The Changing Roles of Industry and Country Effects in the Global Equity Markets

Kate Phylaktis*
Sir John Cass Business School
City of London
106 Bunhill Row
London EC1Y 8TZ

Lichuan Xia
Sir John Cass Business School
City of London
106 Bunhill Row
London EC1Y 8TZ

Keywords: Portfolio diversification; Risk; International Equity Markets; Industrial structure

JEL classification: G11; G15

*Corresponding author: Fax: 020 70408881; Email: K.Phylaktis@city.ac.uk

The Changing Roles of Industry and Country Effects

in the Global Equity Markets

Abstract

Using a comprehensive database covering 50 industry groups and 34 countries over the period 1992 to 2001 this paper examines the roles of the country and industry effects in international equity returns. It focuses on their evolution and on geographical differences. Although the country effects still dominate the industry effects in the full sample period, there has been a major upward shift in the industry effects since 1999, especially in Europe and North America. This is not confined to the Technology, Telecommunications and Media sectors and is not thus a temporary phenomenon. These developments have implications for international portfolio diversification.

1. Introduction

Diversifying a financial portfolio by adding international investment improves the portfolio's risk-return characteristics. This international diversification benefit, first identified in Grubel (1968), is now well documented by academics and experienced by investors. International diversification benefits stem from the fact that equity markets are not perfectly integrated due to country specific factors, such as local monetary and fiscal policies, and differences in institutional and legal regimes. These country factors may act as a wedge to separate equity markets from full integration and induce large country specific variation in returns. On the other hand, however, the diversification benefits might be due to the differences in the national industrial compositions. For example, investing in Switzerland means a disproportionate bet on banking industry and diversification into Australia places a large bet on basic resources. As Roll (1992) argues, industry factors are important in explaining cross-sectional differences in volatility, as well as the correlation structure of country index returns. The relative importance of country factors versus industry factors in the equity return process defines the diversification strategies for financial portfolio management. If country factors are more important, diversification across countries is a more effective tool in reducing the portfolio risks. Conversely, if industry factors are more important, diversification across industries has more merits in achieving the risk reductions.

Whether the national return variation is driven by country effects or industry effects has long been a challenge to academics. Early studies including Lessard (1974) and Solnik (1974) have documented the influence of industry effects on country index returns. Both papers conclude that country effects dominate industry

effects. The dominance of country effects over industry effects has also been identified in most of the recent studies. For example, Heston and Rouwenhorst (1994) analyse 12 European countries (MSCI Indexes) on 829 stocks and 7 broad industries from 1978-1992 and find that the industrial structure explains less than 1% of the variance of equally-weighted country index returns and the low correlation between country indexes is almost completely due to country-specific sources of return variation. The small industry effects imply that country diversification remains more effective than industrial diversification.

Using data from Dow Jones Global Indexes which include 25 worldwide countries and 66 well-defined industries during the period of 1992-1995, Griffin and Karolyi (1998) report that the industrial composition of country indexes can only explain 4% of the variation in the average country index, and the country effects dominate the industry effects for the time period examined. Similar results are also found in Grinold et al. (1989), Beckers, Grinold and Stefek (1992), Drummen and Zimmermann (1992), Heston and Rouwenhorst (1995), Beckers, Connor and Curds (1996) and Rouwenhorst (1999).

Yet the more recent papers by Baca et al. (2000) and Cavaglia et al. (2000) contrast themselves by showing that the industry effects are as equally important as, or even more important than, the country effects. Baca et al. use data from Datastream Global indexes and study 10 sectors in the 7 largest countries from 1979-1999. They find a significant shift in the relative importance of national and economic influences in the equity returns of the world's largest equity markets. In these markets, the impact of the industrial sector effects is now roughly equal to that of the country effects. By studying 36 industries in 21 developed countries in MSCI

indexes from 1986 to 1999, Cavaglia et al. provide evidence showing that the industry effects have been growing in relative importance and may now dominate the country effects. They also reveal that over the past five years, diversification across global industries has provided greater risk reduction than diversification by countries. The same findings are also found in L'Her et al (2002) and Brooks and Delnegro (2002).

Studies in the literature have shown no consensus on the number of countries and industries which are included into their estimation. For example, some authors use broader industry sectors rather than the partitioned industry groups. There are also many researchers who test their results by employing data of a certain region such as Europe. An analysis of returns consisting of fewer countries and smaller number of industry groups, analogous to examining portfolio returns less diversified across countries and industries, may reduce the power of the tests and induce bias in the estimation. In this paper, we employ a new comprehensive database, The Dow Jones Global Indexes (DJGI), which are based on 34 countries and 51 industry group categories, to re-examine the relative importance of country and industry effects in the international equity returns. Our analysis focuses on the following issues:

First, we examine the evolution of country and industry effects over time, which might explain the contrasting findings in the literature relevant to the relative importance of country and industry effects. Though the country effects have traditionally dominated the industry effects, recent economic developments might have caused that dominance to shift. With the increasing financial market integration and business globalization in recent years, the country boundaries would be blurred and the country effects diminish. At the same time, the industry effects, which are more pertinent to the global business cycles, would become more important. By

using the most recent data from DJGI, we explore whether the dynamics of country and industry effects have been changing over time. In fact, our findings nest the earlier studies and provide an explanation for their contrasting results.

Second, we study the heterogeneity of country and industry effects across regions. The formation of large economic and trading blocks such as EU, NAFTA and ASEAN, has accelerated the regional integration in economic activities. Notably, in Europe the establishment of the European Monetary Union (EMU) and the increasing harmonization of government policies stand in contrast to the other regions. The regional integration and the varying degree of regional economic concentration may suggest that the dynamics of country vs. industry effects vary across different regions, and therefore analyses based on one region as in many earlier studies might be misleading.

Third, we explore whether the recent increase of industry effects is due to IT bubbles. Brooks and Delnegro (2002) find that the rise of industry effects is only confined to the TMT (Technology, Media and Telecommunications) sectors, and it has been caused by IT bubbles and is thus a temporary phenomenon. We address this issue in our estimation by investigating whether the increase of industry effects is an industry-wide phenomenon or just prominent in TMT sectors.

Finally, we examine whether there are any differences between traded and non-traded goods industries, as suggested by Griffin and Karolyi (1998).

The paper is organized as follows: Section 2 discusses the data and methodology, and Section 3 presents the descriptive statistics and our major results. Section 4 tests the robustness of our results by excluding the TMT sectors, which could have been responsible for the increase of the industry effects in recent years.

The last section summarizes our results and discusses the implications for portfolio diversification.

2. Data and Methodology

2.1 Dow Jones Global Indexes Data

The Dow Jones Global Indexes database has a comprehensive coverage both across industries and across countries. Its coverage represents 95% of free float market cap at the country level and comprises large cap, mid-cap and small-cap equities. Currently the indexes include 51 well partitioned industry groups and 34 worldwide countries, 11 of which belong to emerging markets.[1] In a sense, the indexes are well diversified both across countries and across industries, and the estimation based on such dataset will be less biased and reflect more accurately the universal global industry effects.

The data used in this paper are the weekly industry-level total return series. We use US dollar-denominated, Wednesday to Wednesday total return indexes spanning the period from Jan 8, 1992 to Dec 26, 2001, with a total of over 1030 observations at a point in time.[2]

Table 1 presents the coverage of indexes both across countries and across industries (as of date Dec 26, 2001). The number of companies included in the global indexes is 4801, with US represented by the highest number, 1650, and Venezuela by the lowest, 5. Panel A reveals the number of industries present in each country. The US is represented in 50 industries and Austria and Venezuela are represented in fewer than 10 industries. Panel B shows the number of countries covered in each industry group. Only 9 out of the total 50 industries have coverage in fewer than 10 countries.

2.2 Methodology

We apply in our analysis the dummy variable regression framework of Heston and Rouwenhorst (1994) and Griffin and Karolyi (1998). The return of an equity can be decomposed into four components: a common factor, an industry effect, a country effect and a firm-specific disturbance. The model has the following form:

$$R_{ijkt} = \alpha_t + \beta_{jt} + \gamma_{kt} + e_{it} \qquad (1)$$

where R_{ijkt} is the return of an equity *i* that belongs to industry *j* and country *k* in period *t*. α_t is a common factor, β_{jt} is the pure industry effect for industry *j*, γ_{kt} the pure country effect for country *k* , and e_{it} is a firm-specific disturbance, which is assumed to have a zero mean and finite variance for returns in all countries and industries, and uncorrelated across equities. Model (1) allows separate influences of industry and country effects, but rules out any interaction between these effects. Our data include 50 industry categories distributed over 34 countries, so for each period *t*, we re-write model (1) as:

$$R_i = \alpha + \sum_{j=1}^{50} \beta_j I_{ij} + \sum_{k=1}^{34} \gamma_k C_{ik} + e_i \qquad (2)$$

Like in Griffin and Karolyi (1998), we use industry indexes to measure returns instead of individual equities. So R_i is the return on each industry index *i*. I_{ij} is an industry

dummy variable that is to equal one if the index *i* belongs to industry *j* and zero otherwise, and C_{ik} is a country dummy variable that is equal to one if the index *i* is from country *k* and zero otherwise.

There is a perfect multicollinearity problem in the estimation of equation (2) since each return belongs to both one country and one industry. One way to solve the problem is to choose an industry and a country as benchmarks. However, to avoid the interpretation problem of an arbitrary benchmark, we apply the following constraints to equation (2) as other studies have done:

$$\sum_{j=1}^{50} w_j \beta_j = 0 \qquad (3a)$$

$$\sum_{k=1}^{34} v_k \gamma_k = 0 \qquad (3b)$$

where w_j and v_k denote the value weights of respective industry *j* and country *k* in the world market portfolio.

Based on equation (2) under restrictions of (3a) and (3b), we run cross-sectional regression by the Weighted Least Squares (WLS) estimate. We weigh each equation by the market cap at the beginning of the week. The estimated intercept, $\hat{\alpha}$, then indicates the world value-weighted market. The coefficients $\hat{\beta}_j$ can be interpreted as the "pure" industry effect relative to the value-weighted world market portfolio, and $\hat{\gamma}_k$ as the "pure" country effect relative to the value-weighted world market portfolio.

Note that the regressions above produce the industry and country effects for one particular week. By running a cross-sectional regression for every week, we obtain a time series of $\hat{\alpha}$, $\hat{\beta}_j$ and $\hat{\gamma}_k$. Based on those estimated $\hat{\alpha}$, $\hat{\beta}_j$ and $\hat{\gamma}_k$, we apply two methods to gauge the relative importance of country and industry effects. The first one is to compute and compare the variances of country versus industry effects in the value-weighted country and industry index returns. The estimation procedure shown above allows us to decompose the value-weighted index return of country *k*, R_k, into a component common to all the countries, $\hat{\alpha}$, the value-weighted average of the industry effects (i.e. cumulative industry effects) based on the unique industrial composition of that country's index, and a pure country specific effect, $\hat{\gamma}_k$, as follows:

$$R_k = \hat{\alpha} + \sum_{j=1}^{50} x_{k,j}\hat{\beta}_j I_{k,j} + \hat{\gamma}_k \qquad (4)$$

where $x_{k,j}$ denotes the proportion of the total market cap of country *k* included in industry group *j*. Equation (4) states that the return in, say, Hong Kong, may differ from the world market portfolio because the industrial composition of Hong Kong market is different from the industrial composition of the world market portfolio, and because the returns of Hong Kong equities are different from returns on equities in the same industry in other countries. Similarly, the return index of an industry *j*, R_j, can be decomposed into a component common to all the industries, $\hat{\alpha}$, the value-

weighted average of the country effects (i.e. cumulative country effects) based on the unique industry index, and a pure industry effect $\hat{\beta}_j$:

$$R_j = \hat{\alpha} + \sum_{k=1}^{34} \phi_{k,j} \hat{\gamma}_k C_{k,j} + \hat{\beta}_j \qquad (5)$$

where $\phi_{k,j}$ represents the proportion of the market cap of the industry *j* index composed of country *k*'s equities.

The second method of comparing the relative importance of country and industry effects is the use of mean absolute deviation (MAD). Formally, the industry or country MADs are defined as the absolute value of estimated industry or country effect in time *t* multiplied by the corresponding market cap at that time. So, country and industry MAD can be written as:

$$MAD_{Ct} = \sum_{k=1}^{34} \nu_{kt} \left| \gamma_{kt} \right| \qquad (6a)$$

$$MAD_{It} = \sum_{j=1}^{50} w_{jt} \left| \beta_{jt} \right| \qquad (6b)$$

MAD was employed in Rouwenhorst (1999) and Cavaglia et al. (2000). It can be thought of as the cap-weighted returns of "perfect foresight" strategies that are exclusively based on either country or industry tilts. The country MAD can be interpreted as the capitalisation weighted average tracking error for returns on

industry-neutral country portfolios. The industry MAD has an analogous interpretation.

3. Empirical Results

3.1 Descriptive statistics

Table 2 summarizes the means and standard deviations of the average raw returns across 50 industries and 34 countries during the full time period and the three sub-periods. All returns are measured in US dollars and expressed as percent per week. The country returns at the top panel display quite a large difference not only across countries but also over time. During the entire sample period, the highest average return was that of the US. The worst players were Greece, Indonesia, Philippines, Thailand and Taiwan, which experienced negative returns. In terms of the standard deviation, Korea, Indonesia, Malaysia and Venezuela were the most volatile countries. In general, emerging markets exhibited higher volatility than advanced markets did. Closer examination of the sub-periods shows that in the first sub-period equity returns were much higher (and more volatile) in emerging markets than in the advanced markets. In the second sub-period, which covered the Asian crisis, emerging markets performed as expected much worse than advanced markets (i.e. lower returns and higher volatility). During the third sub-period, all countries with very few exemptions experienced negative returns and high volatility. In fact, 27 out of the 34 countries had negative returns in the last period.

The bottom panel in Table 2 shows that industry performance was generally more uniform than country performance. On average, industries had a higher return and lower standard deviation than did countries. The average return and standard

deviation for industries for the full period were 0.107% and 1.885% respectively. The corresponding figures for countries were 0.093% and 2.653%. The negative returns were present for most of the industries during the third sub-period. In fact, out of the total 50 industries, 41 had minus returns during this period. The standard deviations for industries during the three sub-periods were all smaller than those for countries. But the result also shows that the level of the industry volatility was increasing at a very fast speed from the first to the third sub-period, which is an indication that industries might have become increasingly important in recent years.

3.2 The global country and industry effects

We first look at the estimated results for our full sample period in Table 3. Panel A of Table 3 shows the comparison of pure country effects with the cumulative sum of industry effects for the country index returns based on equation (4), whereas Panel B compares the pure industry effects with the sum of country effects for the industry index returns based on equation (5). In Panel A, one quick conclusion to be drawn is that there are considerable differences across countries in the variances of country index components. The US had the smallest country effect variance (1.112%-squared), followed by UK (2.448%), Netherlands (3.065%) and France (3.614%). On the other hand, Brazil had the highest country effect variance (50.393%), followed by Indonesia (49.14%) and Venezuela (39.816%). Generally, developed countries had smaller country effects than developing countries. The level of country effect variance for all the developed countries was less than 10% (except for Finland, which was 26.766%), whereas the variance level for emerging market economies was over 10%, with the highest being more than 40 times that of US. Thus, emerging markets,

compared to advanced markets, tend to exhibit large country effects and are more segmented from the rest of the world. On average, the pure country effects in our sample were 15.181%, whereas the average cumulative industry effects were only 0.791%.

In Panel B, the semiconductors industry had the largest variance of pure industry effect at 21.906%-squared. Other industries like advertising, biotechnology, communication technology, consumer services, investment services and tobaccos were also among the highest (around 10-15%). Overall, the average pure industry effects across all industries were 5.952%. On the other hand, the corresponding cumulative country effects stood at 0.554%.

Clearly the country effects were dominant over the cumulative industry effects in the country index returns as shown in Panel A. Likewise, the industry effects dominated the sum of country effects in the industry index returns as shown in Panel B. However, if comparing the average pure country versus industry effects, one can find that the former had a variance of 15.181%, while the latter had a variance of only 5.952%. The two effects had a ratio of 2.55:1. This result indicates that the country effects during our whole sample period were a more important determinant of variation in international returns than the industry effects.

The results derived from our full sample period may not reveal recent developments in the light of EMU, the Asian crisis and increasing mergers and acquisitions, which may have had an impact on the roles of country and industry effects in the global financial markets. In order to study the evolving process of those effects over time, we divide our sample into three sub-periods: the first sub-period is from Jan 1992 to Mar 1995. This is the time period studied by Griffin and Karolyi

(1998). The second sub-period ranges from April 1995 to November 1999, and this sample period was examined by Cavaglia et al. (2000), who have found that industry effects were becoming increasingly more important. The third sub-period covers from Dec 1999 to Dec 2001, which includes the boom and bust of IT bubbles.

Our sub-period results are also shown in Table 3. Several points are noteworthy: first, Brazil had a very high country effect variance (92.66%) in the first sub-period and Indonesia a most volatile time (with variance of 81.843%) in the second sub-period. This comes as no surprise as Brazil was badly hit during Latin America financial and currency crisis in the early nineties and Indonesia had a political turmoil in the late nineties. Second, in Finland, both country and cumulative industry effects went up abruptly in the third sub-period, the time when the global technology bubbles prevailed. It should be pointed out that Finland's market heavily concentrates on the technology sector, which accounted for over 60% of its total market cap during the time examined.

In the first sub-period, the average pure country effects were 13.593%, against a value of 2.842% for the average pure industry effects. The two effects had a ratio of 4.78:1. Griffin and Karolyi (1998) report a ratio of 3.32:1 for the same time period. The higher ratio in our estimation is expected as our sample includes 7 more emerging markets than theirs. Yet the ratio kept decreasing in the second and third sub-periods: 3.17:1 in the second and only 1.29:1 in the third period. Closer examination reveals that the decrease of the ratio was entirely due to the increase of industry effects. In fact, the country effects were increasing across the three sub-periods: from 13.593% in the first up to 17.075% in the third sub-period. On the other hand, the corresponding industry effects went up from 2.842% to 13.152%. Clearly the

industry effects were catching up with the country effects at a very fast pace. One thing to bear in mind is that the increase of country effects over time was not a reflection of the decrease of global market integration; rather, it was caused by some particular reasons in specific regions such as the financial crisis in Asia Pacific, as illustrated in the following sub-section.

During the third period, over one fifth of the industries had an industry effect higher than the average country effects. Such industries include not only technology and telecommunications industry groups, such as biotechnology, semiconductors, communications technology, software, but also other industries, such as consumer services, tobaccos, entertainment, household products and advertising.

Overall, our analysis demonstrates that the country effects still dominated the industry effects for the whole sample period. However, even though the country effects kept increasing over time, the industry effects were catching up at a faster speed, especially in the most recent years. In fact, in some of the industries as noted above which cover not only TMT sectors but also other non-TMT sectors, the industry effects had already outperformed the country effects.

3.3 The geographical breakdown of country effects

The global country effects analyzed above do not account for the geographical differences. The country effects in different regions may vary because of the regional substantial variations in how economic and financial integration have progressed. Our geographical breakdown of country effects can nest other papers which focus on the European countries such as Heston and Rouwenhorst (1994, 1995) and Rouwenhorst (1999). In additon, it allows us to explore whether the evolution of

country and industry effects in each region is consistent with the differences across regions in economic and financial integration.

We divide our sample of countries into 4 regions: Europe (16 countries), Asia Pacific (11), North America (2) and Latin America (4). For each region, we average the pure country effects and cumulative industry effects of the countries within that region to obtain the regional country effects and regional cumulative industry effects. We also divide our sample of countries into developed and emerging markets to detect any differences between the two markets. The results are presented in Table 4.

Panel A of Table 4 reports the country and cumulative industry effects across regions. During the entire sample period, Latin America exhibited the highest country effects (with a variance of 31.263%), followed by Asia Pacific with a variance of 21.251%. This is as expected since all the four countries included in Latin America belong to emerging markets, and there are 7 developing countries included in Asia Pacific. By contrast, the country effects for Europe and North America (including only the US and Canada) were much smaller (8.842% and 3.067% respectively).

The sub-period results show that compared to the first sub-period, the country effects for all the regions except Asia Pacific decreased in the second period. In the third sub-period, the country effects decreased in both Asia Pacific and Latin America, but increased in Europe and North America. Recall that the global country effects shown in Sub-section 3.2 went up during the second and third sub-periods. By breaking down those country effects across regions, we find that the increase of global country effects during the second period was entirely due to the surge of country effects in Asia Pacific countries, which might be a consequence of the Asian crisis during that time period. On the other hand, the increase of global country effects

during the third period was due to the climbing-up of country effects in Europe and North America.

Comparing the country effects in each region with the global industry effects, one can see that the country effects in North America were lower than the global industry effects for not only the full sample period, but for the three sub-periods as well. In Europe, the country effects were higher than the industry effects in the first and second periods, but for the third period, the two effects nearly levelled each other (13.783% of country effects vs. 13.152% of industry effects, a ratio of 1.05). There were no surprising results for the Asia Pacific and Latin America regions: the country effects had still dominated the industry effects not only for the full sample period but also for the sub-sample periods.

All in all, during the entire period of 1992-2001, the country effects had dominated the industry effects in all the regions except North America. The country effects for Latin America and Asia Pacific were much higher than those for Europe and North America. The ratios of country/industry effects were 5.25:1, 3.57:1 and 1.49:1 respectively for Latin America, Asia Pacific and Europe. Yet judging from sub-periods, the ratios for all the three regions were continuing to decrease (except for Asia Pacific in the second sub-period when the Asian crisis occurred). The ratios in the last sub-period were down to 1.44:1, 1.8:1 and 1.05:1 respectively for the above three regions. Especially in Europe, the industry effects almost levelled the country effects. The decreasing ratios across all the regions imply a tendency that not only in Europe, but globally, equity markets have become increasingly integrated. The only difference across regions is that the industry effects in Europe were catching up with the country effects at a faster rate.

Panel B of Table 4 shows the comparison of country and cumulative industry effects between developed and emerging markets. It confirms our geographical breakdown analysis that the emerging markets tend to have larger country effects. It also indicates that during the third sub-period, the industry effects began to dominate the country effects in developed markets. Generally, the result suggests that it was only in recent years that the industry effects had become more important than the country effects in the developed world, as those developed markets had lower country effects and might be more globally integrated not only relative to the emerging markets but also over time.

3.4 The global and regional country vs. industry effects: MADs estimation

We conduct MAD estimation in our analysis to investigate the changing roles over time as well as the regional differences between the country and industry effects. Figure 1-7 plot the 52-week moving averages of industry and country MADs for the globe, the 4 regions and the developed vs. emerging markets. Notice that the regional country and industry MADs are calculated in the same way as the global country and industry MADs except that the weight is the proportion of country or industry value in the regional portfolio. A similar procedure is applied to the calculation of MADs for developed and emerging markets.

Figure 1 shows that in the global markets, the country effects varied less compared to the industry effects during the whole sample period. Before the year 1998, the country effects dominated the industry effects. Since then, however, they had been outperformed by the industry effects so that the return opportunities from industry tilts had dominated those from country tilts.

Figures 2-5 are the MAD plots for the regions of Europe, Asia Pacific, Latin America and North America. Several common features are noteworthy: First, in the early stage of our sample period, the country effects dominated the industry effects in all regions, including North America. Second, the industry effects for all the regions showed an upward trend, although the increase was not identical across regions. Third, as in the global markets, the industry effects in all the regions increased sharply and then turned downwards during the last several years, which may be related to the boom and bust of IT bubbles. Nevertheless, such increase was not completely attributable to the IT bubbles as the level of industry effects at the end of our sample was still historically high, and even higher than the country effects in some regions.

In Europe, the industry effects surpassed the country effects within the year 1999 and the margin of the difference since then was wide relative to the scenarios in other regions. This finding supports the notion that the start of EMU as well as the introduction of single euro currency have accelerated the economic integration in the region and brought it to stand in contrast to the other regions. The dominance of industry effects over country effects took place earlier in North America, back in 1995. Yet the gap was very small and in the recent period, both country and industry effects went up abruptly and industry effects lost its dominance for a short time in 2000. Again this may be related to the burst of the technology bubbles. For Asia Pacific, the country effects hit the highest during 1997-1999, the Asian crisis period. After the crisis, the two effects were moving closer and the gap between the two had become narrower. In Latin America, there were two spikes present on the line of the country effects. The first one, which was also the highest, was related to the Latin America financial crisis during the early 1990s and the second happened at the time of the

Asian crisis. Clearly the Asian crisis had a great impact on the region. Although the country effects dominated the industry effects in the region for the whole period, the gap was getting smaller and the importance of industry effects was increasing as well in recent years.

Figure 6 shows that for the developed countries, the industry effects increased very fast while the country effects were relatively constant. The former had dominated the latter with a great margin since 1998. On the other hand, Figure 7 reveals that in the developing countries, although the industry effects were all the way dominated by the country effects, their importance was increasing over time and the gap between the two effects was narrowing in recent years.

To sum it up, our MADs estimation indicates that the world had witnessed a major shift in the sources of importance in the return variation: industry effects began to dominate the country effects in recent years. The increasing importance of industry effects worldwide seems to coincide with the increasing process of business and financial globalization. Yet the situation varies across regions: while the industry effects became more important in Europe and North America in recent years, they were still dominated by the country effects in Asia Pacific and Latin America. In terms of the developed versus emerging markets, the former had shown industry effect dominance while the latter country effect dominance. It is clear that emerging markets had larger country effects and were less integrated with the rest of the world.

3.5 Traded vs. non-traded goods industries

Griffin and Karolyi (1998) point out that traded and non-traded goods industries might behave differently in terms of the variance of the pure industry

effects. Traded goods industries are denoted with a "T" in parenthesis in Table 3. In fact, Table 3 shows that most of the traded goods industries exhibited greater industry effects than non-traded goods industries. We separate the industries into traded and non-traded goods industries to investigate whether there are significant differences between the two categories.

Table 5 indicates that compared to non-traded goods industries, the traded goods industries did have among the highest industry effects. The traded goods industries had a pure industry effect variance of 7.169% and non-traded goods industries had a variance of 5.43%. On the other hand, the sum of country effects for the traded goods industries was lower than that for the non-traded goods industries: 0.529% vs. 0.565%. Those results held true not only for the whole sample period, but also for the three sub-periods. F statistics strongly rejects the null that either the variance of pure industry effects or the cumulative sum of the country effects was equal between the two categories.

Therefore, during our whole sample period, as well as for the three sub-periods, traded goods industries had larger industry effects and smaller cumulative country effects than the non-traded goods industries. Such a significant difference between the two industry categories may have a theoretical explanation. For firms in traded goods industries, their profitability, cash flows and asset values are more sensitive to the external factors such as the international input and output price fluctuations and change of exchange rates, rather than domestic factors. So the sources of variation in global industry factors can be more important for equity prices of traded goods firms. Those traded goods firms as a whole tend to exhibit a higher

co-variation. As a result, industry factors can explain a relatively larger proportion of the total variation in the index returns of traded goods industries.

4. Robustness Test

Our estimation shows that the industry effects were catching up and gaining in importance in the most recent years, although they were still dominated by the country effects during our whole sample period. The increasing importance of industry effects were closely related to the ongoing capital market integration worldwide. However, some papers, such as Brooks and Delnegro (2002), have argued that the recent increase of industry effects is confined to a narrow set of industry sectors—Technology, Media and Telecommunication (TMT)[3], while for the rest of the industries, the industry effects are still dominated by the country effects. They further conclude in their paper that the recent rise of industry effect is not an indication of global market integration, rather it is a temporary phenomenon associated with the equity market technology bubble in the late 1990s.

To address the above issue and also to investigate the robustness of our analysis, we re-examine the country vs. industry effects by excluding the TMT sectors in our sample. The results for the detailed variance computation and the MAD estimation can be made available by the authors. We report in the paper the main findings.

At the global level, the average variances of the pure country effects and industry effects were 15.716% and 5.098 % respectively during the full sample period. The two effects had a ratio of 3.082:1, higher than the ratio of 2.55:1 in the prior estimation, which included TMT sectors. For the sub-periods, the ratio of the two

effects dropped from 5.798:1 in the first period to 4.175:1 in the second period and further down to 1.291:1 in the third period (For comparison, the ratios for the three sub-periods in the prior estimation were 3.32:1, 3.17:1 and 1.29:1 respectively).

Looking at the results by regions, we find that the industry effects surpassed the country effects in North America during the full sample period. As far as sub-periods are concerned, in Europe the industry effects (11.419%) slightly outperformed the country effects (11.197%) in the third sub-period. This is a more favourable result compared to our prior estimation (the corresponding figures were 13.152% and 13.783%). While the industry effects were still dominated by the country effects in emerging markets in the third sub-period, they began to outperform the country effects in the developed markets.

Clearly, all those findings support our prior estimation. Our MAD estimations without TMT sectors further indicate that the industry effects in the late 1990s had surpassed the country effects at the global level and for the developed countries. In terms of regions, while the industry effects had been still dominated by the country effects in Asia Pacific and Latin America, the situation for Europe and North America had changed: the industry effects had become more important than the country effects in recent years.

Overall, our results were robust to the estimation which excludes TMT sectors. In other words, the recent growth of industry effects was not confined to a narrow set of TMT sectors. Rather, it was an industry-wide phenomenon which was embedded in the ongoing financial and business globalization process.

5. Conclusion

Previous literature has shown a mixed empirical result over the importance of country and industry effects in the international equity returns. In this paper, we employ a new comprehensive database, the Dow Jones Global indexes, to re-examine the issue with a focus on those effects' changing roles over time and their geographical divergence. Our sample covers 50 well partitioned industries and 34 worldwide countries for the time period of Jan 1992 – Dec 2001. Our results indicate that the earlier findings of the dominance of country effects over industry effects in papers such as Griffin and Karolyi (1998) and Heston and Rouwenhorst (1994) were due to their use of a sample period that only covered the 1980's and early 1990's. As we have shown, however, the importance of the two effects was changing over time and the industry effects were catching up with the country effects in recent years. In fact in some industries like semiconductors, technology, consumer services, household products, tobacco and entertainments, the industry effects had already outperformed the country effects.

Our results have also shown that the shift between the two effects varied across geographical regions. While the industry effects became more important in Europe and North America in recent years, they were still dominated by the country effects in Asia Pacific and Latin America. The results were in contrast to those found in some earlier studies on Europe, such as Rouwenhorst (1999) who employed the regional data for the period 1993-98. Our estimation of industry effects is based on a large number of countries and industries, which may be a more appropriate representation of the world portfolio.

We tested the robustness of our results by excluding TMT, which might have been the reason for the rising importance of the industry effects in recent years. Our

results show that the increasing industry effects were not only bounded to the TMT sectors, but an industry-wide phenomenon which may be related to the globalization activities.

We also confirm the previous findings by Griffin and Karolyi (1998) of the different pattern within the traded and non-traded goods industries. Traded-goods industries, such as semiconductors, auto manufacturers, software and energy, tend to have higher industry effects than do the non-traded goods industries. The difference between the two types of industry is statistically significant for the entirely sample period as well as all the three sub-periods.

Our findings have several implications for international portfolio diversification strategies. First, while global portfolios focusing on diversification across countries still has merits, diversification across industries cannot nevertheless be neglected. For industries with higher industry effects such as semiconductors, consumer services, etc, it is more favourable to choose equities across those industries to diversify than to choose equities across countries. Second, diversifying portfolios across countries or industries also depends on the regions the assets are allocated. In Asia Pacific or Latin America, where most emerging markets are located, the traditional diversification across countries is still preferable. However, in Europe and North America, where the markets are more integrated, such traditional diversification will miss out the benefits of industrial diversification. Third, knowing the different characteristics of traded and non-traded goods industries is also important in the international diversification. Investing abroad in a manner that tilts toward traded goods industries should take into account the industrial composition of the portfolios. Otherwise the diversification potential would be reduced.

References

Baca, S., B. Garbe and R. Weiss, 2000, The Rise of Sector Effects in Major Equity Markets, *Financial Analysts Journal*, Sep/Oct, 56, 34-40.

Beckers, S., R. Grinold, A. Rudd and D. Stefek, 1992, The Relative Importance of Common Factors Across the European Equity Markets, *Journal of Banking and Finance*, 16, 75-95

Beckers, S., G. Connor and R. Curds, 1996, National versus Global Influences on Equity Returns, *Financial Analysts Journal*, Mar/April, 52, 31-39

Cavaglia, S., C. Brightman and M. Aked, 2000, The Increasing Importance of Industry Factors, *Financial Analysts Journal*, Sept/Oct, 56, 41-54

Brooks, R. and M. Delnegro, 2002, The Rise in Comovement across National Stock Markets: Market Integration or IT Bubble? *Federal Reserve Bank of Atlanta Working Paper* 2002=17a

Drummen, M., and Zimmermann, H., (1992), The Structure of European Stock Returns, *Financial Analysts Journal*, July/Aug 14-26

Griffin, J. M. and G. A. Karolyi, 1998, Another Look at the Role of the Industrial Structure of Markets for International Diversification Strategies, *Journal of Financial Economics*, 50, 351-373

Grinold, R., A. Rudd and D. Stefek, 1989, Global Factors: Fact or Fiction? *Journal of Portfolio Management*, 16, 79-88

Grubel, H., 1968, International Diversified Portfolios: Welfare Gains and Capital Flows, *American Economic Review*, 58, 1299-1314

Heston, S. L. and K. G. Rouwenhorst, 1994, Does Industrial Structure Explain the Benefits of International Diversification? *Journal of Financial Economics*, 36, 3-27

Heston, S. L. and K. G. Rouwenhorst, 1995, Industry and Country Effects in International Stock Returns, *Journal of Portfolio Management*, 53-58

Lessard, D., 1974, World, National and Industry Factors in Equity Returns, *Journal of Finance*, 24, 379-391

L'Her, J., O. Sy and M. Tnani, 2002, Country, Industry, and Risk Factor Loadings in Portfolio Management, *The Journal of Portfolio Management*, Summer, 70-79

Roll, R., 1992, Industrial Structure and the Comparative Behaviour of International Stock Market Indices, *Journal of Finance*, 47, 3-42

Rouwenhorst, K. G., 1999, European Equity Markets and the EMU, *Financial Analysts Journal*, May/June, 55, 57-64

Solnik, B., 1974, The International Pricing of Risk: an Empirical Investigation of the World Capital Market Structure, *Journal of Finance*, 29, 365-378

Table 1. Industry and country composition of Dow Jones Global Indexes

(as the data of Dec 31, 2001)

Panel A shows the number of industries in each country (with the number of companies covered in parentheses). Panel B shows the number of countries with representation in each country. Traded-goods industries have a "T" to the right of their name in Panel B

Panel A

country	No. of Industries	country	No. of Industries	country	No. of Industries
Australia(148)	38	Indonesia(28)	17	Singapore(91)	28
Austria(7)	6	Ireland(19)	13	South Africa(95)	31
Belgium(29)	18	Italy(82)	44	Spain(47)	23
Brazil(90)	20	Japan(695)	48	Sweden(63)	25
Canada(202)	42	Korea(113)	36	Switzerland(77)	29
Chile(38)	17	Malaysia(131)	30	Taiwan(237)	32
Denmark(23)	15	Mexico(34)	15	Thailand(35)	19
Finland(29)	19	Netherlands(57)	25	UK(321)	48
France(107)	41	New Zealand(16)	15	US(1650)	50
Germany(105)	43	Norway(20)	13	Venezuela(5)	2
Greece(45)	25	Philippines(18)	11		
HongKong(132)	36	Portugal(12)	10		

Panel B

Industry	No. of ctry.	Industry	No. of ctry.	Industry	No. of ctry.
banks	30	forest prodts.(T)	20	textile/apparel(T)	14
fxdline communi.	29	publishing	20	auto part/equip (T)	13
leisure gds/serv.	27	broadcasting	19	container/packaging	12
food (T)	26	real estate	19	gas utilities	12
mining/metals (T)	25	airline	18	tobacco (T)	12
indust.services	25	chemical (T)	18	auto manufact (T)	10
buldg material	24	elect.utilities	18	consumer service	10
divers. Industrial	24	invest.services	18	aerospace	8
retailers	24	pharmaceutical (T)	17	biotechnology	8
energy(T)	23	food produ.(T)	17	cosmetics (T)	8
communi. Tech	22	home construc.	17	health providers	8
insurance	22	software(T)	17	household prodts.	8
indust.transport	22	semiconductors (T)	15	indust. Equip	8
beverage	21	tech prodts (T)	15	advertising	7
divers.financial	21	elect.compo.(T)	14	water utilities	7
heavy constructn	20	adv.industry equip.	14	entertainment	5
wireless communi.	20	medical prodts	14		

Table 2. Summary Statistics (weekly data 1992-2001)

All the returns are measured in US dollar, expressed in percent per week. Standard deviation is also expressed in percent

PANEL A By country

	Whole period Jan 1992- Dec 2001		**Sub 1** Jan 1992-Mar 1995		**Sub 2** Apr 1995-Nov 1999		**Sub 3** Dec 1999-Dec 2001	
	mean	*std. dev*	*mean*	*std. dev*	*mean*	*std. dev*	*mean*	*std. dev*
Austria	-0.027	1.675	0.036	1.439	-0.033	1.762	-0.110	1.818
Australia	0.167	1.876	0.114	1.705	0.334	1.859	-0.125	2.129
Belgium	0.089	1.608	0.162	1.182	0.205	1.552	-0.282	2.163
Brazil	0.250	3.867	0.487	4.147	0.217	3.833	-0.042	3.487
Canada	0.162	1.881	0.070	1.466	0.250	1.885	0.109	2.384
Switzerland	0.128	1.920	0.197	1.347	0.253	1.716	-0.255	2.850
Chile	0.158	2.546	0.442	2.624	0.021	2.539	0.024	2.423
Germany	0.070	1.918	0.129	1.382	0.179	1.534	-0.263	3.051
Denmark	0.076	1.701	-0.042	1.747	0.100	1.248	0.203	2.378
Spain	0.071	1.852	-0.010	1.930	0.211	1.559	-0.116	2.277
Finland	0.116	1.656	0.149	1.113	0.184	1.571	-0.087	2.384
France	0.194	2.122	0.190	1.622	0.330	1.975	-0.105	2.947
UK	0.182	2.023	0.195	2.215	0.295	1.648	-0.089	2.428
Greece	-0.061	2.427	0.001	0.744	0.170	1.484	-0.670	4.693
HongKong	0.149	2.842	0.248	2.300	0.211	3.159	-0.139	2.858
Indonesia	-0.013	5.631	0.220	1.665	0.078	7.621	-0.575	4.191
Ireland	0.138	1.655	0.129	1.282	0.179	1.590	0.059	2.225
Italy	0.139	2.701	-0.009	2.980	0.319	2.457	-0.034	2.767
Japan	0.010	2.998	0.126	3.164	0.126	2.910	-0.429	2.911
Korea	0.113	4.729	0.360	2.544	0.067	5.843	-0.167	4.560
Mexico	0.082	3.809	-0.199	3.827	0.349	4.105	-0.079	3.001
Malaysia	0.090	4.079	0.407	2.248	-0.057	5.282	-0.071	3.063
Netherlands	0.159	1.837	0.191	1.350	0.255	1.777	-0.104	2.498
Norway	0.086	2.380	0.117	1.712	0.160	2.143	-0.128	3.513
New Zealand	0.114	1.752	0.272	1.392	0.041	1.757	0.034	2.185
Philippines	-0.018	3.339	0.425	1.979	-0.174	3.886	-0.353	3.637
Portugal	0.083	2.041	0.110	1.066	0.259	2.254	-0.348	2.573
Sweden	0.146	1.948	0.128	1.917	0.254	1.790	-0.065	2.302
Singapore	0.097	2.804	0.290	1.741	0.120	3.421	-0.253	2.586
Thailand	-0.085	3.720	0.305	2.311	-0.345	4.712	-0.104	2.845
Taiwan	-0.023	3.272	0.234	2.785	-0.058	2.931	-0.342	4.474
US	0.269	2.036	0.216	1.512	0.408	1.997	0.037	2.713
Venezuela	0.018	4.771	-0.233	4.271	0.088	5.528	0.249	3.539
South Africa	0.049	2.783	0.260	1.681	0.052	3.150	-0.285	3.229

Average	**0.093**	**2.653**	**0.168**	**2.011**	**0.148**	**2.779**	**-0.144**	**2.914**
Median	**0.093**	**2.251**	**0.176**	**1.726**	**0.179**	**2.070**	**-0.108**	**2.806**

PANEL B By Industry

	Whole period Jan 1992- Dec 2001		**Sub 1** Jan 1992-Mar 1995		**Sub 2** Apr 1995-Nov 1999		**Sub 3** Dec 1999-Dec 2001	
	mean	*std. dev*	*mean*	*std. dev*	*mean*	*std. dev*	*mean*	*std. dev*
advertising	0.114	2.385	0.052	1.312	0.414	1.887	-0.460	4.018
airline	0.015	1.975	0.117	1.128	0.126	1.917	-0.392	2.886
aerospace	0.067	1.821	0.106	1.515	0.145	2.031	-0.164	1.750
auto part/equip (T)	0.021	2.165	0.151	1.347	0.096	2.630	-0.345	2.010
auto manufact (T)	0.154	2.410	0.147	1.495	0.278	2.886	-0.111	2.384
buldg material	0.109	1.814	0.251	1.344	0.089	2.114	-0.066	1.716
banks	0.231	2.052	0.320	1.470	0.317	2.404	-0.098	1.949
broadcasting	0.090	2.281	0.169	1.062	0.259	1.563	-0.408	4.177
biotechnology	0.093	2.310	-0.029	1.343	0.266	1.726	-0.103	4.007
beverage	0.135	1.637	0.221	1.235	0.092	1.919	0.096	1.498
chemical (T)	0.097	1.682	0.259	1.449	0.091	1.843	-0.138	1.625
communi. Tech	0.145	2.422	0.221	1.301	0.297	2.083	-0.313	3.945
heavy constructn	-0.023	1.944	0.147	1.269	-0.023	2.258	-0.286	2.033
cosmetics (T)	0.193	1.462	0.140	1.248	0.197	1.548	0.267	1.578
consumer service	0.080	2.121	0.249	0.983	0.169	1.964	-0.377	3.349
container/packaging	-0.008	1.228	0.028	0.946	0.019	1.295	-0.125	1.446
wireless communi.	0.092	2.052	0.152	0.732	0.252	1.361	-0.361	3.872
pharmaceutical (T)	0.210	1.557	0.176	1.097	0.309	1.798	0.040	1.580
elect.utilities	0.166	1.482	0.306	1.528	0.165	1.512	-0.048	1.319
elect.compo.(T)	0.156	2.006	0.234	1.293	0.190	1.877	-0.040	2.968
energy(T)	0.191	1.789	0.266	1.371	0.230	2.027	-0.012	1.793
leisure gds/serv.	0.058	1.771	0.160	0.719	0.066	1.730	-0.117	2.743
food produ.(T)	0.174	1.388	0.158	1.015	0.296	1.505	-0.075	1.580
divers.financial	0.147	2.038	0.242	1.443	0.194	2.384	-0.104	1.983
food (T)	0.089	1.659	0.146	1.380	0.129	1.869	-0.086	1.555
forest prodts.(T)	0.091	1.687	0.243	1.338	0.017	1.938	0.020	1.563
fxdline communi.	0.152	2.388	0.229	1.085	0.363	2.197	-0.438	3.781
gas utilities	0.193	1.417	0.241	1.308	0.224	1.496	0.052	1.403
health providers	0.163	1.740	0.379	1.693	0.106	1.483	-0.042	2.252
home construc.	-0.037	1.864	0.043	1.310	-0.079	2.189	-0.066	1.814
household prodts.	0.008	1.376	0.128	1.049	-0.051	1.675	-0.045	1.041
divers. Industrial	0.060	1.790	0.150	1.222	0.117	1.886	-0.207	2.242
indust. Equip	0.083	1.504	0.165	1.305	0.135	1.632	-0.160	1.479
insurance	0.138	1.766	0.132	1.247	0.238	1.921	-0.078	2.058
adv.industry equip.	0.017	1.927	0.210	0.939	0.121	1.438	-0.515	3.389

mining/metals (T)	0.098	2.022	0.311	1.502	0.061	2.264	-0.148	2.130
entertainment	0.072	2.187	0.196	1.043	0.170	1.784	-0.339	3.736
medical prodts	0.110	1.377	0.039	0.833	0.172	1.190	0.083	2.202
publishing	0.105	1.780	0.208	1.005	0.221	1.395	-0.312	3.015
real estate	-0.011	1.606	0.031	1.270	0.005	1.891	-0.112	1.369
retailers	0.122	1.778	0.183	1.171	0.215	1.970	-0.181	2.064
invest.services	0.132	2.224	0.225	1.328	0.211	2.485	-0.189	2.659
semiconductors (T)	0.264	3.148	0.218	0.844	0.394	2.467	0.044	5.727
software(T)	0.099	2.571	0.191	1.155	0.336	1.629	-0.570	4.813
indust.services	0.084	1.737	0.137	1.190	0.221	1.655	-0.305	2.442
textile/apparel(T)	0.014	1.533	0.169	1.165	-0.061	1.666	-0.057	1.708
tech prodts (T)	0.195	2.650	0.225	1.297	0.391	2.668	-0.288	3.857
tobacco (T)	0.200	1.504	0.114	1.129	0.297	1.591	0.116	1.783
indust.transport	0.035	1.483	0.109	1.159	0.043	1.590	-0.099	1.673
water utilities	0.165	1.731	0.047	1.165	0.287	1.859	0.076	2.122
Average	**0.107**	**1.885**	**0.174**	**1.216**	**0.176**	**1.882**	**-0.152**	**2.442**
Median	**0.102**	**1.790**	**0.169**	**1.248**	**0.181**	**1.873**	**-0.111**	**2.061**

Table 3 Variances of Country and Industry Effects (34 countries and 50 industries)

(Variance: %-squared)

PANEL A

	Whole period Jan 1992- Dec 2001		**Sub 1** Jan 1992-Mar 1995		**Sub 2** Apr 1995-Nov 1999		**Sub 3** Dec 1999-Dec 2001	
Country	pure ctry effect	cum. Ind. effects	pure ctry effect	cum. Ind. effects	pure ctry effect	cum. Ind. effects	pure ctry effect	cum. Ind. effects
Austria	6.803	0.800	5.678	0.210	6.218	0.473	9.941	2.363
Australia	5.067	0.426	5.638	0.120	4.307	0.276	5.962	1.203
Belgium	4.424	0.697	2.829	0.202	4.241	0.391	7.271	2.115
Brazil	50.393	1.007	92.660	0.365	33.760	0.865	22.797	2.333
Canada	5.021	0.252	3.231	0.094	2.876	0.155	12.618	0.707
Switzerland	5.643	1.184	4.658	0.423	6.291	0.566	5.552	3.718
Chile	12.058	1.131	15.897	0.413	11.185	1.005	7.900	2.509
Germany	4.603	0.177	4.034	0.095	3.263	0.118	8.565	0.950
Denmark	6.597	0.310	6.975	0.166	5.504	0.134	8.442	0.397
Spain	7.021	0.560	7.117	0.222	5.650	0.435	9.864	1.337
Finland	26.766	5.041	14.910	0.646	20.255	0.795	60.039	21.319
France	3.614	0.177	2.998	0.033	3.095	0.102	5.787	0.566
UK	2.448	0.298	2.475	0.043	2.607	0.118	2.084	1.097
Greece	20.814	0.773	21.550	0.911	18.987	0.518	23.405	1.143
HongKong	11.450	0.493	11.235	0.301	10.694	0.384	13.616	1.032
Indonesia	49.140	1.231	12.881	0.164	81.843	0.879	32.311	3.614
Ireland	11.305	1.104	8.450	0.414	10.905	0.570	16.794	3.331
Italy	9.693	0.371	14.649	0.188	7.370	0.279	7.285	0.867
Japan	8.468	0.128	5.995	0.043	9.800	0.104	9.303	0.309
Korea	31.659	0.755	16.686	0.137	37.977	0.364	41.080	2.598
Mexico	22.784	0.756	27.587	0.247	20.242	0.413	20.856	2.321
Malaysia	24.459	0.429	13.263	0.097	35.928	0.314	15.981	1.157
Netherlands	3.065	0.517	2.354	0.284	3.227	0.317	3.758	1.308
Norway	8.738	0.583	6.515	0.176	7.465	0.525	15.151	1.315
New Zealand	10.829	1.033	7.167	0.492	9.166	0.990	20.170	1.976
Philippines	24.179	0.846	20.932	0.347	24.772	0.525	27.844	2.340
Portugal	9.177	0.879	11.217	0.951	7.230	0.380	10.545	1.900
Sweden	10.758	0.821	7.215	0.145	6.420	0.291	26.045	3.011
Singapore	11.441	0.285	7.051	0.159	12.869	0.170	15.005	0.740
Thailand	30.004	0.398	20.973	0.221	37.916	0.275	25.648	0.954
Taiwan	27.063	1.683	21.074	0.119	19.295	0.771	54.026	6.170
US	1.112	0.062	1.437	0.024	1.010	0.048	0.848	0.152
Venezuela	39.816	1.041	45.353	0.239	43.074	0.732	23.969	2.983
South Africa	9.738	0.636	9.470	0.231	9.836	0.408	10.102	1.713

Mean	**15.181**	**0.791**	**13.593**	**0.262**	**15.449**	**0.432**	**17.075**	**2.398**
Median	**10.248**	**0.666**	**7.833**	**0.206**	**9.483**	**0.387**	**13.117**	**1.525**

PANEL B

	Whole period Jan 1992- Dec 2001		**Sub 1** Jan 1992-Mar 1995		**Sub 2** Apr 1995-Nov 1999		**Sub 3** Dec 1999-Dec 2001	
Industry	pure ind. effect	cum. ctry effects	pure ind. effect	cum. ctry effects	pure ind. effect	cum. ctry effects	pure ind. effect	cum. ctry effects
advertising	12.387	0.358	6.713	0.531	11.645	0.314	22.816	0.190
airline	8.153	0.206	3.270	0.187	7.630	0.126	17.007	0.416
aerospace	4.926	0.547	2.199	0.807	5.080	0.424	8.593	0.423
auto part/equip (T)	3.626	1.242	1.393	1.051	4.203	1.478	5.743	1.019
auto manufact (T)	4.894	1.132	2.389	0.473	4.220	1.113	10.347	2.190
buldg material	2.246	0.368	1.277	0.244	1.664	0.363	4.888	0.577
banks	2.894	0.348	2.168	0.693	1.816	0.178	6.454	0.198
broadcasting	4.429	0.496	2.317	0.920	3.921	0.350	8.794	0.170
biotechnology	9.464	0.791	5.085	1.024	5.289	0.715	25.477	0.613
beverage	6.207	0.207	1.983	0.326	4.815	0.170	15.956	0.107
chemical (T)	3.170	0.120	0.841	0.044	2.142	0.090	9.014	0.301
communi. Tech	12.326	0.316	2.177	0.174	9.415	0.119	33.856	0.955
heavy constructn	4.036	1.492	4.325	1.459	3.402	1.314	4.834	1.950
cosmetics (T)	5.790	0.180	1.507	0.135	4.575	0.165	15.194	0.283
consumer service	12.964	0.280	3.526	0.349	13.507	0.243	26.280	0.258
container/packaging	3.833	0.134	1.154	0.133	3.813	0.096	7.950	0.220
wireless communi.	7.421	0.528	3.243	0.107	6.752	0.689	15.365	0.796
pharmaceutical (T)	5.684	0.200	3.153	0.223	3.552	0.203	14.361	0.157
elect.utilities	4.703	0.113	1.417	0.136	4.449	0.121	10.232	0.063
elect.compo.(T)	4.156	1.668	2.110	1.414	2.438	1.677	11.247	2.029
energy(T)	5.935	0.326	2.699	0.515	5.134	0.248	12.760	0.212
leisure gds/serv.	1.855	0.411	1.111	0.313	1.267	0.433	4.337	0.508
food produ.(T)	4.523	0.165	1.196	0.121	2.355	0.170	14.606	0.223
divers.financial	3.123	0.178	1.313	0.371	3.471	0.067	5.153	0.135
food (T)	3.614	0.162	1.098	0.119	2.145	0.154	10.699	0.246
forest prodts.(T)	6.525	0.345	3.214	0.169	6.675	0.184	11.257	0.981
fxdline communi.	4.432	0.436	2.343	0.829	3.110	0.264	10.543	0.222
gas utilities	5.533	0.305	1.421	0.177	3.437	0.287	16.686	0.539
health providers	9.058	0.650	8.189	0.953	6.108	0.558	16.098	0.392
home construc.	3.205	0.667	2.375	1.019	2.178	0.521	6.545	0.453
household prodts.	7.119	0.727	2.036	0.903	4.321	0.713	21.377	0.493
divers. Industrial	2.169	0.148	0.899	0.128	1.298	0.114	6.119	0.249
indust. Equip	2.726	1.314	2.259	1.814	2.567	0.988	3.800	1.276

insurance	2.486	0.304	0.917	0.381	1.139	0.243	7.897	0.323
adv.industry equip.	7.492	1.474	1.784	0.510	1.872	1.419	29.020	3.007
mining/metals (T)	3.942	0.458	1.645	0.354	3.300	0.411	8.765	0.732
entertainment	7.943	0.380	2.791	0.323	5.689	0.256	21.080	0.745
medical prodts	3.896	0.485	3.645	0.692	2.259	0.396	7.780	0.367
publishing	1.883	0.499	0.868	0.752	1.323	0.348	4.691	0.454
real estate	2.658	1.369	1.735	1.973	2.040	1.165	5.282	0.893
retailers	3.438	0.107	1.538	0.145	2.768	0.069	7.897	0.136
invest.services	11.221	0.870	8.358	1.674	12.039	0.550	14.013	0.345
semiconductors (T)	21.906	0.328	9.974	0.234	21.463	0.332	41.666	0.466
software(T)	12.270	0.562	7.493	0.740	9.341	0.524	26.271	0.373
indust.services	1.449	0.097	0.433	0.096	1.216	0.103	3.565	0.089
textile/apparel(T)	2.627	0.522	1.095	0.534	2.175	0.472	5.924	0.617
tech prodts (T)	8.387	0.264	3.152	0.167	8.636	0.270	15.932	0.402
tobacco (T)	14.106	0.428	9.162	0.929	13.388	0.207	22.874	0.157
indust.transport	2.150	1.080	1.066	0.707	1.693	1.245	4.612	1.291
water utilities	6.598	1.924	4.033	1.676	4.243	1.496	15.958	3.295
Mean	**5.952**	**0.554**	**2.842**	**0.595**	**4.860**	**0.483**	**13.152**	**0.651**
Median	**4.613**	**0.395**	**2.173**	**0.427**	**3.682**	**0.323**	**10.621**	**0.409**

Table 4 Geographical country effects vs. industry effects

(Variance: %-squared)

A. Regional country effects vs. industry effects

	Europe		Asia		Latin America		North America		Global Industry	
	ctry effect	cum.ind effects	ctry effect	cum.ind effects	ctry effect	cum.ind effects	ctry effect	cum.ind effects	ind. effect	cum.ctry effects
Whole period (1/92-12/01)	8.842	0.893	21.251	0.701	31.263	0.984	3.067	0.157	5.952	0.554
Sub 1 (1/92-3/95)	7.727	0.319	12.991	0.200	45.375	0.316	2.334	0.059	2.842	0.595
Sub 2 (4/95-11/99)	7.420	0.376	25.870	0.459	27.065	0.754	1.943	0.102	4.860	0.483
Sub 3 (12/99-12/01)	13.783	2.921	23.722	2.008	18.880	2.536	6.733	0.430	13.152	0.651

B. Country effects of developed and emerging markets vs. industry effects

	Developed		Emerging		Global Industry	
	ctry effect	cum.ind effects	ctry effect	cum.ind effects	ind. effect	cum.ctry effects
Whole period (1/92-12/01)	8.472	0.736	29.21	0.890	5.952	0.554
Sub 1 (1/92-3/95)	7.190	0.247	26.98	0.291	2.842	0.595
Sub 2 (4/95-11/99)	7.367	0.346	32.35	0.589	4.860	0.483
Sub 3 (12/99-12/01)	12.959	2.351	25.68	2.486	13.152	0.651

Table 5 Estimation of industry effects for traded and non-traded goods industries

"Mean(median)" is calculated by taking the average (median) of the cumulative country effects, pure industry effects across all industries separately for traded and non-traded goods industries. "Average variance" is estimated by pooling the time series of all cumulative country or pure industry effects across the industries in that subset and estimating the variance separately for non-traded and traded goods industries. The F-statistics is computed for the ratio of the variances across groups separately for the cumulative sum of country effects and pure industry effects and tests for the equality of variances between non-traded and traded goods industries

		Mean(median)		Average variance		F-statistics
		Non-traded goods	Traded goods	Non-traded goods	Traded goods	(p-value)
Full sample	pure ind. effect	5.430(4.429)	7.169(5.684)	5.428	7.174	0.76(.000)
	cum ctry effects	0.565(0.411)	0.529(0.345)	0.567	0.532	1.07(.000)
Sub1	pure ind. effect	2.602(2.168)	2.935(2.168)	2.599	3.411	0.76(.000)
	cum ctry effects	0.647(0.510)	0.474(0.354)	0.644	0.472	1.36(.000)
Sub2	pure ind. effect	4.268(3.437)	4.623(3.437)	4.297	6.271	0.69(.000)
	cum ctry effects	0.475(0.348)	0.503(0.270)	0.479	0.506	1.98(.000)
Sub3	pure ind. effect	12.333(8.794)	12.909(11.257)	12.298	14.976	0.82(.000)
	cum ctry effects	0.640(0.416)	0.676(0.402)	0.642	0.682	0.94(.000)

MADs Estimation (Figure 1-7)

Figure 1 Cap-weighted MADs for the globe, 1992-2001

(52-week moving average)

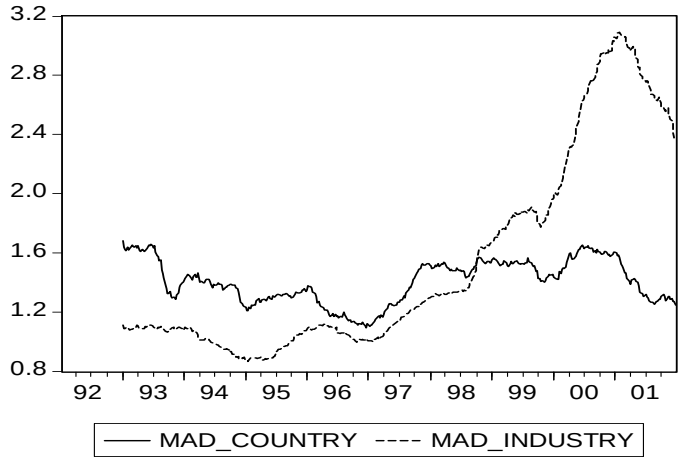


Figure 2 Cap-weighted MADs for Europe, 1992-2001

(52-week moving average)

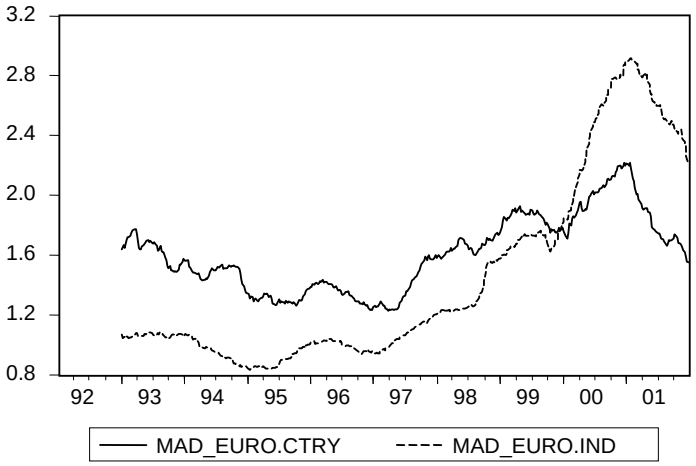


Figure 3 Cap-weighted MADs for Asia Pacific, 1992-2001

(52-week moving average)

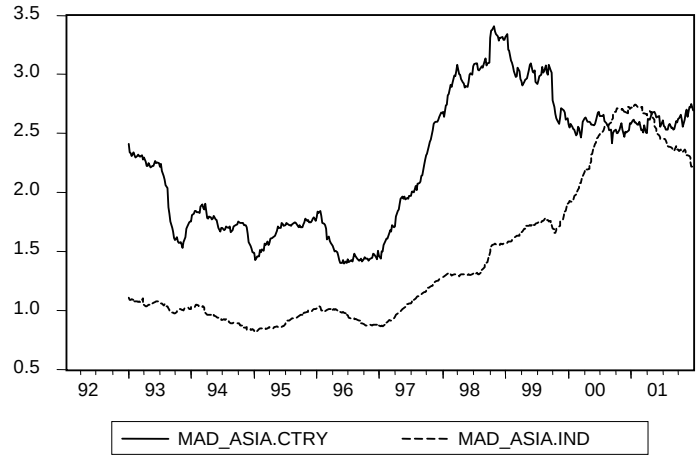


Figure 4 Cap-weighted MADs for Latin America, 1992-2001

(52-week moving average)

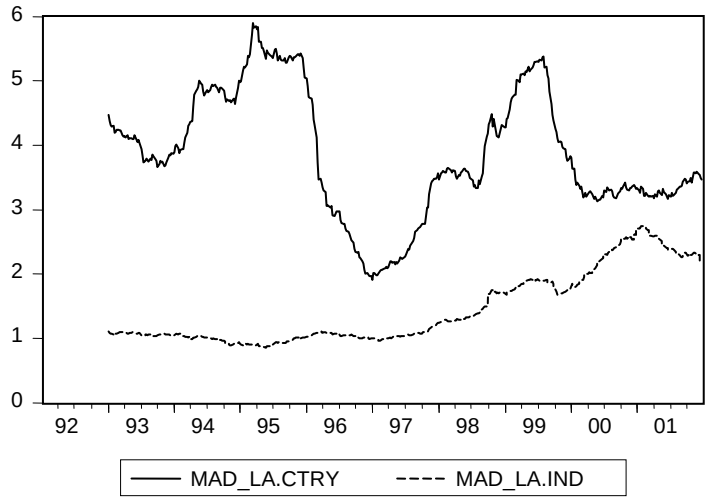


Figure 5 Cap-weighted MADs for North America, 1992-2001

(52-week moving average)

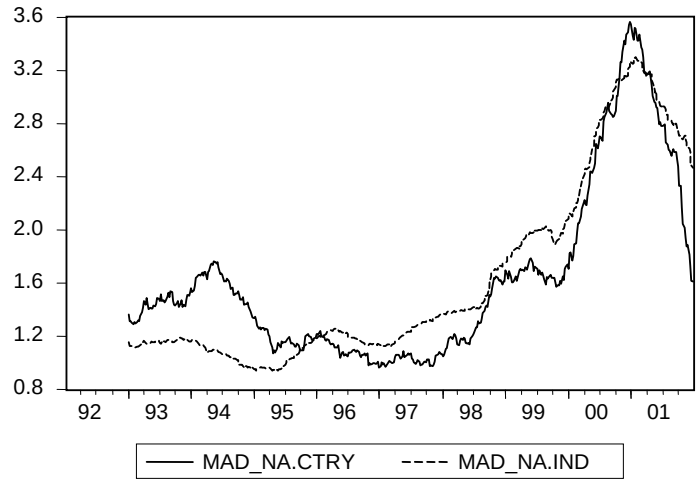


Figure 6 Cap-weighted MADs for developed markets, 1992-2001

(52-week moving average)

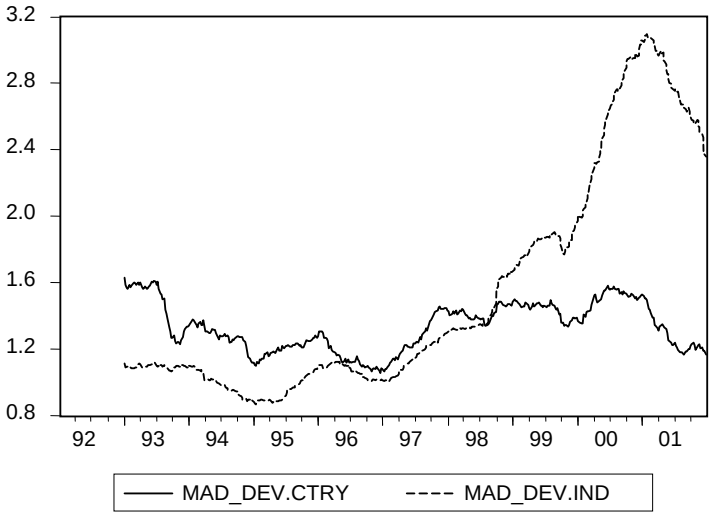
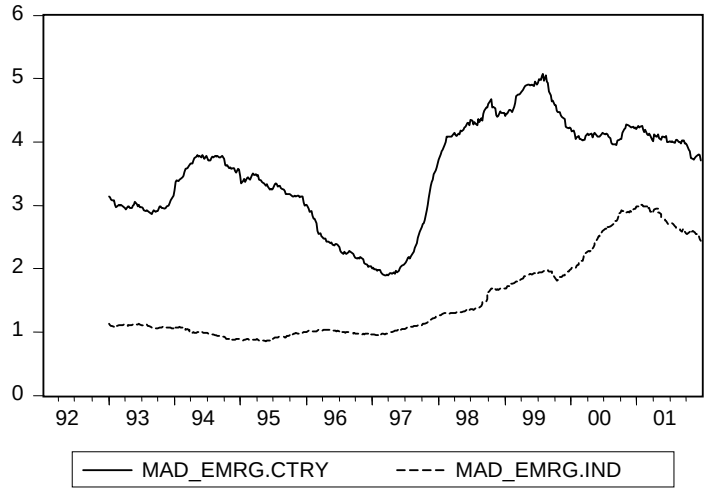


Figure 7 Cap-weighted MADs for emerging markets, 1992-2001

(52-week moving average)



[1] The emerging markets in our sample were: Brazil, Chile, Mexico, Venezuela, South Korea, Taiwan, Philippines, South Africa, Malaysia, Indonesia and Thailand.

[2] The industry data are downloaded from Dow Jones website, http://www.djindexes.com. Dow Jones indexes classify the industries into 51 industry groups. In our sample, one industry group, the technology services, is not available during the time period examined.

[3] Those industries also include biotechnology industry.