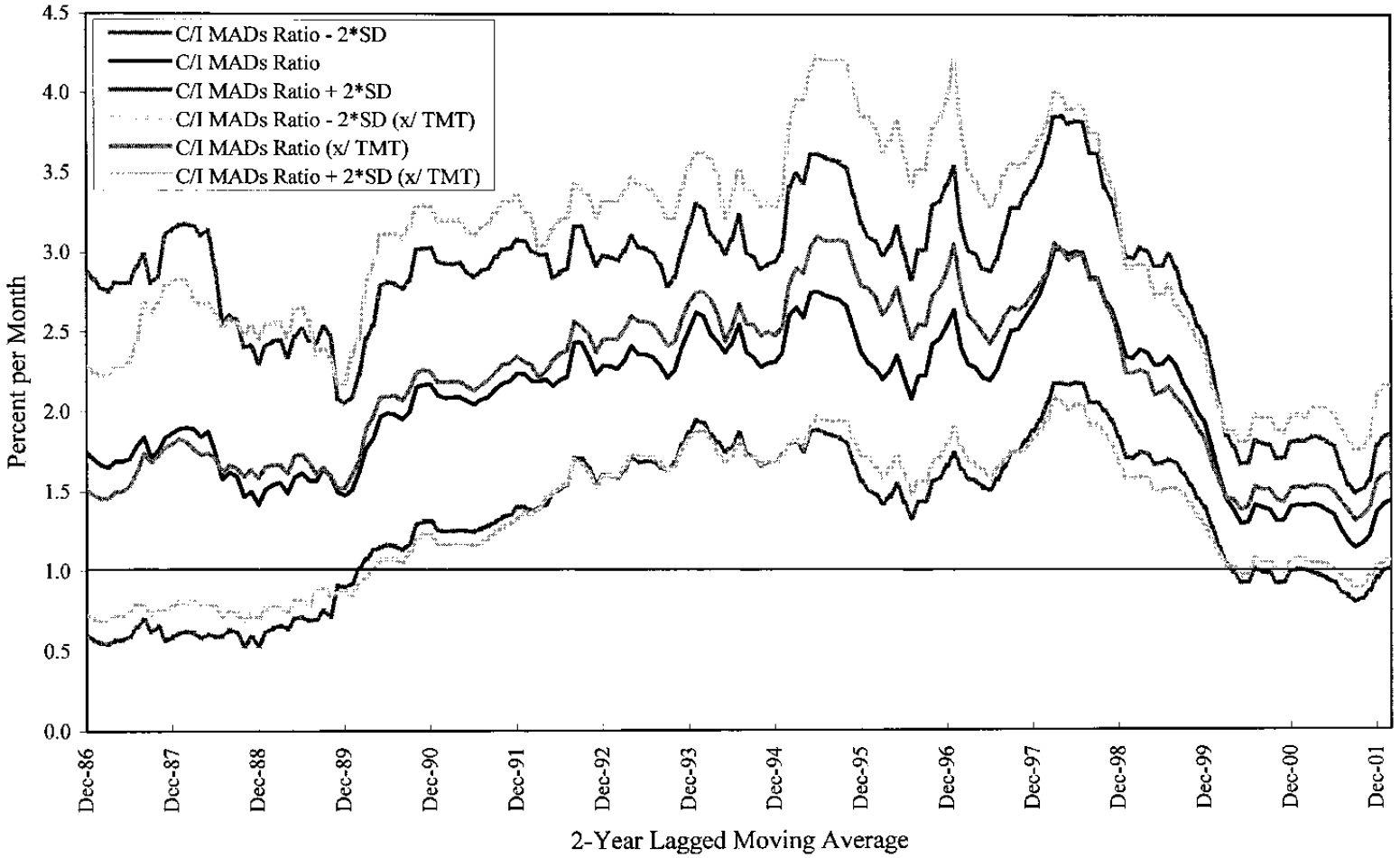
Note: Ratios of country to industry mean absolute deviations (MADs) for the subsample of 12 Western European countries in Rouwenhorst (1999) and for that subsample without telecom, media, biotech and information technology (TMT) firms. The error bands are constructed using the Delta method and assume no serial correlation of the residuals in equation (2). All series are 24-month lagged moving averages. The full sample covers monthly U.S. dollar-denominated market caps and returns of almost 10,000 stocks in 42 countries from January 1985 to February 2002. Returns are in percent per month. The European market is the benchmark portfolio.

Figure 7. Ratio of Country to Industry MADs for Developed European Markets with and without TMT Firms
(Global Benchmark Portfolio)



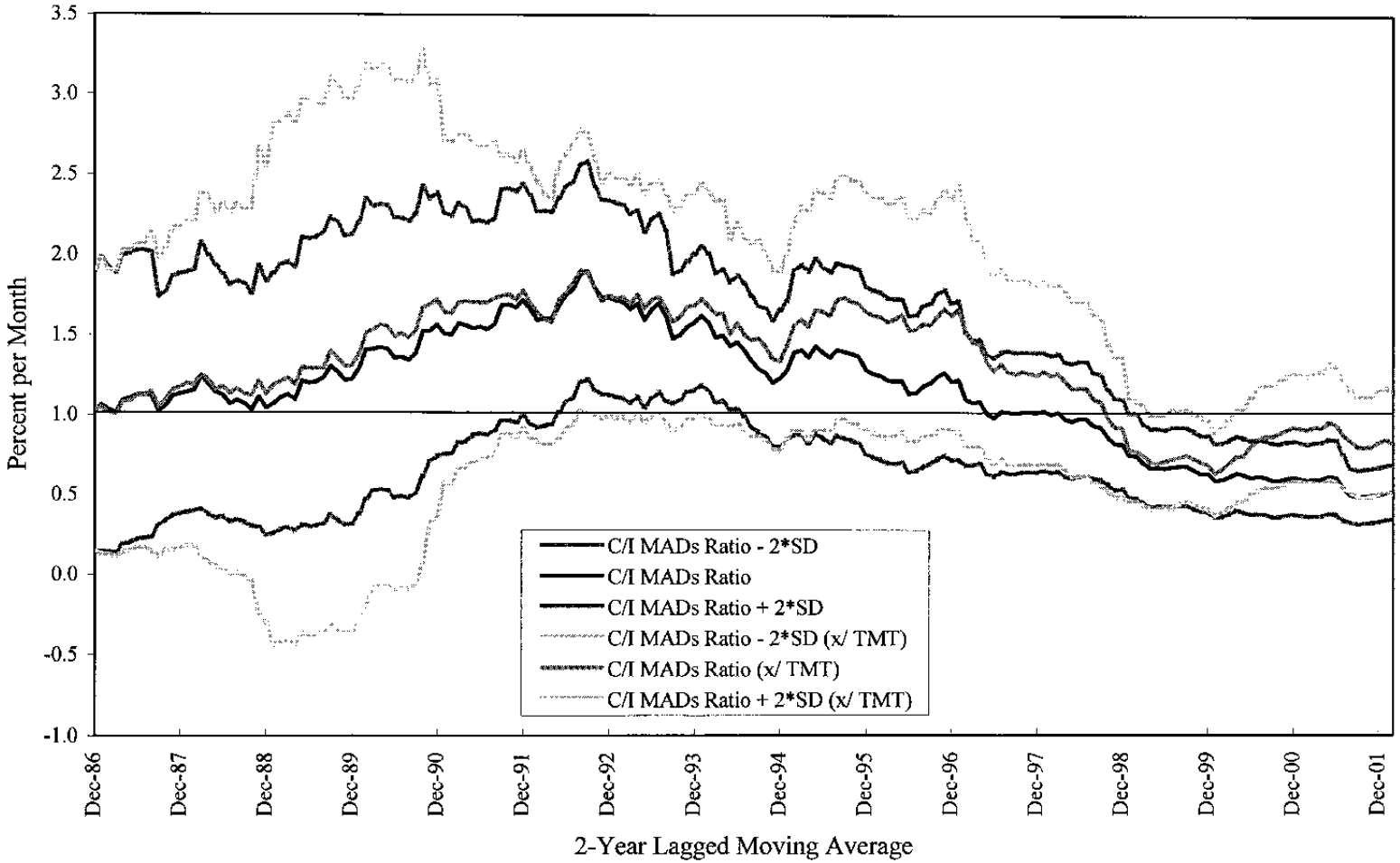
Note: Ratios of country to industry mean absolute deviations (MADs) for the subsample of 12 Western European countries in Rouwenhorst (1999) and for that subsample without telecom, media, biotech and information technology (TMT) firms. The error bands are constructed using the Delta method and assume no serial correlation of the residuals in equation (2). All series are 24-month lagged moving averages. The full sample covers monthly U.S. dollar-denominated market caps and returns of almost 10,000 stocks in 42 countries from January 1985 to February 2002. Returns are in percent per month. The global market is the benchmark portfolio.

Figure 8. Ratio of Country to Industry MADs for the MSCI Asia Region with and without TMT Firms
(Global Benchmark Portfolio)



Note: Ratios of country to industry mean absolute deviations (MADs) for the Asia region with and without telecom, media, biotech, and information technology (TMT) firms. The error bands are constructed using the Delta method and assume no serial correlation of the residuals in equation (2). All series are 24-month lagged moving averages. The full sample covers monthly U.S. dollar-denominated market caps and returns of almost 10,000 stocks in 42 countries from January 1985 to February 2002. Returns are in percent per month. The global market is the benchmark portfolio.

Figure 9. Ratio of Country to Industry MADs for the MSCI Americas Region with and without TMT Firms
(Global Benchmark Portfolio)



Note: Ratios of country to industry mean absolute deviations (MADs) for the Americas region with and without telecom, media, biotech and information technology (TMT) firms. The error bands are constructed using the Delta method and assume no serial correlation of the residuals in equation (2). All series are 24-month lagged moving averages. The full sample covers monthly U.S. dollar-denominated market caps and returns of almost 10,000 stocks in 42 countries from January 1985 to February 2002. Returns are in percent per month. The global market is the benchmark portfolio.

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